ALLEGHENIES

BROADBAND

Alleghenies Broadband Inc., Pennsylvania

Development of Five Tower Sites—

Bakers Summit, Buck Falls, Chaneysville, Dutch Corner, and Hopewell

February 12, 2026

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1. GENERAL GUIDELINES

1.1. Introduction

The purpose of this Request for Proposals (RFP) is to solicit responses from qualified firms or teams to complete the construction of five (5) broadband tower sites within Bedford County, Pennsylvania. Alleghenies Broadband, Inc. (ABI) is seeking information regarding the products, services, experience, and qualifications of interested respondents as they relate to this project.

Bedford County is committed to ensuring that all residents and businesses have access to reliable, high-speed internet service. In support of this goal, Bedford County partnered with Huntingdon County, Fulton County, ABI, Upward Broadband, and Crowsnest Broadband to secure a $20,463,175 grant from the National Telecommunications and Information Administration (NTIA). A portion of these funds will be used to construct five new telecommunication towers and install associated equipment to expand fixed wireless coverage across Bedford County.

To ensure the successful completion of this project, Mission Critical Partners® (MCP) has been selected to provide project management oversight. To support MCP's efforts, ABI is issuing this RFP to engage a qualified construction firm or team of firms. Respondents are asked to submit qualifications, rates, experience, and technical competence demonstrating their ability to manage and execute the construction of the five tower sites.

1.2. Response Information

A. **Closing Submission Date**: Responses must be submitted electronically no later than **4:00 PM Eastern on March 20, 2026.** It is the sole responsibility of the Respondent to ensure that ABI receives the response by the stated deadline. Late submissions will not be considered.

B. **RFP Questions/Clarifications**: All questions or requests for clarification must be submitted in writing to Dustin Bishop at dbishop@allegheniesbroadband.com no later than 12:00 PM (noon) Eastern on March 14, 2026. Responses to all submitted questions will be compiled and shared with all Respondents by 4:00 PM Eastern on March 16,2026.

C. **Submission Instructions:** Responses must be submitted in PDF format via email to Dustin Bishop at dbishop@allegheniesbroadband.com.

D. **Submissions Assistance**: For technical questions regarding the project or this RFP, contact Dustin Bishop at dbishop@allegheniesbroadband.com.

E. **Selection Date**: ABI anticipates selecting a firm or team of firms as early as **March 25, 2026**.

F. **Anticipated Project Start Date**: The project is expected to commence immediately following the selection and execution of a contract with the selected Respondent.

G. **Completion of Work**: ABI anticipates that all work will be completed within 9 to 12 months of the initial project kick-off meeting, which will be scheduled after the contract is awarded.

1.3. Who May Respond

Responses will be accepted from any qualified legal entity, including private corporations, cooperatives, or limited liability companies. Respondents are referred to individually as “Respondent” and collectively as “Respondents.”

1.4. Conditions of Response

All costs associated with preparing and submitting a response to this RFP are the responsibility of the Respondent and will not be reimbursed by ABI.

1.5. Bonds

A. Bid Bond: Respondents shall submit a bid bond in the amount of 5% of their proposed pricing, with their RFP response.

B. Performance Bond: The selected Respondent shall submit a 100% performance bond as part of the contract.

C. Payment Bond: The selected Respondent shall submit a 100% payment bond as part of the contract.

1.6. Right to Reject

ABI reserves the right to reject any and all responses received in connection with this RFP. A contract with the selected Respondent will be awarded based on the evaluation criteria described herein.

1.7. Notice of Decision

A decision determining the selected Respondent is expected as early as March 25, 2026. Once a contract is executed, all other Respondents will be notified in writing of the outcome and the name of the selected Respondent.

1.8. Non-Discrimination Provision

In selecting a contractor or team of contractors, ABI will not discriminate on the basis of gender, race, religious creed, color, disability, ancestry, or national origin. Furthermore, the selected contractor(s) and any representatives acting on their behalf shall not, on these bases, discriminate against any qualified United States (U.S.) citizen available to perform the work described in this RFP.

1.9. Prevailing Laws for Public Works

A. All applicable federal, state and local laws pertaining to a resulting contract are hereby made part of this specification. All site and construction work shall comply with Pennsylvania’s

prevailing wage regulations. The selected Respondent shall provide certified payroll reports attesting that all workers have been paid in accordance with the appropriate wage category listed in Appendix E.

B. Applicable Occupational Safety and Health Administration (OSHA) standards shall be followed.

C. The responsibility for direction and control of the work and materials shall rest with the selected Respondent's project manager. However, ABI shall retain the sole rights to interpret this document, and its decision on any such interpretation shall be final and binding.

1.10. Partial/Multiple Awards

A. While ABI desires the ability to award all aspects of this RFP to a single vendor, ABI reserves the right to make partial or multiple awards per site(s) that provide the best value and solution for ABI.

1.11. Weekly Communications

A. The selected respondent will be required to provide weekly communications, in written, verbal or both communicating the progress made the previous week and the planned activities for the coming week(s). Any delays will require additional clarifications as to the why.

2. PROJECT OVERVIEW

2.1. Project Intent

A. ABI is issuing this RFP for the construction and development of five broadband tower sites in Bedford County. This initiative is part of a broader broadband expansion project aimed at improving internet availability and reliability for residents and businesses across the county.

B. This construction effort will enable the installation of broadband and microwave systems, which will be provided and installed by Crowsnest Broadband LLC, the designated broadband service provider for these sites.

2.2. Project Summary

A. This bid covers full turnkey, greenfield site development for five new tower locations. The sites have been assigned identifiers by ABI and will be referenced as follows.

1. Bakers Summit – Kimmel Township (Site A)

   (a) Latitude 40° 12’ 24” N

   (b) Longitude 78° 28’2” W

2. Buck Falls – Bedford Township (Site B)

   (a) Latitude 39° 54’ 40.9304” N

   (b) Longitude 78° 33’ 48.9706” W

3. Chaneysville – Southampton Township (Site C)

   (a) Latitude 39° 48’ 52.0906” N

   (b) Longitude 78° 28’ 42.1253” W

4. Dutch Corner – Bedford Township (Site D)

   (a) Latitude 40° 06’ 43.7252 N

   (b) Longitude 78° 25’ 21.1806” W

5. Hopewell – Hopewell Township (Site E)

   (a) Latitude 40° 06’ 53.6378” N

   (b) Longitude 78° 20’ 24.5211” W

B. Survey drawings and geotechnical studies have been completed for all five sites, including geotechnical borings at the projected tower locations. These documents are provided in Appendix B.

C. Required Work: The specifications generally describe the work to be completed at each site, methods to be used, and materials to be furnished, including, but not limited to, the following:

1. Tower Construction: Furnish and install a new 180-foot, self-supporting tower at each site, including:

   (a) Subgrade development

   (b) Manufacturer-engineered tower foundation

   (c) Ice bridge and cable support ladder

   (d) Federal Aviation Administration (FAA)-required marking and lighting

   (e) Federal Communications Commission (FCC) tower registration (if applicable)

   (f) Lightning protection

   (g) *ANSI/TIA-607-E, Generic Telecommunications Bonding and Grounding for Customer Premises,* grounding compliance

   Note: Antenna, antenna mounts, and cabling will be supplied and installed by the broadband vendor.

   Note: All steel must be U.S.-manufactured (per funding requirements; no exceptions).

2. Compound Construction

   (a) Supply all materials and labor to build a 100-foot by 100-foot fenced compound at each site

   (b) Install electrical service from the utility provider to meter base

   (c) Install perimeter security fencing

3. Utility Power Installation

   (a) Coordinate with the utility provider to run power underground from the nearest demarcation point

   (b) Install two 3-inch conduits, one for power and one with innerducts for future telecommunication use

4. Access Road Development

(a) Complete and finish-grade access roads to each site

(b) Claycomb Excavating 814-329-1474 completed road path clearance for some of the sites. In full disclosure he is also the property owner of the Baker Summit site

5. Optional Pricing

(a) Supply and install a new 10-foot by 8-foot concrete equipment shelter (e.g., VFP Model 6500 or approved equal).

(b) Supply and install a new 15 kilovolt ampere (kVA) generator

D. All work must meet or exceed the requirements in this document, be ANSI/TIA-607-E compliant, and conform to all applicable federal, state, and local codes. The most stringent shall apply.

E. The selected Respondent must provide all specifications, plans, documents, and exhibits for approval by ABI's designated representative.

F. The selected Respondent will be responsible for obtaining and managing all necessary permits and inspections, at its own expense, to deliver a turnkey project.

G. Respondents must complete the compliance matrix included in Appendix C. Failure to address any item in the matrix may affect eligibility. Respondents taking exception to any requirement shall provide detailed justification explaining why they are exempt from, or unable to meet, that requirement.

H. Respondents must submit a separate schedule of values with their proposal.

3. TECHNICAL SPECIFICATIONS

3.1. Site Development

3.1.1. Site

A. The selected Respondent shall conduct a site walk at each site with ABI and their representative to identify any areas requiring special attention prior to beginning work.

   1. The selected Respondent shall document, by photograph, existing site conditions before beginning site development.

   2. The selected Respondent shall inform the ABI project manager or their designated person(s) of any existing spoils.

B. The selected Respondent shall perform a four-point (Wenner) method soil resistance test and provide a tower grounding system design that meets the bid specifications. The selected Respondent shall provide engineered construction designs for foundations and supply, deliver, and install the tower and accessory items.

C. Cleanup activity related to installation shall be the selected Respondent's responsibility.

D. The selected Respondent is responsible for the removal of concrete spoils generated from the tower project.

E. Onsite burning shall not be allowed anywhere on the properties.

F. The selected Respondent shall keep each project site neat and free from waste and debris. Daily cleanup shall be completed before leaving the site.

G. The selected Respondent shall perform site clearing and dispose of refuse in compliance with federal, state, and local codes and ordinances.

H. The selected Respondent shall clean equipment and devices internally and externally using methods and materials recommended by manufacturers, and repair damaged finishes.

3.1.2. Water and Drainage

I. The selected Respondent shall grade the soil around each tower area to ensure proper drainage and prevent water accumulation. Drainage shall not be directed toward any buildings or adjacent properties.

J. Grading and tower compound finishing shall be coordinated with the authority having jurisdiction (AHJ) to ensure compatibility with any existing or future site plans.

3.1.3. Site Preparation

A. Pre-Construction Planning

1. The selected Respondent shall provide final state-engineered, stamped construction drawings for ABI's review and comment prior to commencing system design. Appendix A indicates the locations for the tower and other structures. Locations require field verification with ABI's representative prior to approval.

2. The Respondent shall carefully examine and study existing conditions, potential difficulties, and utilities affecting execution of work. Later claims for additional compensation due to labor, equipment, or materials required as a result of difficulties encountered shall not be considered.

B. Erosion and Sediment Control

1. The selected Respondent shall implement erosion-control measures during the performance of work for the duration of the project.

2. The selected Respondent and its subcontractor(s) shall comply with Pennsylvania Department of Environmental Conservation and Pennsylvania State Soil and Water Conservation guidelines for erosion and sedimentation (E&S) control.

C. Site Clearing and Earthwork

1. The selected Respondent shall clear areas for permanent construction of trees, brush, roots, stumps, logs, wood, and debris per specifications. Subgrades for fills shall be stripped of vegetation, sod, topsoil, and organic matter.

2. The selected Respondent shall perform deep foundation excavation (e.g., guyed-tower anchors, tower, wooden telecommunications poles, and other foundations) as specified by engineered site and tower documents, removing to three feet below ground surface as required. The more stringent requirement shall apply.

3. Due to protected wildlife in the tower site areas, the following restrictions on tree removal are required to be followed:

    Bakers Summit – No tree removal between May 15 and August 15 annually
    Buck Falls – No tree removal between May 15 and August 15 annually
    Hopewell – No tree removal between April 1 and September 30 annually
    Dutch Corner – No tree removal between April 1 and November 15 annually
    Chaneysville – No restrictions

D. Utility Coordination

1. The selected Respondent shall bury electric utility medium-voltage from the utility demarcation point to within 50 to 100 feet of the compound.

2. The selected Respondent shall bury low-voltage in conduit and terminate at the electric meter board in the compound per the utility provider's requirements.

   (a) A single-phase 120/240-volt, 200-ampere (amp), electric service and meter socket is the minimum requirement.

   (b) The selected Respondent shall establish the neutral-to-ground bond for the shelter's service within the main disconnect after the meter base.

3. The selected Respondent shall not interrupt utilities serving neighboring residences unless permitted and approved by the AHJ, and then only after providing temporary utility service per requirements.

E. Protection of Existing Conditions

1. The selected Respondent shall protect and maintain benchmarks, monuments, property corners, and reference points, reestablishing them by registered professional surveyor if disturbed or destroyed, at no cost to ABI.

2. The selected Respondent shall locate and identify existing utilities to remain, protect them from damage, and reestablish if disturbed or destroyed, at no cost to ABI.

3. The selected Respondent shall install protective measures (fencing, tree trunk boxing) as required and approved by ABI or ABI's representative.

F. Access, Safety, and Traffic Control

1. The selected Respondent shall conduct operations with minimal interference to public/private access; maintain ingress and egress at all times; and sweep roadways daily or as required. At such times as deemed necessary by ABI, dust control shall be provided with water sprinkling systems or equipment provided by the selected Respondent or its subcontractor(s) as deemed necessary by the AHJ.

2. When appropriate, the selected Respondent shall provide traffic control per contract documents, the U.S. Department of Transportation's Manual of Uniform Traffic Control Devices, and the Pennsylvania State Department of Transportation. ABI and its representatives shall not be responsible for damages due to failure to protect utilities encountered in the work.

3.1.4. Access Roads

A. The selected Respondent shall provide a 10-foot-wide access road from the ABI-dedicated easement road to the fence gate at each new tower site.

B. The selected Respondent shall provide a stone base pathway, two feet wide minimally, around the compound fence.

C. Roadbeds and driveways shall be prepared, rolled, and provided with six inches of coarse aggregate base or as required by the submitted and approved state engineer's design. All sites shall be finished with asphalt millings and properly rolled to create a finished surface.

D. Roads shall be graded appropriately for proper drainage and minimal erosion.

3.1.5. Security Fencing

A. The specifications described below are minimal.

B. Fencing shall comply, at a minimum, with the building codes of each municipality and their fencing guidelines.

C. The fencing steel shall be U.S.-manufactured (per funding requirements; no exceptions).

D. The selected Respondent shall furnish material and install an 8-foot total height perimeter security chain-link fence at each tower site. The fence shall have consist of 7 feet of chain-link fencing topped with three rows of equally spaced deterrent wire, oriented at a 45-degree outward angle and 1 foot high.

E. The selected Respondent shall reference Unified Facilities Criteria (UFC) 4-022-03, *Security Fences and Gates*, for material and installation clarification.

F. Framework: Type I or Type II Steel Pipe

1. Type I: Schedule 40 steel pipe with 1.8 ounces of zinc coating per square foot of surface area, conforming to ASTM F1083, *Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures*.

2. Type II: Pipe manufactured from steel conforming to ASTM A1011, *Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength*.

   (a) External surface shall be triple coated per ASTM F1043, *Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework*.

   (b) Type II pipe shall resist 1,000 hours of exposure to salt spray with a maximum of 5% red rust, tested in accordance with ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*.

3. All coatings shall be applied to both the interior and exterior after welding.

4. Unless otherwise noted, Type II framework shall be provided.

5. Pipe shall be straight, true to section, and conform to the following weights:

Table 1: Type I and Type II Steel Pipe Specifications

Pipe Size Outside Diameter	Type I Weight Lb./Ft.	Type II Weight Lbs./ Ft.
$1^{5}/_{8}$"	2.27	1.84
2"	2.72	2.28
2½"	3.65	3.12
3"	5.79	4.64
3½"	7.58	5.71
4"	9.11	6.56
$6^{5/}_{8}$"	18.97	

G. Fabric

1. Aluminized fabric shall be manufactured in accordance with ASTM A491, *Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric*, and coated before weaving with a minimum of 0.4 ounces of aluminum per square foot of surface area.

   (a) The steel wire and coating shall conform to ASTM A817, *Standard Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire*.

   (b) Fabric shall be 9-gauge woven in a 2-inch diamond mesh.

   (c) The top selvage shall be twisted and barbed. The bottom selvage shall be knuckled.

2. Zinc-coated fabric shall be galvanized after weaving with a minimum of 1.2 ounces of zinc per square foot of surface area and conform to ASTM A392*, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric,* Class I.

   (a) Fabric shall be 9-gauge wire woven in a 2-inch diamond mesh.

   (b) The top selvage shall be twisted and barbed; the bottom selvage shall be knuckled.

3. The fabric shall be extended to within 2 inches of the firm, finished grade and anchored using a horizontal bottom rail.

H. Fence Post

Table 2: Fence Posts Specifications

Fence Posts Type I – II		
Fabric Height	**Line Post O.D.**	**Terminal Post O.D.**
Under 6’	2”	2½”
6’–9’	2½”	3”
9’–12’	3”	4”

I. Gate Post

Table 3: Gate Post Specifications

Gate Posts Type II		
Single-Gate Width	**Double-Gate Width**	**Post O.D.**
Up to 6’	Up to 12’	3”
7’–12’	13’–25’	4”

J. Rails

1. Rails shall be $1^{5}/_{8}$-inch outside diameter (O.D.).

K. Braces

1. Brace rails shall be $1^{5}/_{8}$-inch O.D.

2. Steel truss braces shall have a minimal nominal diameter of ⅜-inch with turnbuckle tensioners.

L. Tension Wires

1. Tension wires shall not be used in lieu of specified top and bottom rails.

2. When tension wires are permitted, they shall be interwoven within the fabric at the top and bottom, or the fabric may be attached with wire ties or hog nose rings.

M. Fabric Tension Bar

1. The bar shall be threaded through the last vertical link of fabric and attached to line, terminal, or gate posts by galvanized tension bands.

N. Fabric Ties

1. Ties shall be minimally 9-gauge steel.

2. The tie coating shall be electrolytically compatible with the fence fabric and other fence components.

3. When installed on tension wires, ties shall be installed by three full twists, at a minimum.

4. When hog nose rings are used on tension wires, they shall be 9-gauge steel, at a minimum.

O. Post Footings

1. The posts' minimum footing shall be as noted below or by manufacturer specifications. The more stringent shall apply.

2. No footing shall be less than four times the post diameter.

3. Gate post footings, per post diameter, are as follows:

   (a) For an 8-inch diameter post, install a 40-inch diameter footing

   (b) For a 6-inch diameter post, install a 36-inch diameter footing

   (c) For a 4-inch diameter post, install a 24-inch diameter footing

4. The depth of the footing shall be 42 inches, minimally.

   (a) The posts shall be suspended to a 36-inch post depth allowing a 6-inch footing pocket beneath.

5. The footings shall be filled with 4,000 pounds per square inch (psi) concrete, at a minimum.

P. Post Capping

1. Each post shall receive a top capping to inhibit collection of debris, weather, and insect migration.

2. The top capping may consist of, but not be limited to, top guard supports, top rail loop caps, or termination caps. The capping shall be secured welding.

Q. Fasteners, Clamps, Hardware, and Ties

1. Hot-dipped galvanized steel shall be used on aluminum and galvanized steel fence installation.

R. Top Guards (Outriggers)

1. Top guards will support three rows, at a minimum, of 12-gauge barbed wire equally spaced on the top guard. The top guard will increase the fence height by 1 foot, at a minimum.

S. Barbed Wire

1. Barbed wire consists of two wires twisted together forming a strand. Two- or four-point barbs are tightly wrapped and held in place at specified intervals; reference ASTM A121, *Standard Specification for Metallic-Coated Carbon Steel Barbed Wire*, and ASTM F1665, *Standard Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used with Chain-Link Fence*.

T. Drainage Ditches, Utility Openings, and Tunnels

1. Protective measures to inhibit unwanted access to the site at any ditch, opening, or tunnel greater than 96 square inches in area—with the smallest side being more than 6 inches—shall be properly secured.

U. Fence Installation

1. General: Fence installation shall conform to ASTM F567, *Standard Practice for Installation of Chain-Link Fence*.

2. Component Placement: Posts, rails, bracing, and tension wires shall be placed on the inside of the fence to inhibit tampering.

3. Height: Fence height shall be as indicated on contract drawings. The compound fence shall be 7 feet high, plus 1 foot for barbed wire, as indicated on compound drawings.

4. Post Spacing: Line posts shall be uniformly spaced between angle points at intervals not exceeding 10 feet.

5. Post Alignment: Posts shall be installed vertically within plus or minus 2 degrees in any direction.

6. Post Foundation: Foundations shall be per requirements in Section 3.1.5.O: Post Footings.

7. Bracing:

   (a) Gate, terminal, and end posts shall be braced back to adjacent line posts with horizontal brace rails and diagonal truss rods.

   (b) The rod shall extend from near ground level to within 6 inches of the fabric top of the adjacent post.

8. Top Rail:

    (a) Top rails shall be installed through the line post loop caps connecting sections with sleeves to form a continuous rail between terminal posts.

    (b) The connecting sleeves, with a 6-inch minimal length, shall allow for expansion and contraction of the rail.

    (c) A top rail with a 3-inch swage end is acceptable in lieu of a connecting sleeve.

9. Bottom Rail:

    (a) Fencing shall have a bottom rail instead of a tension wire.

    (b) Bottom rails shall be installed at 2 inches parallel to the ground in a way that will prevent even a small child from crawling underneath.

    (c) These rails shall further be installed so that the use of a pry bar will not allow them to bend for anyone to crawl under the fence.

    (d) The selected Respondent should contemplate pegging these rails to meet this requirement.

10. Fabric:

    (a) The fabric shall be pulled taut with the bottom selvage 2 inches above grade.

    (b) The fabric shall be fastened to the terminal posts with tension bars threaded through mesh and secured with tension bands at maximum 15-inch intervals.

    (c) The fabric shall be tied to the line posts and top rails with tie wires spaced at a maximum of 12 inches on posts and within 4 inches from the top and bottom of the post.

    (d) The fabric shall be tied to the rails on intervals of 24 inches maximum and within 4 inches from posts.

    (e) The fabric shall be attached to the bottom rail with top rings at maximum 24-inch intervals.

11. Top Guards:

    (a) Guards shall be permanently installed at an outward (i.e., away from the protected site) 45-degree angle on top of each fence line, terminal, and gate post.

    (b) The guards shall be attached with tamperproof screws or by welding.

    (c) They will support three rows of barbed wire, minimally.

(d) The guards shall be the same material as the fencing material, reference ASTM F626, *Standard Specification for Fence Fittings*.

12. Barbed Wire:

    (a) The barbs shall be, minimally, 4-point and spaced at 5 inches on centers.

    (b) Three rows of 12.5-gauge barbed wire, equally spaced, shall be installed on permanent post-mounted support arms, pulled taut and firmly installed in the slots of the line, terminal, and gate post support arms.

    (c) The wire shall be of the same material as the fencing material.

13. Drainage Ditches, Utility Openings, and Tunnels:

    (a) If the fence crosses a ditch or drainage swell, the method of securing the opening would be to install ⅜-inch diameter rods, electrolytically compatible with the fence material and with the environment, driven vertically 18 inches into the ground on 4-inch centers.

    (b) The rods will be woven through the fence fabric or affectively attached to the bottom rail to provide security for these areas.

3.1.6. Security Fence Gates

A. Security fence gates are designed for access control into a restricted zone. The design for gate installation must consider the following items, but not be limited to:

    1. Pedestrian traffic
    2. Traffic flow
    3. Types of vehicles entering the restricted zone
    4. Site operational security plan

B. Pedestrian and vehicular gates should be separated and clearly labeled.

C. Gates:

    1. Frame assembly of 2-inch O.D. pipe (Type I or Type II) with welded joints.

        (a) Weld areas shall be repaired with zinc-rich coating applied per manufacturer's directions.

    2. The fence fabric shall match the fence posts, gateposts, and gates.

    3. Gate accessories, hinges, latches, center stops, keepers, and necessary hardware shall be of a quality required for industrial and commercial application.

    4. The gate shall be secured by a locking latch that can accept a padlock provided by ABI.

5. The construction of the gate shall include reinforcing to prevent sagging or bending.

D. Vehicular Gate: A 12-foot double-swing gate shall be installed, per drawing location. Adjustments to the location may be made with approval from ABI or its representative.

1. The gate shall run parallel along the fence line upon opening.

2. The gate shall move freely and be installed plumb and level.

3. The gate shall open onto grade that is parallel to the gate bottom or at a slight downward grade.

4. When closed, the gate shall maintain a 2-inch or less distance from the bottom rail to the road or firm soil surface. The gate shall not drag, and ample distance shall be accounted for surface upheaval during seasonal freeze-thaw periods.

5. The gate shall be secured by a locking latch that can accept a padlock provided by ABI.

(a) This latch assembly shall include a pin-type mechanism that secures the gate by causing a pin to enter the top of the fence and a socket secured in concrete at the bottom.

6. When closed the gates shall be 3-inches or less apart.

3.1.7. Gate Operation

A. The vehicular double-swing gate shall be manually operated.

3.1.8. Security Fence Signage Requirements

A. The fence requires appropriate signage with respect to site address, authorization of admittance, security monitoring, RF hazard, and ABI contact information.

B. ABI will provide the proper wording for the required signage.

3.1.9. Site Finishing

A. The enclosed area of each tower compound shall be graded level and tamped, removing sod, large rocks, and other debris. A smooth, flat surface is required.

B. Vegetation stop and aggregate shall be applied to the entire compound area and 2 feet beyond the fencing.

1. Care shall be given to avoid damage to any underground cabling, grounding, or other infrastructure.

C. A water permeable, weed-blocking fabric shall be installed over the topsoil, extending at least 2 feet beyond the perimeter fence.

    (a) Aggregate shall be applied 6 inches in depth and consist of American Association of State Highway and Transportation Officials (AASHTO) #10 coarse aggregate.

    (b) The stone shall be raked level and evenly dispersed in the compound.

    (c) The stone shall be filled in beyond the outside of the perimeter fence for 2 feet or until it meets the roadway surface.

2. Pre-existing sub-course, and grassy areas that have been excavated, shall be returned to their original condition.

    (a) The sub-course shall be restored to meet erosion control and site drainage requirements.

    (b) Certified compaction testing is required.

3.1.10. Disposal

A. The selected Respondent shall remove surplus soil, unsuitable topsoil, obstructions, demolished materials, and waste materials (including trash and debris), and legally dispose of them off owner property.

B. The selected Respondent shall separate recyclable materials produced during site clearing from non-recyclable materials.

C. The selected Respondent shall store or stockpile recyclable materials separately to avoid intermixing with other materials.

D. The selected Respondent shall transport recyclable materials to appropriate recycling facilities.

3.1.11. Restoration

A. The selected Respondent shall re-establish original grades, unless otherwise indicated.

B. The selected Respondent shall restore surface features, including vegetation, at areas disturbed by the work of this section.

C. The selected Respondent shall restore areas disturbed by trenching, storing of dirt, and other activities to their original condition. This shall include application of topsoil, fertilizer, lime, seed, sod, sprig, and mulch, as required.

D. If sod has been removed, the selected Respondent shall replace it as soon as possible after backfilling is completed.

3.1.12. Area Perimeter and Signage Requirements

A. Coordination with ABI shall be required to finalize signage and perimeter marking requirements.

B. The tower sites require appropriate signage to indicate the presence of electromagnetic RF radiating equipment.

C. Signage shall be installed, as appropriate, to inform the public and professional personnel of area entry requirements.

D. The selected Respondent shall post applicable warning signs in accordance with ANSI/TIA-607-E guidelines, FCC, and Occupational Safety and Health Administration (OSHA) rules.

3.2. Foundations and Concrete

3.2.1. Foundation Design

A. The selected Respondent shall install a concrete foundation for the tower structure. The selected Respondent shall also install a concrete foundation for the equipment shelter and/or generator, if ABI exercises the option for either.

B. All detailed drawings of structures and foundations shall be sealed by a professional engineer (P.E.) registered in the Commonwealth of Pennsylvania and competent in civil and structural design. Submittal and seal shall attest that the design is in full compliance with the mechanical, structural, and electrical parameters established by these specifications.

C. After completion of the foundation and other construction below grade, and before backfilling, excavations shall be clean of vegetation, trash, debris, and inorganic materials.

D. Rebar used in any foundation shall meet the U.S.-manufactured steel requirement.

3.2.2. Tower Foundation

A. The tower manufacturer shall provide the tower foundation and structural design based on the geotechnical report from the soil survey in Appendix B.

B. The tower and foundation shall be designed to support initial attachments plus future attachments as identified by ABI or ABI’s representative for this project.

C. The foundation for the tower structure shall be constructed in accordance with the design and the manufacturer's specifications.

D. The tower support piers shall have their rebar electrically connected to the tower anchoring bolts.

1. All anchoring bolts and the rebar cage shall be electrically bonded.

2. These components shall be properly connected to the grounding electrode system.

E. Complete structural calculations shall include sufficient information to permit an independent engineer to thoroughly review the design of the proposed tower foundation.

3.2.3. Shelter Foundation

A. The foundation design for a prefabricated shelter shall be based upon site soil conditions.

1. The foundation shall be appropriate for the structure.

B. The foundation for the prefabricated shelter shall be in accordance with the manufacturer's specifications. (Prefabricated building manufacturers typically provide standard foundation specifications for their models.)

C. The foundation rebar shall be electrically connected to the ground electrode system, per this document, National Electrical Code® (NEC) (National Fire Protection Association [NFPA] 70), and/or as required by local building codes, as a concrete-encased ground electrode (Ufer ground).

3.2.4. Foundation Construction

A. Concrete forms of wood, metal centering, cores, molds, and similar materials shall be used as required for the proper execution of plain and reinforced concrete work. Sufficient quantities shall be used to properly execute and expedite work without endangering the safety or strength of any part of the construction.

B. Steel reinforcement shall be furnished and installed in accordance with the approved foundation drawing.

C. Concrete used in the foundation shall meet or exceed the tower manufacturer’s foundation design requirements.

D. If the selected Respondent, in the process of digging the foundation, finds a condition that makes use of the proposed foundation impossible, it shall do the following:

1. Notify ABI and their representative.

2. Provide drawings and specifications for a revised foundation as designed by the selected Respondent’s certified P.E. and provide a written quotation of the cost for the revised foundation.

3. Upon receipt of the notice, drawings, specifications, and price quote, ABI may:

(a) Determine through its professional engineering sources if the price quoted is reasonable.

(b) Issue a change order reflecting the increased cost to ABI and, once approved, authorize the selected Respondent to proceed with the work.

(c) If the quote is deemed unreasonable by ABI, the selected Respondent shall reconsider the price and seek competitive bids for the revised foundation using the provided drawings and specifications.

4. Any reasonable amount of time lost due to redesign and acquisition of the revised tower foundation shall not be charged against the allocated project completion time.

3.2.5. Concrete Test

A. Testing of composite samples of fresh concrete, obtained according to ASTM C172, *Standard Practice for Sampling Freshly Mixed Concrete*, shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cubic yards (cu. yd.), but less than 25 cu. yd., plus one set for each additional 50 cu. yd., or fraction thereof.

2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd., or fraction thereof, of each concrete mixture placed each day.

(a) If this frequency results in fewer than five compressive-strength tests for a concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C143/C143M, *Standard Test Method for Slump of Hydraulic-Cement Concrete*; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.

4. Air Content: ASTM C231/C231M, *Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method*; pressure method for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

5. Concrete Temperature: ASTM C1064/C1064M, *Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete*; one test hourly when air temperature is 40 degrees (°) Fahrenheit (F) and below and when 80° F and above, and one test for each composite sample.

6. Unit Weight: ASTM C567/C567M, *Standard Test Method for Determining Density of Structural Lightweight Concrete*; fresh unit weight of structural lightweight concrete; one

test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

7. Compression Test Specimens: ASTM C31/C31M, *Standard Practice for Making and Curing Concrete Test Specimens in the Field*:

   (a) Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample

   (b) Cast and field cure two sets of two standard cylinder specimens for each composite sample

8. Compressive-strength Tests: ASTM C39/C39M, *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*:

   (a) Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.

   (b) Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.

   (c) Compressive-strength test shall measure the average compressive strength from a set of two specimens obtained from the same composite sample and tested at the age indicated.

B. Compressive strength test results shall be made available to ABI, its representative, and engineer for review prior to the first concrete pour. Target compressive strength shall meet the requirements specified by the tower designer.

C. Prior to erecting steel or placing the shelter on the foundation, the selected Respondent shall provide ABI's representatives and engineer with a sample of each truckload of concrete that has been tested for compliance with foundation specifications. Written certification of strength shall accompany each test cylinder.

D. If any concrete used in the foundation does not meet specifications, the selected Respondent shall remove the noncompliant foundation and repour using materials that meet specifications, at no cost to ABI.

3.3. Communications Towers

3.3.1. Intent

A. The Respondent shall adhere to all applicable federal, state, and local building codes, as well as any County- or township-imposed standards, codes, or regulations.

B. The new towers shall meet the current ANSI/Telecommunications Industry Association (TIA) 222-H, *Structural Standard for Antenna Supporting Structures and Antennas and Small Wind*

Turbine Support Structures, Class III standard. Towers subject to structural analysis shall be considered Class III structures per ANSI/TIA 222.

C. Self-supporting structures shall, at a minimum, be designed and installed in accordance with the latest revision of ANSI/TIA-222, *Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures*, while meeting ABI's specifications in this document and attached drawings. In the event of conflicting requirements, those listed in this section shall take precedence for installation and construction. If these requirements cannot be met, the Respondent shall provide a written statement explaining why compliance is not possible.

D. The selected Respondent shall comply with all requirements and associated tasks specified herein. Adherence to ANSI/TIA-607-E shall apply to all aspects of the execution of this project.

3.3.2. Tower Structures

A. Tower requirements for each location shall be as follows: One 180-foot, self-supporting tower; Valmont V-Series or approved equal.

3.3.3. Construction

A. The Respondent shall confirm that each tower it is bidding is designed per ANSI/TIA-222, *Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures* (latest revision), in accordance with the height, style, and present and future loading specifications contained herein and with consideration of the anticipated soil as indicated above.

   1. Prior to commencing work, the selected Respondent shall provide ABI's representative complete detailed drawings of the structure and its foundation, including the certification and seal of a competent Pennsylvania-licensed P.E. confirming compliance with all mechanical, structural, and electrical parameters in these specifications.

B. Each tower shall be designed to support an additional 50% of the proposed current loading to account for future loading.

C. The selected Respondent shall provide drawings for the structure and foundation for ABI's review and approval prior to manufacture.

D. All drawings and certifications shall bear the seal of a Pennsylvania-licensed P.E.

E. A Pennsylvania-licensed P.E. shall certify that the tower and foundation meet or exceed all applicable requirements.

F. The geotechnical reports in Appendix B may be referenced for foundation design. If the report is inconclusive, the Respondent shall assume rocky soil (mountaintop conditions) suitable for excavation with a moderately sized excavator when designing the foundation.

G. The tower safety factor shall meet ANSI/TIA-222, *Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures* (latest revision).

H. The structure shall maintain microwave stability within allowable signal degradation limits per ANSI/TIA-222-H, Annex D, *Twist and Sway Deformation Limitations for Microwave Antennas*.

I. Tower steel shall meet the U.S.-manufactured steel requirement.

J. Towers and components shall be fabricated from solid steel protected by hot-dip galvanizing or other approved anti-rust methods.

K. Sections shall be connected using flange plates.

L. Welding shall be done in the factory prior to galvanizing. Field welding is not acceptable.

M. Prior to erecting steel on the foundation, the selected Respondent shall provide ABI's representative with a sample from each truckload of concrete that has been tested by an independent certified lab for compliance with foundation specifications. Written reports certifying compressive strength shall accompany each set of test cylinders.

    1. Tests shall be conducted, at a minimum, at 7 days and 28 days after the foundation is poured to confirm compliance with foundation design requirements.

N. If any concrete used in the foundation does not meet specifications, the selected Respondent shall remove and replace the foundation at no cost to ABI.

O. If, during excavation, the selected Respondent discovers conditions that make use of the proposed foundation impossible, it shall:

    1. Notify ABI and its representative.

    2. Provide drawings and specifications for a revised foundation designed by the selected Respondent's P.E., along with a written quotation.

    3. Upon receipt, ABI may:

        (a) Determine whether the price quoted is reasonable through its engineering sources.

        (b) Issue a change order and, once approved, authorize the selected Respondent to proceed.

        (c) If the quote is deemed unreasonable, require the selected Respondent to reconsider and obtain competitive bids for the revised foundation using the P.E.-stamped design.

    4. Any reasonable time lost due to redesign and acquisition of a revised tower foundation shall not count against the overall project completion schedule.

P. The selected Respondent shall be responsible for required signage at the sites.

Q. Signage shall meet ANSI/TIA-607-E minimum requirements and owner specifications.

3.3.4. Foundation

A. Foundation design shall be provided by the tower manufacturer based on the supplied borings and any other required site information.

B. Foundation design for towers and other equipment shall be based on site soil conditions as noted in the geotechnical reports.

C. The foundation shall be appropriate for the structure.

D. Each tower and foundation shall be designed to support proposed attachments as identified by ABI's representative for this project.

E. Complete structural calculations shall include sufficient detail to allow independent engineering review of the proposed tower foundation design.

F. The selected Respondent shall install the concrete foundation for each tower structure.

G. The foundation for a tower structure shall be constructed in accordance with the design and the manufacturer's specifications.

H. Concrete forms (wood, metal centering, cores, molds, etc.) shall be used as required for proper execution of plain and reinforced concrete work, in sufficient quantities to expedite work without compromising safety or structural integrity.

I. Steel reinforcement shall be furnished and installed in accordance with the approved foundation drawings.

J. After completion of the foundation and other below-grade construction, and before backfilling, excavations shall be cleared of vegetation, trash, debris, and inorganic materials.

K. Concrete used in the foundation shall meet or exceed the tower manufacturer's foundation design requirements.

L. Compressive-strength requirements (per tower manufacturer) shall be provided to ABI, its representative, and engineer for review prior to the first concrete pour. Unless otherwise specified, target compressive strength shall be reached within 28 days.

M. Prior to erecting steel on the foundation, the selected Respondent shall provide ABI's representative and engineer with test results for each truckload of concrete used, including strength, slump, and other relevant data. Written reports and test cylinders shall accompany all results.

N. The selected Respondent shall engage, at its expense, an ABI-approved third-party testing agency to verify that soils, reinforcement, and concrete pours meet the tower manufacturer's engineered design.

O. If any concrete used in the foundation does not meet specifications, the selected Respondent shall remove and replace the foundation with compliant materials at no cost to ABI.

3.3.5. Tower Design and Loading

A. Each tower structure and supporting concrete foundations shall be designed and manufactured in accordance with these specifications and ANSI/TIA-222-H, *Structural Standards for Steel Antenna Towers and Antenna Supporting Structures* (latest revision), and be designed as a Class III structure.

B. Each tower and tower foundation shall be designed to support two broadband carriers and two commercial cellular carriers.

3.3.6. Design Calculations and Drawings

A. Drawings, certifications, and design calculations shall be prepared and sealed by a P.E. licensed and registered in the Commonwealth of Pennsylvania.

B. The selected Respondent shall submit structural calculations for each tower and foundation, along with erection drawings for the selected bid. Structural calculations shall include sufficient information to permit independent engineering review of the designs.

C. Drawings must include tower name and height; manufacturer's name and model number; elevation and plan views showing tower orientation, tower height and antenna azimuth; and section assembly information including tower members, part numbers, accessories, and appurtenances.

3.3.7. Wind and Ice Load Design

A. Each tower shall be designed and installed to the maximum loading conditions from ANSI-EIA/TIA-222-H, *Structural Standard for Antenna Supporting Structures and Antennas and Small Wind Turbine Support Structures*, for a Class III structure.

3.3.8. Antenna Load

A. The selected Respondent shall account for antenna side arms, standoffs, and mounting hardware to support equipment for two broadband companies and two cellular companies in the tower design.

B. Brackets used for design purposes shall be the appropriate standoff type based on frequency requirements.

C. The actual mounting devices will be provided by the broadband vendor and will not be the responsibility of the selected Respondent.

D. Climbing Access

1. A ladder beginning at a point at least 30 feet above ground shall be included as an integral part of the tower to allow access by authorized personnel.

2. The ladder shall rise in a straight vertical line from base to top; combination of angled and vertical ladder sections are not acceptable.

3. The ladder shall be equipped with an OSHA-approved anti-fall safety device.

   (a) The safety device shall not interfere with the climber's hand or foot movement when ascending or descending.

4. A portable ladder section shall be included to provide access to the permanent ladder. It shall be designed and constructed to be securely held to the tower and firmly supported at the bottom when in use. Clamps, hooks, or similar devices may be used to secure the ladder in a vertical position.

5. Alternatively, Respondents may propose a permanently installed climbing ladder extending to ground level, provided it includes a locked climbing access cage.

E. Cable Ladder

1. The transmission line shall be anchored to the tower using hardware recommended by the transmission line manufacturer.

2. Transmission lines shall not be installed in a manner that impedes climbing or safety devices.

3. Transmission line installation shall be planned to accommodate future expansion.

4. Anchoring hardware spacing shall not exceed 3-foot intervals unless the RF cable manufacturer specifies closer spacing. The cable ladder width shall accommodate planned RF cabling plus 50% growth capacity.

3.3.9. Labeling and Identification

A. Labeling shall be weatherproof and durable, such as a stamped metal plate or equivalent. Labels may be attached to a tower leg or cross brace.

B. Make, model, and serial numbers shall be clearly labeled near the base of each tower.

C. Tower height, in feet, shall be clearly labeled near the base of each tower.

D. Latitude and longitude (in degrees/minutes/seconds) shall be clearly labeled near the base of each tower.

E. FAA and FCC identification numbers, if applicable, shall be clearly labeled near the base of each tower.

F. Panels, cables, and connectors shall be clearly identified by number and function for all equipment and demarcations.

3.3.10. Tower Grounding

A. The selected Respondent shall provide all materials and labor required to ground each tower as specified in Section 3,6, Grounding, within this document.

B. If the tower foundation extends into the area designated in Appendix A for the ground system, the selected Respondent shall adjust the grounding and fencing as needed to maintain the specified spacing. Any additional materials and labor required for this adjustment shall be the responsibility of the selected Respondent.

3.3.11. Ice Bridge

A. The selected Respondent shall install an ice bridge and cable support system so that an underground conduit system is not used between the tower and the shelter.

B. The ice bridge and cable ladders shall be installed between the cable conduit exit point and the shelter entry port.

C. The ice bridge shall be built in accordance with industry standards using hot-dipped galvanized construction.

D. The ice bridge shall be installed to span the entire distance between the tower and the shelter entry port.

E. The selected Respondent shall provide the materials, installation, and grounding of the ice bridge structures.

F. The ice bridge grounding shall comply with Section 3.6, Grounding, of this document.

G. The ice bridge width shall provide protection for RF cables per the width of the cable entry port.

H. The ice bridge shall be installed to allow for proper RF cable support for entry into the top ports of the entry port.

I. A trapeze system shall be installed to allow for three levels of cable attachment beneath the ice bridge.

3.3.12. Tower Lightning Protection System

A. Air terminals (lightning rods) shall be installed on each tower in compliance with NFPA 780, *Standard for the Installation of Lightning Protection Systems,* UL standards, and this document. The more stringent requirement shall apply.

   1. Air terminals shall be compatible with the tower structure. Stainless steel rods are preferred and shall have a minimum Class 2 rating.

   2. Air terminals shall be directly attached to the tower legs using manufacturer-approved attachment methods.

   3. When air-terminal extension rods are used, a properly sized and material-compatible down lead shall be installed and attached securely to the top extreme of the leg.

   4. Copper or copper-alloy air terminals, conductors, or attachment hardware shall not be used on galvanized towers. Stainless steel is recommended. Tinned copper and aluminum are acceptable alternatives.

   5. Any obstruction (e.g., side marker lights and antennas) mounted above 150 feet shall be protected by properly installed horizontal air terminals. Two terminals shall be mounted at the vertex to cover the obstruction width, one directly above and one directly below the obstruction. Terminals shall extend a minimum of 10 inches beyond the obstruction.

3.3.13. Tower Finishing

A. The enclosed area of each tower compound shall be graded level and tamped, with sod and large rocks removed.

   1. Backfilled soil shall also be graded level and tamped.

   2. Care shall be taken to avoid damaging underground cabling, grounding, or other infrastructure.

B. Sod, large rocks, and other debris shall be removed.

C. A water-permeable, weed-blocking fabric shall be applied to the compound prior to stone installation.

D. The site shall be finished with the application of 2B stone at a minimum depth of 6 inches throughout the entire compound.

   1. The stone shall be raked level and evenly dispersed in the compound.

   2. Stone shall extend 2 feet beyond the perimeter fence or until it meets the roadway surface.

E. Pre-existing asphalt, concrete, sub-course, and grassy areas that have been excavated shall be returned to their original condition.

F. The sub-course shall be restored to meet site plan requirements, and certified compaction testing shall be provided.

3.3.14. Tower Climbing and Installation Safety Practices

A. Because each tower installation requires working at heights, ABI is very concerned that all work be done in a safe manner.

B. The Respondent must submit, as part of its response, its written environmental safety and health program, which it agrees to follow.

C. The Respondents must submit a copy of its written drug and alcohol policy, including information on what drug and alcohol testing policies are currently used by the Respondent.

D. All tower climbers and their supervisors must have completed an OSHA-approved tower climbing safety and rescue course (e.g., ComTrain or Tractel) within the last five years. At least one person must have completed the course within the last year to ensure training is up to date. The Respondent must submit certification cards for its personnel with its response.

E. When performing work on an antenna support structure or near any RF emitters, the selected Respondent must comply with FCC OET[1] Bulletin 65, Edition 97-01 (including Supplement A), *Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields*. The Respondent must show proof of RF exposure training for all personnel who may be exposed, including course descriptions or other details , and list the names of those trained.

    1. The proposal must include the model number and serial numbers of at least two personal RF safety monitors.

    2. The selected Respondent shall be solely and completely responsible for RF exposure compliance, safety, and supervision of all engaged personnel.

F. An industry-standard rescue bag must be ready at the tower site whenever a climber is working. The bag must include a 400-foot, properly rated rescue rope, an appropriate safety pulley system, and all equipment needed to safely lower an injured worker. The Respondent must supply evidence that it owns at least one such kit.

G. All climbers must always wear a full-body safety harness with an approved shock-absorbing safety lanyard attached to the D-ring at the top of the back. Each climber must be issued, equipped, and use fall-protection equipment that must ensure a 100% tie-off while climbing.

[1] Office of Engineering and Technology.

All fall-protection equipment must meet ANSI/OSHA standards and is subject to inspection by ABI or its representatives.

H. At least two certified, competent tower climbers must be on site whenever work is being performed above ground level. All personnel working on or near the tower must wear hard hats.

I. A pre-climb safety meeting shall be conducted prior to each climb. A log of meetings must be kept and made available for ABI's review.

J. All standard, best safety practices must be followed at all times. The selected Respondent is solely responsible for the safety and supervision of its employees and any subcontractors.

K. ABI reserves the right to perform unannounced safety inspections at any time. ABI may inform the selected Respondent of unsafe procedures, equipment, or conditions, and may halt work until corrections are made. No additional charges may be billed to ABI for work stoppage due to safety concerns.

3.3.15. Field Quality Control

A. Installation Monitoring and Reporting

1. ABI shall be permitted to monitor any activity associated with the implementation of each tower site development.

B. Inspection

1. During the course of the project, the selected Respondent shall maintain an adequate inspection system and perform inspections to ensure that materials supplied and work performed conform to contract requirements.

C. Pre-Final Testing

1. The entire site development, as well as all components, shall be thoroughly tested and documented before being placed in service.

2. The selected Respondent shall submit test plans for each component and the overall systems.

   (a) Sample test plans shall be submitted as part of the response.

   (b) Detailed, final test plans shall be submitted and approved after completion of final system design.

3. The intent of this requirement is to ensure that test plans fully exercise and document functionality and performance, and any additional proposed features or enhancements.

D. Reports

1. The selected Respondent shall provide written reports of tests and observations for ABI's analysis.

2. The selected Respondent shall provide printed test result documentation directly from the test equipment used, indicating that all testing was completed and that all irregularities were corrected and retested before installation acceptance.

   (a) Records of defective materials, workmanship, and unsatisfactory test results shall be provided for ABI's analysis.

   (b) Records of repairs and adjustments shall also be provided for ABI's analysis.

3.4. Shelter (Optional)

3.4.1. Intent

A. The Respondent shall provide optional pricing for a new 8-foot by 10-foot (nominal) concrete shelter with exposed aggregate finish. A clear coat sealer shall be applied to the stone exterior providing ultraviolet (UV) protection (VFP Inc. or approved equal) at each site.

B. The exterior of the shelter and ancillary equipment shall be painted or constructed with materials rated to withstand the elements for a minimum of 15 years.

C. Shelter walls shall be insulated to at least R-11, and the ceiling shall be insulated to at least R-16.

D. The original equipment shelter manufacturer shall provide installation instructions to the selected Respondent.

E. The selected Respondent shall coordinate with ABI at least five calendar days prior to shipping dates, The selected respondent shall be responsible for off-loading the equipment shelter at the job site.

F. The selected Respondent shall be on site to accept delivery of the shelter and inspect it for any damage that may have occurred during shipping. The shelter shall include suitable attachment points for lifting and moving using overhead equipment such as cranes, boom trucks, or hoists.

G. The selected Respondent shall provide loading, transportation, and setting of the shelter on a new foundation.

H. ABI's representative and the selected Respondent shall conduct a walkthrough of the shelter to identify any electrical upgrade requirements. The selected Respondent shall complete identified electrical upgrades in accordance with an approved change order or addendum to the contract.

3.4.2. Climate Control

A. Heating and cooling equipment shall maintain an inside ambient temperature range between 65° F and 85° F.

B. HVAC:

1. Two exterior wall-mounted heating, ventilation, and air conditioning (HVAC) units shall be installed to provide N+1 redundancy.

2. Each HVAC shall be sized to provide 100% of the required cooling and heating capacity.

3. Each HVAC unit shall be sized to maintain interior shelter temperature at 70° F when outside temperatures are as high as 105° F.

4. Electric heat units shall be integrated into each HVAC system to provide a complete package unit.

5. A wall-mounted thermostat, part of the HVAC system, shall control operation with the following minimum setup:

   (a) The heater turns on at 65° F and off at 68° F.

   (b) The air conditioner turns on at 78° F and off at 75° F.

   (c) The controller shall be adjustable within a range of 45° F to 80° F.

   (d) The controller shall allow lead/lag unit setup with weekly automatic changeover.

   (e) The controller shall provide alarm outputs for unit failure, high/low temperature, and common trouble conditions (e.g., filter alerts). Alarm contact points shall be terminated at the shelter's alarm punch-down block.

6. A time-delay relay shall be included with the air conditioner to prevent compressor short-cycling. Initial delay time shall be set for five minutes.

C. An exhaust fan (as required) shall be provided, with damper-controlled exhaust vent, exterior rain hood, and security/insect screens.

D. Separate shelter high- and low-temperature switches shall be installed.

1. Switches shall be bi-metallic with normally closed (NC) and normally open (NO) contacts.

2. Contact closures shall be extended to the shelter's 66 punch-down alarm block and properly labeled (e.g., Dayton 1UHH2.Lighting).

E. All interior, exterior, and emergency lighting shall use LED technology.

F. Exterior lighting shall:

1. Adequately illuminate all shelter entry and exit points.

2. Support dusk to dawn, motion-control, and manual on/off operation.

3. Be powered by a separate, appropriately rated breaker.

4. Be National Electrical Manufacturers Association (NEMA) 3, heavy duty, and weather resistant.

G. Interior lighting shall provide a minimum of 500 lux (50-foot candles), measured per TIA-569-C, *Telecommunications Pathways and Spaces*.

H. Emergency lighting shall illuminate the interior and exterior egress paths of the shelter.

1. Emergency exit signs shall be installed over or pointing toward exit(s).

2. Emergency lights shall be UL-approved and meet OSHA; NFPA 101® (*Life Safety Code®)*; and all applicable federal, state, local, and AHJ life safety code requirements.

3.4.3. Floor

A. The shelter floor shall have vinyl composition tile (VCT) installed, cleaned, and sealed prior to turnover to ABI.

B. Any defects or irregularities noted in the flooring shall be promptly reported to ABI for review and resolution.

3.4.4. Door

A. The shelter door shall fully close and seal to prevent weather intrusion into the shelter.

3.4.5. Roof and Doorframe

A. The shelter roof shall be coated with a waterproofing membrane.

B. The doorframe and door shall be bonded per ANSI/TIA-607-E and this document. The more stringent requirement shall apply.

3.4.6. Locks, Finish, and Openings

A. Locks shall be constructed of non-corroding materials. All shelter locks shall be keyed alike, and four keys for each lock shall be provided to ABI.

B. The door hinges and hardware shall be functional and keyed to ABI’s specifications.

C. A key safe push-button style key box shall be securely mounted to the exterior of the shelter to house a shelter key. The selected Respondent shall coordinate with ABI for style and mounting location.

D. Air intake and exhaust openings shall be fitted with hoods to prevent the entrance of rain, snow, and other elements. Joints shall be sealed with compressible, resilient sealant.

3.4.7. Cable Trays

A. Cable trays shall be installed a minimum of 6 inches above the tops of planned 7.5-foot equipment racks.

B. A minimum of 12 inches of clearance shall be maintained between the cable tray and the ceiling.

C. Cable trays shall not be placed under sprinkler heads or smoke detectors.

D. Cable trays shall be bonded at connection points and connected to the internal interior grounding system.

E. Cable trays shall be a minimum of 18 inches wide and sized to accommodate all communications cabling with 50% growth capacity.

3.4.8. Safety Equipment

A. Safety equipment, meeting at minimum the requirements of ANSI/TIA-607-E and this document, shall be permanently installed inside the equipment shelter and shall include:

1. Fire Extinguisher – Electronic Equipment: A fully charged, wall-mounted, handheld auxiliary FE-36 or carbon dioxide (CO_2) fire extinguisher, minimum size 7–10 pounds (lbs.), clearly labeled for use on electronic equipment fires.

2. Fire – Extinguisher – Structural: A fully charged, wall-mounted, Class ABC fire extinguisher, minimum size 20 lbs., clearly labeled for general purpose structural fires only.

3. First Aid Kit: A kit meeting or exceeding ANSI Standard Z308.1, *Minimum Requirements for Workplace First Aid Kits and Supplies*.

4. Eyewash: A plumbed eyewash station or eyewash solution included within the first-aid kit.

3.4.9. Site Preparation

A. The selected Respondent shall prepare the site to accept an equipment shelter and ancillary equipment (e.g., generator, fuel tank, etc.) of appropriate size.

B. The selected Respondent shall place and install the shelter as described in this document.

C. The selected Respondent shall bond the shelter's single-point ground to the subterranean ground system in accordance with the requirements described in this document.

3.4.10. Antenna Cable Entry Ports

A. The entry port shall provide no fewer than 12 ports, each 4 inches in size, to allow for future expansion.

B. The entry port shall be specifically designed for cabling.

C. Entry of antenna transmission lines into the shelter shall use a commercially manufactured port assembly designed for this purpose.

D. All openings shall be properly booted to provide a weather-tight seal.

E. All unused cable ports shall be sealed with manufacturer-approved materials.

F. RF cable shield grounds shall be connected to the shelter's external ground bus bar (EGB) using tin-plated copper irreversible ground lugs and a non-oxidizing compound applied to prevent corrosion.

G. The entry port shall be grounded to the EGB on the outside of the shelter.

3.4.11. Manual Transfer Switch

A. A manual transfer switch (MTS) provides ABI with the ability to connect an optional portable generator to each shelter power system.

B. The MTS shall be installed by the selected Respondent as follows:

1. The MTS shall be a double-throw, double-pole type that breaks all non-grounded line conductors.

2. The MTS shall be installed inside the structure.

   (a) The MTS shall be installed per NFPA 1225, *Standard for Emergency Services Communications,* and shall be located on the load side of the ATS.

3. A quick-connect 200-amp Appleton Jack (or approved equal) shall be installed on the exterior wall of each shelter near the MTS to provide a quick means of connecting ABI's portable generator to the MTS emergency side.

4. Metallic enclosures for the MTS and jack shall be grounded in accordance with Section 3.6, Grounding, of this document.

3.5. Power Distribution and Utilities

3.5.1. Utilities

A. Electrical installations shall comply with NEC and the serving utility company's requirements. The more stringent requirement shall apply.

B. Utility power (alternating current [AC]) shall be extended to the compound from the nearest medium-voltage demarcation point through a pad-mounted transformer, with primary and secondary lines buried in conduit.

   1. The selected Respondent shall furnish all material, labor, and utility service provider costs to provide electrical service to the site.

C. All utility wiring shall be installed in conduit or ductwork. Where no specific protection method is specified, conduit shall be used.

D. The selected Respondent shall coordinate with ABI regarding the final terminations of electrical conduits and feeders from the pad-mounted transformer to each tower shelter's meter base.

   1. A meter base shall be installed at each shelter's exterior wall as designated by the utility.

E. The selected Respondent shall coordinate with ABI for the final termination of one empty 3-inch conduit with innerducts and pull string extending from the nearest telecommunications provider demarcation point to the shelter.

F. If the optional shelter is chosen by ABI, the selected Respondent shall supply each shelter with 200-amp, 120/240-volt, single-phase electrical service.

G. The following power distribution requirements shall apply to the equipment shelter (if chosen):

   1. The service shall be installed and energized at the shelter's main disconnect.

   2. Power shall be distributed from the electrical panel through raceways and conduits to the indicated fixtures and terminations.

      (a) For equipment and service receptacles, No. 12 American wire gauge (AWG) insulated copper conductors shall be installed in appropriately sized conduit.

      (b) Conduit shall be rigid metal conduit (RMC), intermediate metal conduit (IMC), or electrical metallic tubing (EMT) with wrench-tight fittings. Setscrew fittings are not allowed.

      (c) Each equipment unit or rack shall be supplied with two 20-amp circuits, each terminated at a typical NEMA L5-20 receptacle mounted near the cable tray (but not supported by the tray).

(d) Rack power distribution unit (PDUs) cords shall not be routed in or through cable trays. Proper separation of cable groups shall be maintained.

(e) Convenience receptacles shall be mounted on walls at intervals of 6 feet or less.

(f) One weatherproof ground fault interrupter (GFI) receptacle shall be provided on the exterior of the shelter near the air-conditioning units.

(g) Two 30-amp, double-pole, 240-volt circuits shall be run in RMC, IMC, or EMT with compression fittings along the shelter ceiling and terminated in a junction box above the future direct current (DC) power system location. Final DC location shall be confirmed during rack and equipment layout.

(h) Each branch breaker shall be identified at its corresponding receptacle, and each receptacle shall be labeled with its breaker number. All breakers/circuits shall be 20 amps unless otherwise specified.

3. Power Line Surge Suppression: See Section 3.6.25, Electrical Surge Protection.

4. Site battery or DC plant is not required. Optional backup generator power shall be installed per this document.

5. Conduits and ducts shall be securely mounted with approved clamps, brackets, or straps and fastened with properly selected screws.

6. Wire raceways, conduits, etc., shall be mechanically joined and secured.

7. Flexible steel conduit or armored cable shall protect wiring connected to motors, fans, or other vibrating equipment, and where rigid conduit is impractical.

8. Conduit shall not be used as equipment grounding conductor.

9. Separate ground wires shall be used for all equipment grounding conductors (EGCs).

10. Unless otherwise required by NEC, minimum branch circuit conductors shall be No. 12 AWG copper rated for 600-volt alternating current (AC).

11. Additional grounding requirements are specified elsewhere in this document.

3.5.2. Generator Installation (Optional)

This section specifies the optional supply and installation of standby power systems to provide electrical power in the event of normal supply failure. Systems shall consist of a liquid-cooled engine, AC alternator, system controls, and accessories required for a complete operating system.

A. The selected Respondent shall supply and install an emergency generator system at each new tower site for backup power. The system shall consist of, but not be limited to, the following:

1. A 120/240-volt single-phase 15 kVA generator with an automatic transfer switch (ATS).

    (a) The generator shall meet or exceed NFPA 110, *Standard for Emergency and Standby Power Systems,* Type 10 Level 1 Class 72 requirements.

    (b) The concrete pad shall be designed and installed according to the manufacturer's specifications.

2. Fuel source: diesel or liquid propane (See Sections 3.5.3 and 3.5.4, respectively).

3. Battery charger.

4. Weather-tight, sound attenuated enclosure (≤ 72 decibels [dB]).

5. Compliance with Environmental Protection Agency (EPA) emission requirements.

6. Compliance with NFPA 99, *Health Care Facilities Code*, and NFPA 110, *Standard for Emergency and Standby Power Systems*, for remote monitoring, alarming, and testing.

    (a) Alarms shall terminate on a 66-style punch-down block within the shelter.

B. Generator accessories and ancillary equipment shall comply, at minimum, with the following standards:

1. National Electrical Contractors Association (NECA) 1, *Standard for Good Workmanship in Electrical Construction*

2. NEMA ICS 1, I*ndustrial Control and Systems: General Requirements*

3. NFPA

    (a) NFPA 37, *Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines*

    (b) NFPA 70, *National Electrical Code® (NEC)*

    (c) NFPA 70E®, *Standard for Electrical Safety in the Workplace®*

    (d) NFPA 99, *Health Care Facilities Code*

    (e) NFPA 110, *Standard for Emergency and Standby Power Systems*

    (f) NFPA 731, *Standard for the Installation of Premises Security Systems*

    (g) NFPA 1225, *Standard for Emergency Services Communications*

    (h) NFPA 5000®, *Building Construction and Safety Code®*

4. EPA emissions standards

5. Institute of Electrical and Electronics Engineers (IEEE) 446, *IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications*

6. Underwriters Laboratories (UL) 1008, *Transfer Switch Equipment*

7. UL 2200, *Stationary Engine Generator Assemblies*

C. Shop Drawings and Product Data

1. Dimensioned drawings of the generator set showing all system components and electrical/fuel connection points.

2. Complete specification sheets for generator and components.

3. Drawings and/or specifications describing auxiliary equipment.

D. Labeling and Identification

1. All wiring harnesses and connectors shall be clearly labeled by number and function per the selected Respondent's schematics.

E. All beneath-grade conduits shall be IMC, RMC, or non-metallic Schedule-40 polyvinyl conduit (PVC).

1. Metallic conduits shall be grounded at both ends to the ground electrode system.

2. Within 2–4 feet of the generator, ATS, MTS, or metallic enclosures conduit shall transition to Schedule-40 PVC.

F. Separate conduits shall be provided for block heater, battery charger, controls, and ATS feed.

G. If PVC conduit is used, control cabling shall be shielded and grounded.

H. All wiring shall be installed per NEC and ANSI/TIA-607-E; the more stringent shall apply.

I. Grounding shall comply with Section 3.6, Grounding, of this document.

J. Automatic Transfer Switch

1. ATS shall be compatible with the generator set to ensure full system integration and maintain local serviceability.

2. ATS shall be installed at each site by the selected Respondent.

3. ATS location shall be approved by ABI or its representative.

4. ATS wiring shall comply with NEC and ANSI/TIA-607-E; the more stringent shall apply.

5. ATS grounding shall comply with Section 3.6, Grounding, of this document.

K. Startup and Checkout:

1. Factory-trained technicians shall perform startup inspection, including:

(a) Verifying cold and hot start times.

(b) Checking engine parameters and adjusting as required.

(c) Verifying no-load frequency/voltage and adjusting if required.

(d) Testing automatic shutdowns.

(e) Simulating power failure to verify ATS picks up building load.

(f) Returning to commercial power and verifying proper transfer back.

(g) Conducting 1-hour load test at full building load to confirm stable voltage/frequency.

(h) Verifying remote indicators and controls function.

(i) Ensuring all testing meets or exceeds NFPA 110, *Standard for Emergency and Standby Power Systems,* Level 1 requirements.

2. The selected Respondent shall provide complete written reports of all testing performed.

3.5.3. Diesel Fuel System

A. The diesel fuel tank shall provide sufficient capacity to operate the generator at 100% full load for 72 hours under low ambient temperature conditions (0° F).

1. The fuel tank shall be filled prior to acceptance testing.

2. Proposed fuel systems shall comply with all applicable codes, standards, and requirements.

B. A secondary means of containment shall be provided for all liquid fuel storage tanks, fuel lines, and related components. Secondary containment for the fuel supply tank shall be sized to hold 110% of the tank's storage capacity.

C. Fuel tank and fuel line locations and installations shall comply with all applicable environmental, building, and fire safety codes.

D. The fuel supply shall be located in the base of the generator. The fuel tank shall be connected to the site ground system at the nearest point.

1. If the generator and fuel supply are more than 6 feet from the nearest site ground system, an additional ground rod shall be installed and bonded to the generator, fuel tank, and site ground system.

E. All necessary installation supplies meeting industry, local fire, environmental, and building codes shall be furnished and installed. Fuel leak detectors shall be installed and interfaced with the site alarm reporting system.

F. The selected Respondent shall ensure that the generator is commissioned and tested in accordance with the manufacturer's requirements and NFPA 110, *Standard for Emergency and Standby Power Systems,* Level 1 guidelines. The more stringent shall apply.

3.5.4. Liquid Propane Fuel System

A. The propane fuel tank shall provide sufficient fuel to operate the generator at 100% full load for 72 hours under low ambient temperature conditions (0° F).

1. The fuel tank shall be filled prior to acceptance testing.

2. Proposed fuel systems shall comply with all applicable codes, standards, and requirements.

B. The propane fuel tank shall be located at least 10 feet from the generator and shelter.

C. Clear access shall be provided for safe refueling operations.

D. Construction/Installation

1. Provide riser tube with bolted lid.

2. Provide excess flow and multi-valve.

3. Install high-pressure gas regulator at tank under the cover,

4. Install low-pressure gas regulator near the generator.

5. Install fuel shutoff valve within 24 inches of the generator.

6. Any underground pipe shall be epoxy coated, and all joints shall be wrapped to prevent corrosion.

7. Polyethylene tubing and fittings may be used if they comply with ASTM D2513 and are recommended by the manufacturer for LP gas use (see NFPA 58).

8. All underground pipes shall be buried at least 18 inches below grade.

9. Fuel lines will be protected with a concrete-filled sleeve at both points where they enter and leave the ground, extending at least 12 inches below grade and 6 inches above grade.

10. All above ground pipe shall be supported at intervals of 36 inches maximum.

E. Above-ground tanks should be protected by bollards if deemed necessary by the Respondent.

F. All supplies and materials required for installation shall comply with all applicable industry, fire, environmental, and building codes and shall be furnished and installed by the selected Respondent.

3.6. Grounding

3.6.1. General

A. The selected Respondent shall ensure that each site, structure, equipment, and system is compliant with ANSI/TIA-607-E. Where there is a conflict between this document and TIA-607-E, the more stringent shall apply.

1. The Respondent shall design a grounding electrode system capable of achieving 5 ohms or less earth/ground resistance of 5 ohms.

   (a) Chemical ground electrode and enhancement material shall not be used in the initial design. These materials may only be used with the written approval of ABI or its representatives.

2. The selected Respondent shall verify that the installed system achieves 5 ohms or less using a Fall-of-Potential Test.

   (a) Testing shall be witnessed by ABI and/or its representative.

   (b) Results shall be documented in a written report and accompanied by photos showing test setup, execution, and results.

3. If the 5-ohm requirement is not met, the selected Respondent shall propose a remediation design and value-focused solution for ABI. Chemical electrode grounding shall only be considered as a last resort.

B. The selected Respondent shall install a comprehensive site grounding system.

C. The grounding system shall include, at minimum, the following elements:

1. Subterrain ground ring or electrode system
2. Tower grounding
3. Facility grounding

4. Compound equipment grounding
5. Ice bridge grounding
6. Lighting and controls grounding
7. Generator grounding
8. HVAC system grounding
9. Fencing and access gate grounding

D. The selected Respondent shall ensure that equipment is electrically bonded, grounded, and protected per NEC and ANSI/TIA-607-E.

E. Grounding and lightning protection equipment, including surge arrestors, shall be installed to comply with NEC and ANSI/TIA-607-E.

F. Proper grounding conductors shall be installed per ANSI/TIA-607-E to bond equipment, conduits, trays, and other metallic systems.

G. Each site shall have a single, unified grounding system. Utility grounds, underground piping, structural steel, concrete reinforcing, lightning protection, and all other grounding components shall be bonded to form a single-point ground system.

H. The main point of connection for all ground conductors within the shelter/building shall be at the primary bonding bar (PBB).

1. The PBB shall be bonded to the external grounding electrode system via a properly sized grounding conductor.

2. When needed, an internal perimeter bonding bus (IPBB), secondary bonding bar (SBB), and/or rack bonding bar (RBB) shall be installed to bond multiple items to the ground system.

3. The IPBB, SBB, and/or RBB shall be bonded to the PBB either directly or progressively, per ANSI/TIA-607-E specifications.

3.6.2. Additional Concerns

Several practices shall be followed to allow for neat and secure grounding and wiring.

A. Only the required amount of insulation shall be stripped from ground conductors.

B. Grounding conductor insulation shall be rated for its environment.

C. Surfaces shall be clean before making connections.

D. Paint or galvanic coating shall be removed before making metal-to-metal connections. After attachment, the connection and exposed metal shall be recoated to prevent oxidation.

E. All ground conductors shall be kept as short as possible.

F. Ground connections shall follow the most direct path to ground.

G. Grounding/bonding conductor bending radius shall be greater than or equal to 8 inches and not less than 90 degrees (120 degrees preferred). No short bends or narrow loops are allowed.

H. Grounding conductors shall maintain at least 2-inch spacing from other cables (except at equipment terminations and 90-degree crossovers).

I. Properly sized lugs and compression taps shall always be used.

J. Use of shrink tube or electrical tape wrapping on compression lugs is encouraged.

K. Mechanical attachments shall use 300-series stainless steel hardware.

L. All metal-to-metal connections shall be treated with an antioxidant compound.

M. Mechanical split-bolt-style connectors shall not be used.

N. Conductors passing through metallic enclosures shall be protected per NEC.

O. If the enclosure hole is oversized, the conductor shall be bonded to the metallic enclosure unless spacing is greater than or equal to 2 inches.

P. Conductors subject to physical damage shall be protected by PVC conduit (flexible or rigid). Conduit shall start 16 inches below grade and extend at least 6 feet above grade or near the connection point.

Q. The top of the conduit and area around the grounding conductor shall be sealed with silicone sealant.

R. Non-conductive strapping on PVC conduit is preferred.

S. The conduit and/or conductor shall be supported at intervals less than or equal to 3 feet.

T. When supporting conductors directly, non-conductive straps shall be used. If metallic straps are used, they must be of the same material as the conductor or installed per proper dissimilar metal joining technique.

U. Wire and cable ties shall be trimmed neatly.

V. Vertical cabling runs shall be secured with nylon P-ring-type clamps.

W. All unused existing grounding components shall be removed or abated after grounding enhancements are complete.

X. Braided conductors shall not be used in the grounding system.

Y. All local codes and safety standards (e.g., NEC, OSHA) shall be followed and shall supersede any less stringent standard in this document.

3.6.3. Grounding Components

The tower sites are newly developed (greenfield) sites. The selected Respondent shall install a new grounding system for the exterior, tower, and all other equipment and systems within each compound.

3.6.4. Ground Rod Installation

A. Ground rods shall be copper-clad steel, 10 feet in length, and ¾-inch in diameter.

B. Each ground rod shall have a slightly beveled (pointed) tip to facilitate driving into the earth.

C. Ground rods shall be driven to a depth of not less than 30 inches below grade or beneath the local frost line, whichever is deeper. This shall be accomplished by excavating (typically a trench) in the area where the rod will be driven.

D. Ground rods shall be driven vertically into the earth. If rock prevents vertical installation, rods may be driven at a 45-degree angle as a last resort. If rods cannot be driven, ground plates shall be installed in accordance with ANSI/TIA-607-E .

E. Ground rods shall be installed 20 feet to 25 feet apart.

F. In heavy clay soils, a pneumatic jackhammer is strongly recommended for rod driving, as manual driving may be impractical.

G. Care shall be taken to avoid damage to the rod's top end during driving. If the rod becomes damaged, several inches shall be cut off from the top to ensure a smooth, clean surface for bonding. The final surface shall be clean and shiny to ensure a proper exothermic weld connection.

H. All attachments to ground rods shall be made using exothermic welds. Mechanical connections are prohibited.

I. After cooling, each exothermic weld shall be struck with a hammer to verify a positive, solid weld connection.

3.6.5. Exterior Ground Ring System

A. The selected Respondent shall install a buried ground ring system to provide a common, single-point ground for the shelter, outdoor equipment, and tower.

B. A ground ring (shelter grounding system) shall be installed encircling the shelter foundation with a minimum of 3 feet of separation from the foundation.

C. A second ground ring (tower ground ring) shall be installed encircling the tower base, no closer than 2 feet from concrete pad or piers.

D. The top of each ground rod shall be driven to the same depth as the ground ring conductor (30 inches minimum or below frost line, whichever is deeper).

E. Ground rods shall be exothermically welded to the ground ring. Additional excavation may be necessary to expose rod tops to facilitate welding.

F. All beneath-grade connections, including attaching ground ring bonding jumpers to the EGB and TGB, shall be exothermically welded.

G. The tower and shelter rings shall be bonded together in two locations using exothermic welds. Bonding radials shall be spaced at least 10 feet apart.

H. If the site layout does not allow two separate rings (less than 11 feet of separation between shelter and tower foundations):

1. Install a ground ring encircling both shelter and tower, keeping proper distances from foundations.

2. Install a minimum of three radial conductors radiating away from the combined ring.

3.6.6. Radial Grounding Conductors (when required)

A. Radial grounding conductors shall be sized and installed in the same manner as the ground ring conductor.

B. Each site shall have at least three radial conductors radiating away from the structure(s).

C. Three radials minimum shall originate from the tower rings; others may originate from the shelter ground ring.

D. Radials shall be of different lengths (± 5%), ranging from 25 feet to 80 feet.

E. Tower radials shall be exothermically welded to the tower base and the ground ring where they cross.

F. Shelter radials shall bond to the shelter ground ring where they cross.

G. Test wells shall be installed at radial-to-ring connections.

H. If space does not allow straight radials, alternate ground methods may be used, including ground plates, grids, or a crow’s foot configuration per Lightning Protection Institute (LPI)-175*, Standard of Practice for the Design – Installation – Inspection of Lightning Protection Systems*.

3.6.7. Exterior Equipment Grounding

A. All metallic ancillary equipment shall be bonded to the earth grounding system.

B. Smaller metallic objects shall be attached to the external ground ring using:

1. A No. 2 AWG solid, tin-plated bare conductor (minimum).

2. Exothermic weld to the ground ring on one end.

3. Two-hole, tin-plated copper, irreversible compression lugs with stainless-steel bolts/lock washers on the other end (no nylon lock nuts allowed).

4. PVC conduit protection where physical damage may occur (start 16 inches below grade, extend to 6 feet above grade)

5. Seal conduit tops with silicone sealant.

6. Support conduit/conductors at intervals less than or equal to 3 feet.

7. Use non-conductive straps (or metallic straps of same material as conductor).

8. Clean and burnish connection points, treat with antioxidant compound, and recoat to prevent oxidation.

C. Examples of smaller objects to be grounded include: incoming telco cable metallic members, main telco ground, raceways, wall-mounted HVAC units, light fixtures, junction boxes, soffits/trim, cameras, bollards, alarm boxes, and similar equipment.

D. Larger metallic objects shall be grounded similarly but with 2/0 AWG, bare, copper-stranded, tin-plated conductor.

E. Examples of larger objects to be grounded include: generator chassis, generator steps/platforms (with bonding jumpers on removable parts), generator fuel tanks, light poles, fence posts, ice bridge, tower, storage tanks, structural members, pad-mounted equipment, HVAC units, and steel shelter housings.

3.6.8. Fence Grounding

A. All fencing components—including posts, rails, fabric, and barbed wire—shall be bonded together and connected to the earth ground system.

B. A No. 2 AWG bare, tinned copper conductor shall be exothermically welded to the top and bottom rails of each fence post (on both sides) at corners, every 40 feet along straight runs, and at each gate post.

C. Each fence post shall be connected to the earth ground system using bare, tinned, stranded copper wire exothermically welded to the post and ground ring. Mechanical ground connections are prohibited.

D. Gates shall be bonded to adjacent posts using a flexible gate jumper with cross-sectional area of greater than or equal to 1/0 AWG cable (0.0829 square inch). The jumper shall be attached at the center of each gate.

E. Fence fabric (chain link) shall be bonded to the ground ring at both sides of each corner post, at 40-foot interval on straight runs, where the fence changes direction, at fabric discontinuities, and at each gate.

1. Fence fabric and deterrent wire shall be bonded using a No. 2 AWG bare, solid, tinned copper conductor exothermically welded to the nearest fence post.

2. A minimum of three clamps shall mechanically connect the conductor to the fabric, evenly spaced vertically. Each row of deterrent wire shall be bonded with a clamp.

3. The conductor shall be routed to prevent incidental contact with other metallic objects, with shielding (e.g., flexible PVC conduit) where needed. Conduit ends shall be sealed against weather and insects.

3.6.9. Tower Grounding

A. A tower ground ring shall encircle the tower at a minimum of 2 feet from its concrete base or leg piers.

1. The number of ground rods installed around the ring shall be equal to or greater than the number of tower legs. Additional ground rods shall be added as needed to maintain proper spacing.

B. Tower Leg Bonding

1. A 2/0 bare, tinned, stranded copper conductor ground ring shall be installed.

2. Each tower leg shall be bonded to the ring via a 2/0 bare, tinned, stranded copper conductor.

3. Connection to each tower leg shall be:

(a) Preferred: Exothermic weld (unless prohibited by manufacturer)

(b) Alternate: Irreversible tin-plated copper crimp lug (two-hole lug preferred when practical)

4. Lug connections shall use existing tower holes or shared mounting bolts. No new holes may be drilled.

5. Connections shall be made with 300-series stainless-steel hardware, lock washers, and nuts. Nylon locking nuts are prohibited.

6. Prior to connections, tower legs shall be cleaned and coated with antioxidant compound. The conductor shall be welded to the ground ring at the nearest ground rod connection, routed as vertical and direct as possible, with a bend radius greater than or equal to 8 inches and no less than a 90-degree angle (120-degree preferred).

3.6.10. Ice Bridge

A. The ice bridge shall be isolated from the tower and shelter where possible.

B. A self-supporting ice bridge shall maintain a minimum 6-inch separation from the tower and shelter structures.

C. Where the ice bridge is supported by the shelter and tower, slip-joint fiberglass fasteners may be used to both isolate the bridge and allow for seismic adjustment.

D. Bonding jumpers shall be installed on both sides whenever the ice bridge is mechanically spliced to itself, the tower, or the shelter.

E. Multiple ice bridge sections shall be bonded together at splice points using a No. 2 AWG solid, tinned copper conductor attached via exothermic weld or irreversible two-hole, high-compression, tinned lug with 300-series stainless steel hardware and lock washers.

F. A self-supported ice bridge shall have its support posts bonded to the ground ring system using a 2/0 bare, tinned, stranded copper conductor exothermically welded to both the support leg and ground ring.

G. Each support leg shall be grounded to the nearest grounding ring (tower or shelter). Pairs of legs across the width may share a common grounding conductor. A welded tail beneath grade may be used to connect to the ring.

H. Each ice bridge section shall be bonded to its support legs with a No. 2 AWG, solid, tinned copper conductor, welded to the leg and attached to the ice bridge via exothermic weld or irreversible two-hole, high-compression, tinned lug, and stainless-steel hardware with lock washers.

I. Surfaces where lugs are applied shall be cleaned to bare metal (burnished) and treated with an approved antioxidant compound before connection.

J. All exposed metallic surfaces after bonding shall be recoated to prevent oxidation.

K. The grounding conductor bend radius shall be greater than or equal to 8 inches and no less than a 90-degree angle (120-degree preferred). Short bends or loops are prohibited.

L. Exothermic welds on galvanized components shall be coated with cold-galvanizing spray (Valmont #B364 or equivalent) after cooling to prevent corrosion.

3.6.11. Exterior Ground Bus Bar Installation

A. The EGB shall be positioned just below the ice bridge and entry port of each shelter.

B. The EGB shall be sized according to the number of antenna transmission lines entering the shelter, with capacity for 50% growth.

C. EGB minimum bar dimensions are ¼-inch thick, 2-inches wide, length determined by the number of grounding conductors.

D. The bar shall be constructed of tin-plated copper.

E. Hole spacing for connectors shall be a minimum of ¾-inch on center, sized to allow a two-hole irreversible crimp connector for each grounding conductor.

F. The EGB shall be mounted beneath the entry port using stainless steel mounting brackets, hardware, and insulators rated 2 kilovolts (kV) minimum.

G. The EGB shall be bonded to the exterior shelter ground system using two 2/0 stranded, bare, tinned copper conductors.

H. Conductors shall attach to the lower left and right corners of the EGB using exothermic weld or irreversible high-compression crimp.

I. The other ends of the conductors shall be welded to the ground ring conductor using exothermic welds.

J. Conductors between the EGB and ground ring shall be routed in PVC conduit (no metallic conduit permitted), beginning 16 inches below grade and extending as close to the EGB as possible.

K. The conduit and area around the conductor shall be sealed with silicone sealant.

L. Non-conductive strapping on the PVC conduit is preferred.

M. Conduit and/or grounding conductors shall be supported at intervals of less than or equal to 3 feet.

N. When directly supporting conductors, non-conductive straps (or metallic straps of matching material if necessary) shall be used.

3.6.12. Tower Ground Bus Bar Installation

A. The TGB shall be a minimum of ¼-inch thick, 2 inches wide, and 12 inches long.

B. The bar shall be constructed of tin-plated copper.

C. Hole spacing shall be greater than or equal to ¾-inch on center and sufficient to accommodate a two-hole irreversible crimp connector for each transmission line grounding conductor, with 50% growth capacity provided.

D. A TGB shall be installed at the bottom of the tower below the transmission line grounding kit, near the point where the vertical run transitions to the horizontal run toward the shelter. If transmission lines run underground in PVC conduits, the TGB shall be mounted below the top of the conduits.

E. Optionally, a TGB may be installed at the top of the tower within 6 feet of where the transmission lines turn downward to provide a convenient grounding point.

F. Additional TGBs may be installed as needed to maintain a maximum spacing of less than 75 feet between transmission line ground kits.

G. The TGB shall be mounted to the tower frame using conductive fasteners designed to prevent corrosion from dissimilar metals and minimize impedance to earth.

H. The bottom TGB shall be bonded to the tower ground ring using two 2/0 stranded, bare, tinned copper conductors or direct attachment to reduce impedance. Attachments shall use stainless-steel hardware.

I. Each conductor shall attach to the bottom left and right corners of the TGB using exothermic welds.

J. The opposite ends of these conductors shall be exothermically welded to the tower ground ring conductor.

K. Conductors between the TGB and the ground ring shall be protected in PVC conduit (no metallic conduit permitted), beginning 16 inches below grade and extending as close to the TGB as possible.

L. The conduit and area around the conductor shall be sealed with silicone sealant.

M. Non-conductive strapping on the PVC conduit is preferred.

N. Conduit and/or grounding conductors shall be supported at intervals of less than or equal to 3 feet.

O. When directly supporting conductors, non-conductive straps (or metallic straps of matching material if necessary) shall be used.

3.6.13. Utility Service Entrance Grounding

A. The electrical service entrance, telco entrance, and antenna transmission line entrance shall share a common or adjacent wall(s) and be near each other so that the utilities can share the PBB.

B. The PBB shall serve as the common connection point for all shelter utility electrodes to ground.

3.6.14. Electrical Service Grounding

A. The neutral-to-ground bond for AC separately derived service entrance conductors shall be made only at the first disconnecting means after the utility meter, per NEC standards.

   1. The grounding electrode from the neutral-to-ground bond shall be bonded to the ground system to maintain continuity of the single-point ground system.

B. For sites with two or more separately derived AC systems:

   1. The neutral-to-ground bond shall be connected back to the grounding system at the source or their first means of disconnect.

   2. If systems share a common neutral-to-ground bonding point, additional bonding jumpers shall be removed as required.

   3. Example: If the generator transfer switch does not switch the neutral (i.e., neutral is common to both generator and utility), the generator neutral-to-ground jumper shall be removed.

C. The grounding electrode conductor for the electrical service shall:

   1. Be a 2/0 AWG stranded, bare, tinned copper, connected to the disconnect neutral-to-ground bus.

   2. Be installed in a trench 30-inches deep or below the frost line (whichever is deeper).

   3. Be routed in PVC conduit (no metallic conduit permitted), beginning 16 inches below grade and extending as close to the disconnect as possible.

   4. Terminate in the disconnect.

   5. Have conduit ends sealed with silicone sealant if they do not terminate inside the disconnect.

   6. Be installed to prevent incidental contact with other grounded components.

   7. Be supported at intervals less than or equal to 3 feet with non-conductive strapping (or metallic straps of the same material as the conductor).

   8. Be exothermically welded to the exterior shelter grounding system conductor at its far end.

3.6.15. Telco Service Grounding (as applicable)

A. Outside telecommunication lines and their surge protection devices (SPDs) shall be grounded to the shelter's internal grounding system.

B. If the telco main ground is external, it shall be bonded to the exterior shelter grounding system.

C. The telco main ground shall have an independent conductor. Metallic components (e.g., enclosure) shall be grounded per Section 3.6.7: Exterior Equipment Grounding.

D. The external demarcation ground shall also be bonded to the exterior shelter ground system per Section 3.6.7, Exterior Equipment Grounding.

E. Inside the shelter, all telco components shall be bonded to the internal grounding system using a telco SBB.

1. The SBB shall be bonded to the PBB using a No. 2 AWG, stranded green-jacketed thermoplastic, heat- and water-resistant (THW) conductor.

2. Connection shall use a two-hole, long-barrel compression lug mechanically bonded to the PBB.

3. Grounding conductors shall be supported using non-conductive straps.

4. Lug attachment points shall be cleaned (burnished) to bare metal, treated with antioxidant compound, and recoated after connection.

5. Lugs shall be fastened with ¼-20 stainless-steel bolts, lock washers, and nuts.

6. Conductors shall maintain a bend radius greater than or equal to 8 inches and no less than a 90-degree angle (120-degree preferred), routed directly toward the grounding electrode system.

3.6.16. Internal Bus for Shelter Grounding

A. The selected Respondent shall provide and install a PBB within the shelter.

B. The PBB shall serve as the main point of connection for all internal ground conductors.

3.6.17. Internal Perimeter Bonding Bus

A. The selected Respondent shall install an internal PBB (IPBB) to provide grounding for ancillary equipment, conduits, and non-electronic metallic items back to the PBB.

1. Two equidistant No. 2 AWG, minimal, stranded green-jacketed THW conductors shall originate at the PBB and run in opposite directions around the perimeter of the room.

2. Conductors shall run horizontally approximately 1 foot above the floor.

B. IPBB conductors shall be supported by 2-inch insulated standoffs at intervals less than or equal to 2 feet.

C. Conductors shall be separated by at least 4 inches and meet at a location approximately opposite the PBB.

3.6.18. Primary Bonding Bar

A. The PBB shall be located as close to the electrical service entrance as possible.

B. Minimum size shall be ¼-inch thick, 4 inches wide, and 12 inches long.

C. The PBB shall be constructed of tin-plated, bare, solid copper bus bar.

D. Hole spacing for each connector shall be greater than or equal to ¾-inch on center, with sufficient capacity for multiple two-hole irreversible crimp connectors.

E. A Harger Type “J” Hole Pattern GBIP144xxJPBB or equivalent shall be used, length determined by the number of required grounds, plus 50% growth capacity.

F. Stainless-steel mounting brackets (with at least a 2-inch stand-off) and hardware shall be used.

G. Insulators shall be polyester fiberglass rated greater than or equal to 2 kV.

H. The PBB shall be bonded to the exterior shelter grounding system using a 2/0 AWG, stranded, bare, tinned copper conductor.

I. The conductor shall attach to the bottom of the PBB using an exothermic weld or irreversible crimp.

J. Crimped connections shall be treated with an approved antioxidant compound and secured with ⅜-16 stainless-steel bolts, lock washers, and nuts (nylon locking hardware is prohibited).

K. The conductor shall route through the wall or floor toward the exterior ground ring at a 135-degree downward angle, protected in PVC conduit beginning 16 inches below grade and extending as close to the PBB as possible.

L. The conduit and area around the grounding conductor shall be sealed with silicone sealant.

M. Non-conductive strapping on the PVC conduit is preferred.

N. Conduit and/or grounding conductors shall be supported at intervals of less than or equal to 3 feet.

O. When directly supporting conductors, non-conductive straps (or metallic straps of matching material if necessary) shall be used.

P. The other ends of the conductors shall be welded to the exterior shelter ground ring conductor using exothermic welds.

3.6.19. Secondary Bonding Bar

A. The SBB provides a single termination point for shelter interior grounding conductors, equipment bonding conductors, and IPBB conductors. The SBB is typically installed near telco equipment or transmission line entry ports if utilities enter on different walls.

B. SBB minimum size shall be ¼-inch thick, 2 inches wide, and 12 inches long.

C. The SBB shall be a tin-plated, bare, solid copper bus bar.

D. Hole spacing for each connector shall be greater than or equal to ¾-inch on center, with sufficient capacity for multiple two-hole irreversible crimp connectors.

E. A Harger Type “J” Hole Pattern GBIP144xxJPBB or equivalent shall be used, length determined by the number of required grounds, plus 50% growth capacity.

F. Stainless-steel mounting brackets (with at least a 2-inch stand-off) and hardware shall be used.

G. Insulators shall be polyester fiberglass rated greater than or equal to 2 kV.

H. If the SBB is more than 20 feet from the PBB bonding conductor’s earth entry point, an additional bonding conductor shall be installed to the exterior shelter ground ring (same size and attachment as PBB bonding conductor).

I. The additional grounding conductor shall be installed per PBB bonding requirements (see Section 3.6.18, Primary Bonding Bar).

J. The SBB shall be bonded to the PBB via a No. 2 AWG, stranded, green-jacketed, THW conductor, if no additional grounding conductor to the exterior shelter grounding system is needed.

K. If an additional conductor is needed, the SBB shall be bonded to the PBB via a 2/0 stranded, green-jacketed, THW or THHN (thermoplastic high-heat resistant nylon-coated) copper conductor.

3.6.20. Ground Bus Conductors

A. A ground bus conductor shall be used to bond equipment cabinets, racks, and other systems. They shall always terminate at the PBB or SBB. The other end(s) generally shall be left

unterminated (insulated with green electrical tape) but may be terminated to the last rack. The ground bus conductor and any extensions shall be of the same size.

B. A No. 2 AWG, copper, stranded, green-jacketed conductor shall be run the entire length of the cable tray system.

C. One end shall terminate to the shelter's PBB or SBB via a two-holed, tin-plated, copper, irreversible crimp lug.

D. The other end shall terminate to the most extreme rack or be left unterminated in the rack with the end insulated with green electrical tape.

E. Ground bus extension conductors may "Y" off the ground bus conductor and travel along perpendicular pieces of cable tray to assist in bonding other racks in the shelter. Connections made to the ground bus conductors always must flow toward the PBB or SBB and shall use an irreversible C-type crimp connector.

F. The conductors shall be supported by a cable tray inside the shelter, along the bottom outside edge, along the outside wall, and/or by the equipment rail (framework). Proper cable separation shall be maintained per ANSI/TIA-607-E.

3.6.21. Interior Shelter Ancillary Equipment Grounding

A. All metallic ancillary equipment within 8 feet vertically and 8 feet horizontally of any ground or object being grounded shall be bonded to the PBB, SBB, or IPBB. This will be a very labor-intensive task, though one of the most important described in this specification.

   1. All ancillary equipment shall be bonded to the PBB, SBB, or IPBB by a No. 6 AWG, copper, stranded, green-jacketed conductor.

   2. Daisy-chaining of equipment is prohibited except for grounding of conduit.

B. A No. 6 AWG, copper, stranded, green-jacketed conductor shall bond to each object using a two-hole, tin-plated, copper, irreversible crimp lug.

C. The area to which the lug is to be applied to the equipment shall have all paint removed (i.e., burnished) down to the bare metal. The metallic surface shall be treated with an approved antioxidant compound.

D. The lug shall be fastened to the unit using ¼-20 stainless-steel bolts, lock washers, and nuts (nylon locking nuts are prohibited).

E. The other end shall be attached to the PBB, SBB, or IPBB using a two-hole, tin-plated, copper, irreversible crimp lug.

F. The area to which the lug is to be applied to the busbar shall have all paint removed (i.e., burnished) down to the bare metal. The metallic surface shall be treated with an approved antioxidant compound.

G. The lug shall be fastened to the bus using ⅜-16 stainless-steel bolts, lock washers, and nuts (nylon locking nuts are prohibited).

H. When attaching the bonding conductor to the IPBB, it shall be via a C-style, copper, irreversible crimp connection. Connections shall be wrapped with green insulating electrical tape to inhibit incidental contact.

I. If a two-hole lug is not feasible for connection to the object, a one-hole lug is permissible.

J. All ground conductors shall be kept as short as possible

K. The grounding conductor bend radius shall be greater than or equal to 8 inches and no less than a 90-degree angle (120-degree preferred), routed directly toward the grounding electrode system. Short bends or loops are prohibited.

L. The IPBB has been installed specifically to accommodate connections for ancillary equipment, which includes, but is not limited to:

1. Heater chassis
2. Wall-mount HVAC chassis
3. Ventilation duct/louvers
4. Lights
5. Window/door frames
6. Metallic ceiling grids
7. Metallic raised-floor systems
8. Electrical enclosures
9. Conduits
10. Metallic piping systems
11. Exposed metallic building structure members

3.6.22. Doors and Frames

A. Doors and door frames shall be bonded to the grounding system.

B. The door frame is to be bonded to the IPBB using a No. 6 AWG, copper, stranded, green-jacketed conductor. A C-style copper irreversible crimp connection shall be used to make this connection.

C. The metal door shall be bonded to the frame using a No. 6 AWG, copper, highly flexible cable (e.g., welding cable). Braided conductors shall not be used anywhere in this project.

3.6.23. Electrical Panels and Cabinets

A. The chassis of electrical panels and cabinets shall be bonded to the IPBB.

3.6.24. Cable Ladder Tray Grounding

A. Grounding conductors shall be installed on the interior far side or exterior of the tray. Cable groups shall maintain a 2-inch clearance from other cable groups. Exception: RF transmission cables for transmitting stations shall maintain a 4-inch minimum clearance from power, data, and signal cable groups.

B. The cable and/or ladder tray shall be grounded to the PBB or SBB.

C. A No. 6 AWG, copper, stranded, green-jacketed conductor shall bond to the tray using a two-hole, tin-plated, copper, irreversible crimp lug.

D. The other end of the conductor shall be attached to the PBB or SBB using a two-hole, tin-plated, copper, irreversible crimp lug.

E. If the tray is a single straight unit running away from the ground bus, it shall be bonded at one point back to the PBB or SBB.

F. If the tray runs parallel to the ground bus, it shall be bonded to the PBB or SBB in both directions using two individual bonding conductors.

G. If the tray is shaped in a “U” configuration and running parallel to the ground bus, it shall be bonded on both sides of the “U” closest to the ground bus back to the PBB or SBB.

H. The tray shall not be used as a grounding conductor.

I. All tray splices and joints shall have a No. 6 AWG, copper, stranded, green-jacketed bonding jumper with a two-hole, irreversible crimp lug on each end.

J. When the tray, its splicers, and interconnecting components are labeled by the manufacturer as suitable for grounding purposes, bonding jumpers shall not be required.

3.6.25. Electrical Surge Protection

A. Power circuits to and from the shelter shall be protected by an SPD located at the main power disconnect.

1. SPDs compliant with ANSI/TIA-607-E, Type 2B, shall be mounted to protect both the generator ATS utility and emergency sides.

(a) This may be accomplished by installing the SPD at the main disconnect (before the ATS) or by using a tap-rule per NEC.

(b) If the emergency side feeds directly to the shelter’s critical equipment distribution panel, an SPD compliant with ANSI/TIA-607-E, Type 2A, shall be installed on the shelter’s critical equipment distribution panel.

2. SPDs shall be installed on the generator control, alarm, crankcase heater, and battery charging circuits at the generator and within 24 inches of building entry.

    (a) All SPDs shall comply with ANSI/TIA-607-E and manufacturer specifications.

B. SPD alarm circuits shall run back to the shelter's alarm punch-down block.

C. New exterior alarm circuits shall be installed beneath grade, either in IMC or RMC conduit, or as direct-burial shielded cable in PVC conduit.

1. When installed in IMC or RMC, within 2 feet to 4 feet of the generator, ATS, MTS, or other metallic enclosures, the conduit shall transition Schedule-40 PVC.

D. SPDs shall be installed on alarm circuits within 24 inches of entry into the shelter. Type and location shall be verified with ABI or its representative.

E. Alarm circuits shall be clearly labeled.

F. SPDs are required at all sites containing communications/electronic equipment or other electrical equipment. Abnormal electrical surges or overvoltage occurrences—caused by lightning, distribution equipment failures, or auxiliary equipment—can cause equipment damage and create personnel hazards.

G. Proper exterior and interior site grounding (as described elsewhere in this document) is the first line of defense, but is not sufficient by itself. SPDs must be installed on all electrical, transmission, and communications lines entering the shelter, building, or area that houses communications equipment or personnel.

H. Common-mode SPDs shall not be used on AC electrical circuits. These devices may fail in a short-circuit situation, resulting in unwanted voltage on the grounding conductor due to a neutral-to-ground fault. All SPDs used shall be UL 1449, *Standard for Surge Protective Devices*, listed.

I. Metal Oxide Varistor (MOV) and Silicone Avalanche Diode (SAD) technologies shall be used together as a hybrid configuration at the building's main electrical disconnect.

J. Type 2A SPDs (critical equipment/main service entrance):

1. Normal-mode type only; common-mode SPDs are prohibited.

2. Primary module shall be SAD-rated at 20 kiloamperes (kA) per phase, per polarity, with minimum energy absorption.

3. Secondary module shall be MOV.

4. SPDs shall meet ANSI/TIA-607-E requirements.

5. Enclosure shall be rated NEMA 4.

6. The shelter shall include an integral overcurrent protection device rated at 25,000 amps for short-circuit.

7. SPDs shall be fed by copper conductors sized No. 6 AWG or larger. Conductor sizing shall comply with the overcurrent device per NEC.

8. Indicator lamps shall be visible to monitor SPD status.

9. SPDs shall include integral form C dry contacts (minimum rating 250 VAC, 2 amps) for remote alarming.

10. Remote alarm wiring shall be No. 22 AWG copper wire or larger.

11. SPDs shall be UL 1449, *Standard for Surge Protective Devices*, listed.

12. Testing results from UL-approved laboratory shall be provided.

K. Type 2B SPDs (other equipment panels, including disconnects feeding an ATS):

1. Normal-mode type only; common-mode SPDs are prohibited.

2. Primary modules shall be MOV.

3. Suppression components shall be voltage-limiting, not voltage-switching.

4. The shelter shall include an integral overcurrent protection device rated at 25,000 amps for short-circuit.

5. SPDs shall meet ANSI/TIA-607-E requirements.

6. Enclosure shall be rated NEMA 4.

7. SPDs shall be fed by copper conductors sized No. 6 AWG or larger. Conductor sizing shall comply with the overcurrent device per NEC.

8. Indicator lamps shall be visible to monitor SPD status.

9. SPDs shall include integral form C dry contacts (minimum rating 250 VAC, 2 amps) for remote alarming.

10. Remote alarm wiring shall be No. 22 AWG copper wire or larger.

11. SPDs shall be UL 1449, *Standard for Surge Protective Devices*, listed.

12. Testing results from a UL-approved laboratory shall be provided.

L. Type 3 SPDs (point of use/receptacle, or PDU style):

1. Normal-mode type only; common-mode SPDs are prohibited.

2. Plug-in adapters shall only plug into a single simplex outlet.

3. Plug-strip type may include secondary protection for receptacle, data, and telephone.

4. Plug-strip casings shall be metallic with mounting tabs and an exterior ground stud to accept a No. 6 AWG or larger grounding terminal.

5. No on/off switch is required. If provided it shall include a physical barrier to prevent accidental switching.

6. Indicator lamps shall be visible to monitor SPD status.

7. Type 3 SPDs shall be installed on critical loads located more than 10-foot conductor length (5-foot circuit length) from a Type 1 SPD.

8. Type 3 SPDs shall be installed on loads located more than 50-foot conductor length (25-foot circuit length) from a Type 1 SPD.

9. SPDs shall be UL 1449, *Standard for Surge Protective Devices*, listed.

10. Testing results from a UL-approved laboratory shall be provided.

11. If data/telephone protection is integral, the device shall be UL 1449, *Standard for Surge Protective Devices*, and UL 497, *Standard for Protectors for Paired-Conductor Communications Circuits*, listed.

12. For standalone cabinets without Type 2A or Type 2B SPDs, a Type 3 SPD shall be installed on all loads.

M. Telephone, Data, and Control Circuits

1. Common-mode SPDs may be used.

2. SPDs shall be installed as close as practical to the point of entry into the shelter.

3. SPDs shall be installed as close as practical to the equipment being protected (e.g., generator display, battery charger, fuel gauge).

4. Interior shelter SPDs shall be bonded to the interior grounding system.

5. Exterior equipment SPDs shall be bonded to the exterior ground electrode system.

6. SPDs on 2-pair conductors shall be connected with No. 12 AWG, green-jacketed copper conductors not exceeding 4 feet in length.

7. SPDs on multiconductor circuits (greater than or equal to 2-pair) shall be No. 6 AWG, green-jacketed copper conductors.

3.7. Final Testing and Acceptance

A. During installation and upon completion, each tower installation shall be inspected and tested to verify compliance with the manufacturer's requirements.

B. The selected Respondent shall test, verify, and document that each shelter's electrical and mechanical systems are fully functional and compliant with specifications.

C. The selected Respondent shall coordinate with ABI to arrange for any required third-party inspection to meet ABI quality assurance requirements.

D. The selected Respondent shall provide ABI with all as-built drawings, documentation, and required contractual deliverables.

E. Upon completion of the work, the selected Respondent shall submit documentation detailing final inspection and testing, including:

1. Steel structure:

   (a) Vertical alignment and plumb
   (b) Bolts tight and torqued to specification
   (c) No damaged or missing structural members
   (d) No signs of stress or vibration
   (e) Climbing ladders and other devices installed correctly
   (f) Labels and tags

2. Foundation:

   (a) Concrete finish free of cracks and blemishes
   (b) Proper backfilling and grading

3. Grounding:

   (a) Verify lugs and exothermic welds
   (b) Ground resistance test results recorded

4. Ice bridge:

   (a) Installed per specification

5. Photographs:

   (a) Overall structure from north, east, south, and west
   (b) Footers
   (c) Grounding and lightning protection (both above- and below-grade)

F. At substantial completion, the selected Respondent shall conduct a site walk at each location with ABI's representative to generate punch lists.

G. Punch-list items shall be corrected within 30 calendar days of substantial completion, unless otherwise noted in contract documents.

H. The selected Respondent shall conduct follow-up inspections, if required, to confirm punch-list items have been resolved.

I. Final acceptance of the site shall not be granted until all required testing is completed, documentation is submitted, and ABI has reviewed and approved all results.

APPENDIX A: TOWER SITE DRAWINGS

LEGEND

- ⊙ 5/8" Rebar Unless Otherwise Noted
- ⊙ All Points in Pavement (Set Mag-Nails)
- Ex. Existing
- Prop. Proposed
- —○— Utility Pole

F.04-0.00-117
Jon W. Claycomb & Lois A. Claycomb
Deed Book 1600, Page 957
Parcel 2

F.04-0.00-070
Jon W. Claycomb & Lois A. Claycomb
Deed Book 1376, Page 737

F.04-0.00-071
John W. Claycomb & Lois A. Claycomb

Proposed Tower Site
N: 40 12'24"
W: -78 28'2"

F.04-0.00-069
Jon W. Claycomb & Lois A. Claycomb
Deed Book 1600, Page 957
Parcel 1

E.04-0.00-164
Steven S. Kagarise
Deed Book 1498, Page 215

Kimmel Township
Bloomfield Township

Kimmel Township
King Township

Bloomfield Township
South Woodbury Township

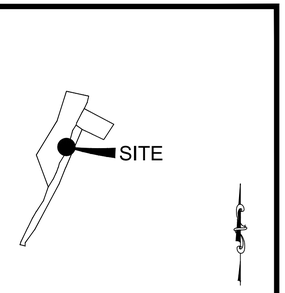
Ex. Dirt Trail

Ex. Lane

Lafayette Road (S.R. 0807)

Flitch Road

Lafayette Road (S.R. 0807)



VICINITY MAP SCALE: 1" = 3,000' ±

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

Bakers Summit- Claycomb Property

Access will be via the existing dirt trail. Tower will within 25 feet of trail.
Utility service will be underground across the Claycomb property following the dirt trail, there is an existing last utility pole on Flitch Road to the southeast, transition to underground from there. The estimated length underground is 1,900 feet.

Tower will be free standing – 180 feet tall, cleared space will be 150' x 150' with a fenced in tower site of approximately 100' x 100' (modified as needed based on site conditions.) Inside the fence area will be a single 8' x 10' shelter.

A to Z Land Consulting Services, LLC
403 LWE SUITE 100
McConnellsburg, PA 17233
PH 717-809-3025
www.atozlandconsultingservices.com

DATE	NO.	REVISION

TOWER SITE EXHIBIT

ALLEGHENIES BROADBAND (BAKERS SUMMIT)

SITUATED IN KIMMEL TOWNSHIP, BEDFORD COUNTY, PENNSYLVANIA

Tax Map:	F.04
Parcel No.	070
Drawn By:	WTG
Checked By:	RLC
Date:	05/20/2024
Scale:	1"=200'
Job No.	23-236
	SHEET 1 OF 1

LEGEND

- ⊙ 5/8" Rebar Unless Otherwise Noted
- ⊙ All Points in Pavement (Set Mag-Nails)
- Ex. Existing
- Prop. Proposed
- —○— Utility Pole

D.12-0.00-005
Thomas R. Howsare and Miriam C. Howsare
Deed Book 702 Page 156
No. 3

D.12-0.00-005
Thomas R. Howsare and Miriam C. Howsare
Deed Book 702 Page 156
No. 4

Ex. Farm Lane

Ex. Dirt Trail

NEW ROAD CUT

Proposed Tower Site
N: 211622.3611
E: 1740266.5459
Elev. = 2,135.44'

LAT:39°54'40.9304"
LON:78°33'48.9706"

UNDERGROUND UTILITY FEED

Ex. Pole

Ex. Pole (2)

Ex. Guy (2)

Ex. Stones

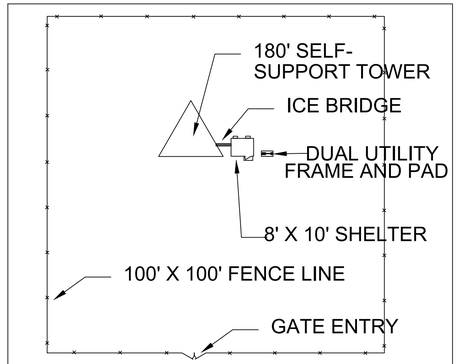
NAD 83

D.12-0.00-007
Thomas Allen and Lana Allen
Deed Book 670 Page 639

Bedford Township
Cumberland Valley Township

Bedford Township
Coleraine Township

D.12-0.00-102
Buckview LLC
Deed Book 1328 Page 595



TOWER SITE PLAN SCALE: 1/32" = 1'-0" ±

Buck Falls - Howsare Property

Access will be via the existing dirt trail - the last 100 -150 yards will require cutting a new path in or seeking approval from electric company to improve switch backs on their right of way.

Utility service will be underground across the Howsare property from the existing utility poles. Estimated length underground 200 feet.

Tower will be free standing - 180 feet tall, cleared space will be 150' x 150' with a fenced in tower site of approximately 100' x 100' (modified as needed based on site conditions.) Inside the fence area will be a single 8' x 10' shelter.

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

NOTES:

1. AN ENTIRE BOUNDARY SURVEY WAS NOT CONDUCTED AT THIS TIME.
2. THE PROPOSED USE OF THIS PLAN IS TO SHOW THE PROPOSED CELLULAR TOWER LOCATION.
3. THIS SURVEY WAS COMPLETED WITHOUT THE BENEFIT OF A TITLE PACKET.
4. THE DATES OF THE SURVEY WERE SEPTEMBER 29, 2023.
5. VERTICAL DATUM (NAVD88) WAS ESTABLISHED BY GPS OBSERVATION. HORIZONTAL DATUM WAS ESTABLISHED BY PENNSYLVANIA STATE PLANE COORDINATE SYSTEM (NAD83), SOUTH ZONE 3702.
6. (PASDA) PENNSYLVANIA SPATIAL DATA ACCESS WAS USED TO ESTABLISH CONTOURS.

MissionCriticalPartners
690 GRAY'S WOODS BLVD.
PORT MATILDA, PA 16870

DATE	NO.	REVISION

TOWER SITE EXHIBIT

ALLEGHENIES BROADBAND (NEW BUCK FALLS)

SITUATED IN BEDFORD TOWNSHIP, BEDFORD COUNTY, PENNSYLVANIA

Tax Map:	D.12
Parcel No.	005
Drawn By:	JAL
Checked By:	SM
Date:	10/10/2023
Scale:	1"=200'
Job No.	23-288
	SHEET 1 OF 1

LEGEND

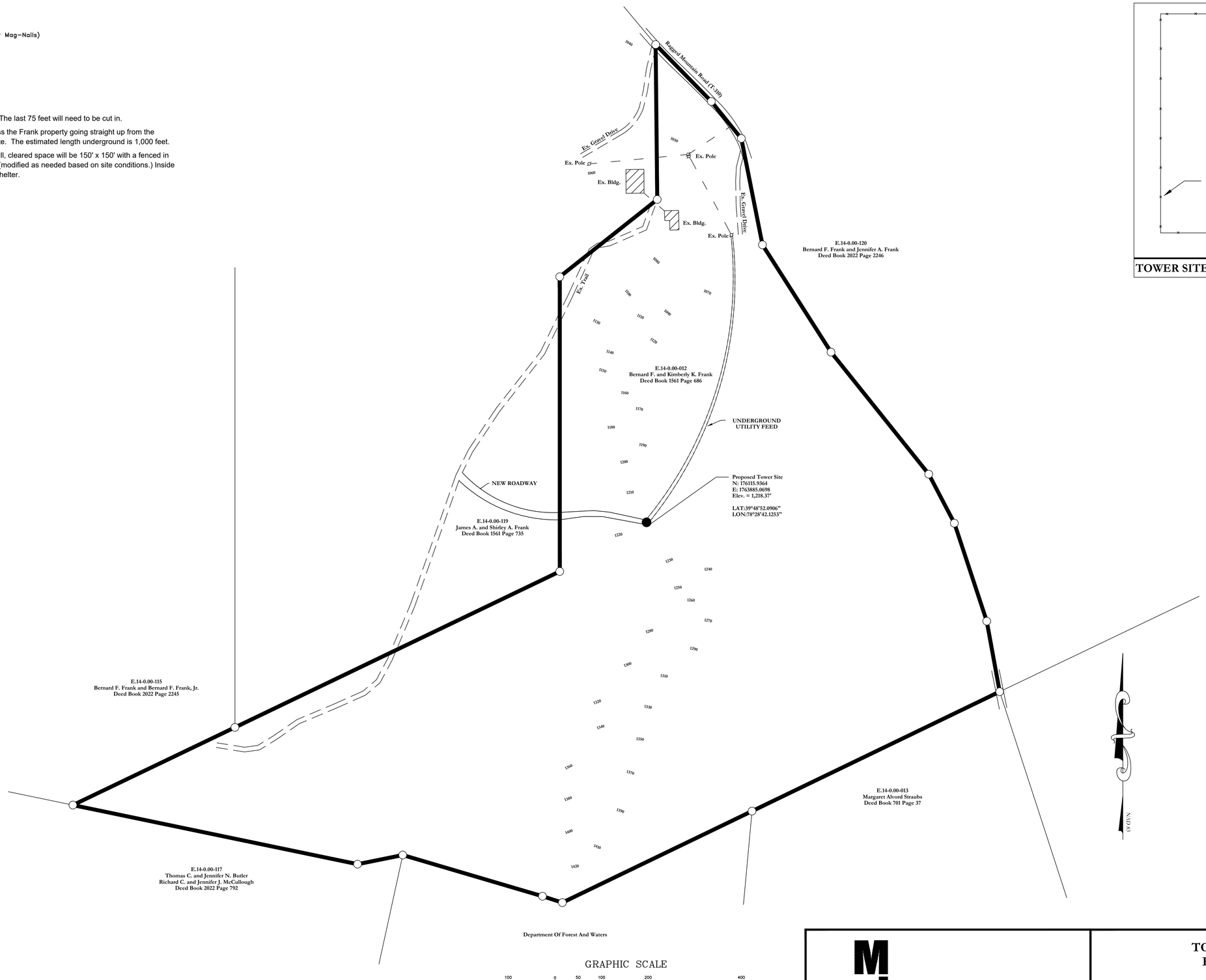
⊙	5/8" Rebar Unless Otherwise Noted
⊙	All Points in Pavement (Set Mag-Nails)
Ex.	Existing
Prop.	Proposed
—○—	Utility Pole

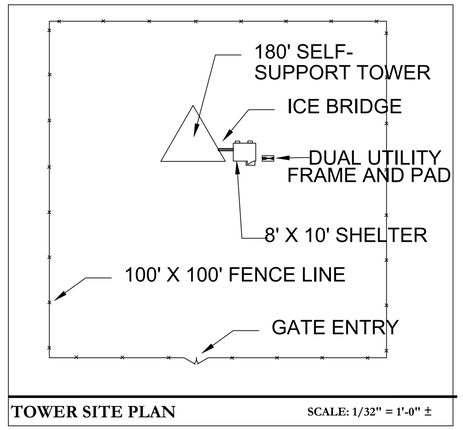
Chaneysville - Frank Property

Access will be via the existing dirt trail. The last 75 feet will need to be cut in.

Utility service will be underground across the Frank property going straight up from the existing utility pole to the north of the site. The estimated length underground is 1,000 feet.

Tower will be free standing - 180 feet tall, cleared space will be 150' x 150' with a fenced in tower site of approximately 100' x 100' (modified as needed based on site conditions.) Inside the fence area will be a single 8' x 10' shelter.





TOWER SITE PLAN — SCALE: 1/32" = 1'-0" ±

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)

1 inch = 100 ft.

MissionCriticalPartners

690 GRAY'S WOODS BLVD.
PORT MATILDA, PA 16870

DATE	NO.	REVISION

TOWER SITE EXHIBIT

ALLEGHENIES BROADBAND (CHANEYSVILLE)

SITUATED IN SOUTHAMPTON TOWNSHIP, BEDFORD COUNTY, PENNSYLVANIA

Tax Map:	E.14
Parcel No.	012
Drawn By:	JAL
Checked By:	SM
Date:	10/10/2023
Scale:	1"=100'
Job No.	22-288, PH. 3
	SHEET 1 OF 1

LEGEND

- ⊙ 5/8" Rebar Unless Otherwise Noted
- ⊙ All Points in Pavement (Set Mag-Nails)
- Ex. Existing
- Prop. Proposed
- —○— Utility Pole

NOTES:

1. AN ENTIRE BOUNDARY SURVEY WAS NOT CONDUCTED AT THIS TIME.
2. THE PROPOSED USE OF THIS PLAN IS TO SHOW THE PROPOSED CELLULAR TOWER LOCATION.
3. THIS SURVEY WAS COMPLETED WITHOUT THE BENEFIT OF A TITLE PACKET.
4. THE DATES OF THE SURVEY WERE AUGUST 14, 2024.
5. VERTICAL DATUM (NAVD88) WAS ESTABLISHED BY GPS OBSERVATION. HORIZONTAL DATUM WAS ESTABLISHED BY PENNSYLVANIA STATE PLANE COORDINATE SYSTEM (NAD83), SOUTH ZONE.
6. (PASDA) PENNSYLVANIA SPATIAL DATA ACCESS WAS USED TO ESTABLISH CONTOURS.

F.07-0.00-005
R. Neal Buterbaugh & Linda J. Buterbaugh
Deed Book 572, Page 299
Tract #1

F.07-0.00-077
Matthew D. Martin
Deed Book 802, Page 652
Tract #1

F.07-0.00-007
Bradley A. King & Lori B. King
Deed Book 1512, Page 0507

F.07-0.00-008
Clair W. Black & Joan E. Black
Deed Book 555, Page 323
Tract #2

F.07-0.00-009
Clair W. Black & Joan E. Black
Deed Book 555, Page 323
Tract #1

F.07-0.00-010
Dustin L. Guyer
Instrument #2019-000389

F.07-0.00-011
Timothy W. Wachter & Merle D. Wachter
Deed Book 1407, Page 871
Tract #4

S 83°13'51" E

N 41°09'51" W

3,775.75'

S 06°48'45" E

F.07-0.00-051
Hardwood Trails, L. P.
Deed Book 790, Page 143
Tract #1

Proposed Tower Site
N: 284426.6962
E: 1780391.0945
Elev. = 2,449.59'

LAT:40°06'43.7252"
LON:78°25'21.1806"

South Woodbury Township
Bedford Township

F.07-0.00-065
R. Donald Hoffman
Deed Book 1094, Page 931

987.63'

S 53°22'51" E

F.07-0.00-052
Ronald Hoffman
Instrument #2023-004378

F.07-0.00-091
Timothy W. Wachter & Merle D. Wachter
Deed Book 1434, Page 712

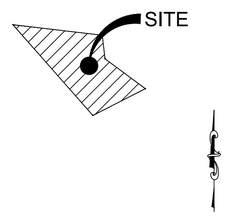
F.07-0.00-055
John Cessna
Deed Book 455, Page 303

ACCESS ROAD TO T482

NAD 83

2,110.90'

2,471.51'



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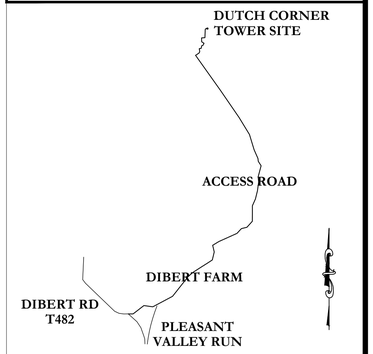

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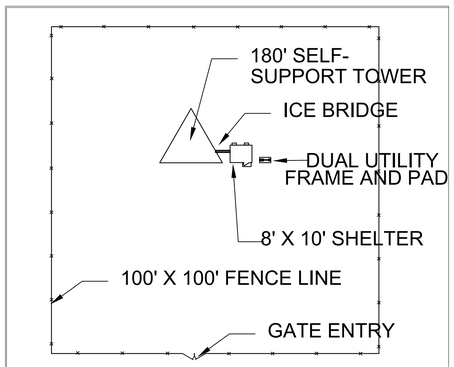


TOWER SITE PLAN SCALE: NO SCALE

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

A to Z Land Consulting Services, LLC
403 LWE SUITE 100
McConnellsburg, PA 17233
PH 717-809-3025
www.atozlandconsultingservices.com

THE SURVEY PORTION OF DRAWING WAS PREPARED BY A TO Z.
THE TOWER SITE PORTION WAS ADDED/OVERLAID BY MCP.

MissionCriticalPartners
690 GRAY'S WOODS BLVD.
PORT MATILDA, PA 16870

DATE	NO.	REVISION

TOWER SITE EXHIBIT

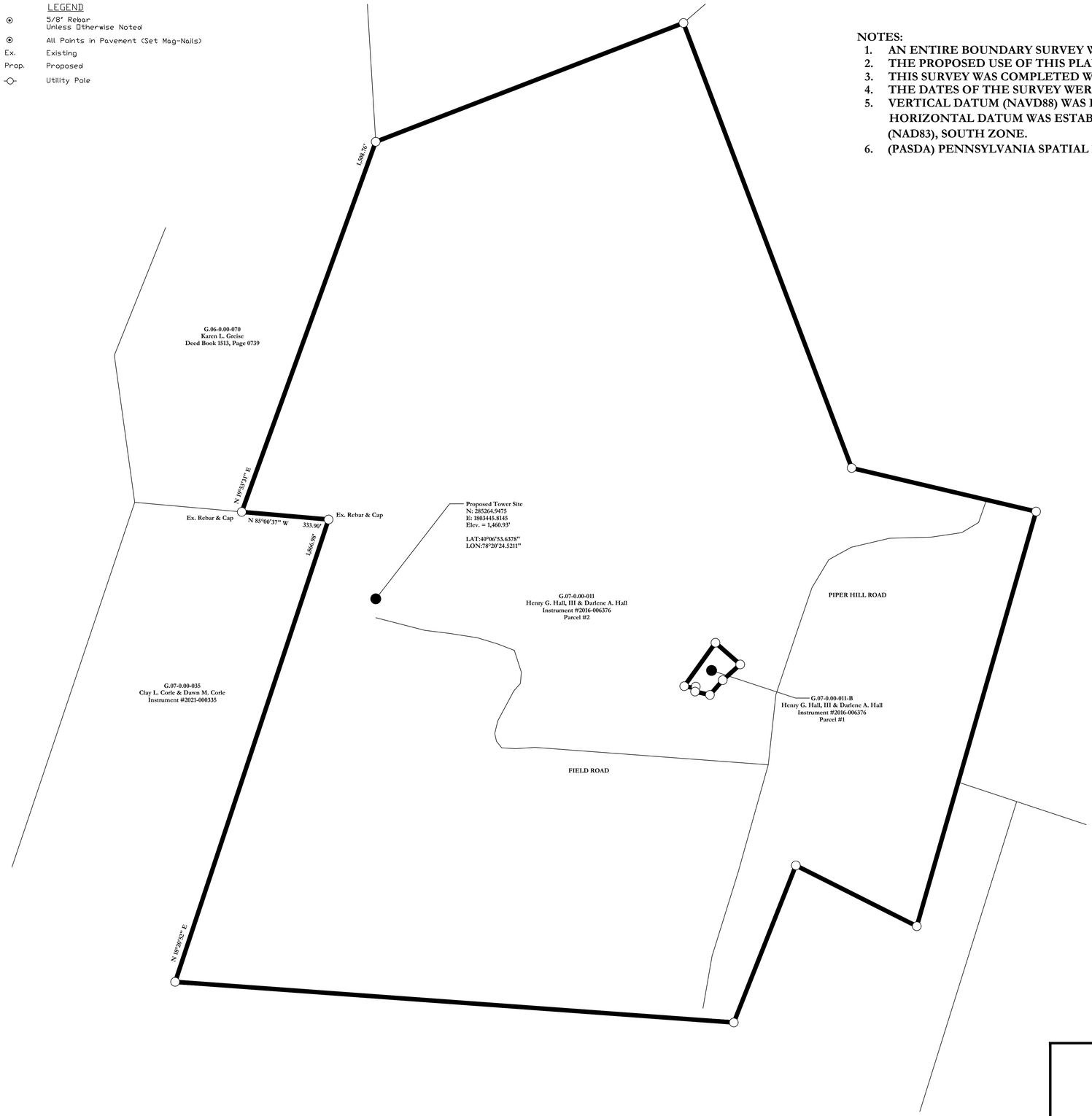
ALLEGHENIES BROADBAND (DUTCH CORNER)

SITUATED IN BEDFORD TOWNSHIP, BEDFORD COUNTY, PENNSYLVANIA

Tax Map:	F.07
Parcel No.	065
Drawn By:	JPK
Checked By:	SM
Date:	6/20/2025
Scale:	1"=200'
Job No.	22-288, PH 3.
	SHEET 1 OF 1

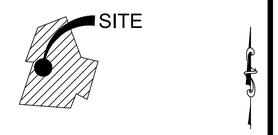
LEGEND

- ⊙ 5/8" Rebar Unless Otherwise Noted
- ⊙ All Points in Pavement (Set Mag-Nails)
- Ex. Existing
- Prop. Proposed
- -○- Utility Pole

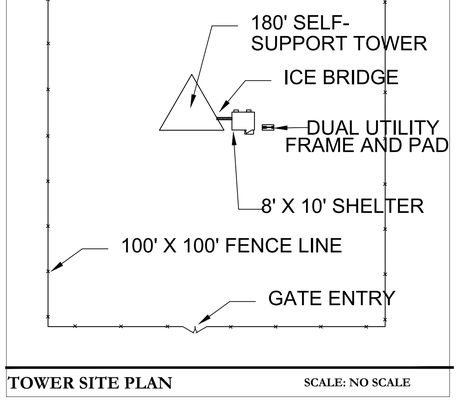


NOTES:

1. AN ENTIRE BOUNDARY SURVEY WAS NOT CONDUCTED AT THIS TIME.
2. THE PROPOSED USE OF THIS PLAN IS TO SHOW THE PROPOSED CELLULAR TOWER LOCATION.
3. THIS SURVEY WAS COMPLETED WITHOUT THE BENEFIT OF A TITLE PACKET.
4. THE DATES OF THE SURVEY WERE AUGUST 23, 2024.
5. VERTICAL DATUM (NAVD88) WAS ESTABLISHED BY GPS OBSERVATION. HORIZONTAL DATUM WAS ESTABLISHED BY PENNSYLVANIA STATE PLANE COORDINATE SYSTEM (NAD83), SOUTH ZONE.
6. (PASDA) PENNSYLVANIA SPATIAL DATA ACCESS WAS USED TO ESTABLISH CONTOURS.



VICINITY MAP SCALE: 1" = 3,000' ±



TOWER SITE PLAN SCALE: NO SCALE

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

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THE TOWER SITE PORTION WAS ADDED/OVERLAID BY MCP.

MissionCriticalPartners
690 GRAY'S WOODS BLVD.
PORT MATILDA, PA 16870

DATE	NO.	REVISION

TOWER SITE EXHIBIT

ALLEGHENIES BROADBAND (HOPEWELL)

SITUATED IN HOPEWELL TOWNSHIP, BEDFORD COUNTY, PENNSYLVANIA

Tax Map:	G.07
Parcel No.	011
Drawn By:	JPK
Checked By:	SM
Date:	09/16/2024
Scale:	1"=200'
Job No.	22-288, PH3
	SHEET 1 OF 1

APPENDIX B: GEOTECHNICAL SURVEYS

TRIAD ENGINEERING, INC.

Report of Geotechnical Exploration

Triad Project No. 03-22-0246

September 26, 2022

Bakers Summit Tower Site
Bedford County, Pennsylvania

Prepared For:
Alleghenies Broadband, Inc.
3900 Industrial Park Drive
Altoona, PA 16602

Prepared By:
Triad Engineering, Inc.
1097 Chaplin Hill Road
Morgantown, WV 26501

www.triadeng.com

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APPENDICES

Report of Geotechnical Exploration
Bakers Summit Tower Site
Bedford County, Pennsylvania

SITE AND PROJECT DESCRIPTION

The project site is located approximately 13 miles north-northeast of Bedford in Bedford County, Pennsylvania. The site consists of a relatively level area on the ridge of Evitts Mountain. The approximate location is shown on Figure A-1 in Appendix A.

According to the *Tower Site Exhibit* prepared by Mission Critical Partners, the proposed development will consist of a 180-foot self-supporting telecommunications tower for Alleghenies Broadband, Inc. The project will also include construction of an adjacent 8-foot by 10-foot utility shed, enclosed within a 100-foot by 100-foot security fence. The proposed tower center is located at coordinates 40.206667, -78.467222. Estimates of loads to be supported by the tower foundations have not been provided.

GEOLOGY

Surficial Geology

Based on the *Quaternary Geologic Map of the Lake Erie 4 Degrees by 6 Degrees Quadrangle*, published in 1991 by the U.S. Geological Survey as part of the Quaternary Geologic Atlas of the United States, the surficial soils at the site are mapped as Holocene and Wisconsin bouldery colluvium and rock waste. Colluvium and rock waste are loose, unconsolidated deposits that accumulate below cliffs or on steep slopes by processes such as rockfall, creep, or rainwash.

This unit consists of angular to subangular blocks, boulders, and cobbles of quartzitic sandstone, sandstone, or conglomerate. On upper slopes it commonly occurs as rock waste with little or no soil matrix, coarsely sorted both vertically and laterally, with block sizes that increase downslope and upward within the deposit. Clasts are generally randomly oriented, and crude imbrication with long axes dipping upslope is common where secondary creep has occurred. Individual boulders may be unstable; boulders can reach diameters of more than 20 feet, with size controlled by bedding thickness and joint spacing in the parent rock. On steep slopes, the deposits form talus cones and aprons, as well as debris cones, and may locally develop into block fields and block streams more than 2,800 feet long. Downslope, the unit may grade into bouldery colluvium with a sandy or loamy matrix, or into loamy to clayey colluvium with scattered boulders. The deposits are most extensive on south-facing slopes and can mantle entire slopes as a continuous cover. Rock outcrops are uncommon within the unit. Thickness is generally less than 10 feet on upper slopes, less than 50 feet on lower slopes, and may exceed 100 feet in places.

Bedrock Geology

According to the *Geologic Map of Pennsylvania* (Pennsylvania Geological Survey, 1980) and the *Pennsylvania Geologic Data Exploration* system maintained by the Department of Conservation and Natural Resources (PA DCNR), the colluvium at the project site is underlain

by the Tuscarora Formation of the Silurian Period. This formation is composed primarily of light- to medium-gray sandstone, with local occurrences of red and green beds, along with orthoquartzite and minor shale and siltstone interbeds. The rock is generally fine- to coarse-grained, very hard, and well cemented, with common crossbedding and localized conglomeratic zones. At its upper contact, it contains the Castanea Member, characterized by alternating red and non-red sandstone. The Tuscarora forms many of the prominent ridges within the Ridge and Valley province. Bedding is typically thick, although crossbedding can obscure it, and the unit can reach a maximum thickness of roughly 1,500 feet.

Coal Resources

We researched mine maps available through the *Pennsylvania Mine Map Atlas*, the *Pennsylvania Historic Surface Mine Permit Locator*, and the *Pennsylvania Active Underground Bituminous Coal Mining* database, all maintained by the Pennsylvania Department of Environmental Protection (PA DEP), to ascertain what minable coal beds are present below the site and to determine if past surface or underground mining operations have been conducted. In performing this evaluation, we could not identify any documented surface or underground mining directly at or beneath the project site.

It should be noted that the abovementioned PA DEP databases may be incomplete due to the limited number of years requiring permitting and mapping. As such, the lack of identified mines at the subject site does not constitute a guarantee of a mine-free area.

SUBSURFACE EXPLORATION

As requested, Triad drilled one test borings at the proposed tower center on September 10, 2025. Triad staked the boring location by using a handheld GPS device. The surface elevation for the boring was obtained from the provided *Tower Site Exhibit* prepared by Mission Critical Partners. Figure A-2 in Appendix A depicts the approximate locations of the test borings drilled for the project.

A geologist from Triad was present full time during the drilling to direct the drilling crew, log all recovered soil samples, and observe groundwater and rock conditions. Triad transported the recovered soil samples to our laboratory for further testing. Detailed descriptions of materials encountered in the test borings are documented on the boring logs in Appendix B. Figures B-1 and B-2 in Appendix B describe the classification system and terminology utilized.

SUBSURFACE CONDITIONS

The materials encountered in the borings are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types, and the actual transitions between boring locations may be gradual.

Colluvium: Cobble and gravel colluvium was observed in the boring to a depth of approximately 3 feet. Standard Penetration Test (SPT) N-values obtained within this material indicated a very dense relative density and was difficult to auger through.

Auger refusal on a sandstone boulder was encountered at a depth of 3 feet. Rock coring was required to advance through the boulder which extended to a depth of approximately 7 feet.

From 7 to 15.5 feet, the colluvium consisted of medium plastic clay with lesser amounts of sand and angular gravel at random orientations. Pocket penetrometer values obtained within he clayey alluvium indicated a very stiff consistency. Overall, the colluvial materials extended to a depth of approximately 15.5 feet.

Bedrock: Competent bedrock was encountered at a depth of about 15.5 feet, and the boring was advanced through the bedrock utilizing rock coring techniques to a depth of 27 feet. Bedrock cored in the boring consisted of firmly cemented, quartzitic sandstone. The rock core recovery values were 86 percent, and Rock Quality Designation (RQD) values were 40 percent per core run. Unconfined compressive strength tests were performed on two samples rock core recovered from the boring. The results ranged from 17,351 to 17,842 psi, corresponding to very hard rock.

Groundwater: Groundwater levels were measured both during and after drilling operations. The borehole was dry prior to coring operations. It should be noted that water levels indicated after rock coring operations are not considered representative of true groundwater levels due to the introduction of water into the borehole during rock coring. Upon completion, the borehole caved in at a depth of 3 feet, and groundwater was not observed at that depth.

It is emphasized that fluctuations in true groundwater levels can occur due to seasonal, climatic and environmental variations which may not have been evident at the time of the field exploration. Consequently, groundwater levels can vary significantly from those recorded at the time measurements were taken.

LABORATORY TESTING

Triad performed laboratory tests on selected soil and rock samples to aid in classification and provide a basis for estimating their engineering properties. The laboratory tests were performed in general accordance with ASTM standard test methods. Appendix C contains the detailed results. These results are summarized in the following table:

TYPE OF TEST	TEST RESULTS
Moisture Content	17.5%
Atterberg Limits	Liquid Limit: 41 Plasticity Index: 19
Percent Passing No. 200 Sieve	81%
USCS Classification	CL
Unconfined Compressive Strength of Rock	17,351 and 17,842 psi

DISCUSSION

The project site is underlain by approximately 15.5 feet of colluvium consisting primarily of cobbles and boulders to a depth of 7 feet, and of very stiff clay from 7 to 15.5 feet. Competent bedrock was encountered at a depth of about 15.5 feet. Bedrock cored in the boring consisted of very hard, quartzitic sandstone to the termination depth of 27 feet.

Based on these conditions, specifically the hardness of the sandstone, difficult drilling conditions for our equipment and close proximity to bedrock, we suggest the use of a pad and pier foundation system to support the proposed tower. Drilling through the sandstone to install shafts is not recommended. It should also be noted that due to the nature of the colluvium and the presence of cobbles and boulders, developing a solid base for the pier may be difficult. The presence of the soil within the loosely nested boulders may result in a varying bearing surface both in elevation and material type. In order to address pockets left by boulders removed during excavation and uneven bearing due to rock and soil zones at the same level, we recommend a 4-foot undercut be included as a contingency in the contract. Backfilling voids left from the removal of cobbles or boulder or the 4-foot deep undercut should be performed using crusher run as defined below. Excavation of rock is not required as part of the 4-foot undercut if implemented.

The following sections of this report include recommendations for the design and construction of the geotechnical elements of the project. Provided that these recommendations are followed, it is our opinion that the site is generally suitable for the proposed construction.

DESIGN RECOMMENDATIONS

The geotechnical engineering evaluation of the site and subsurface conditions at the property, as well as the recommendations for site preparation and foundation support, are based on our site observations, the field data obtained and our understanding of the project information as presented in this report.

Pad and Pier

Based on the subsurface conditions encountered in boring B-1, it is our opinion that the foundation for support of the tower can be a pad and pier type foundation comprised of an isolated foundation and pier extending to the base of the tower. We anticipate that this foundation type may require an excavation on the order of 4 feet below existing grade to meet suitable bearing and be below frost depth. We have assumed a 6-foot square pad for purposes of our analysis. The recommendations provided are acceptable for foundations 6 foot square and larger. For a foundation bearing at 4 feet below existing grade, we recommend foundation design on colluvial soil. If higher design values are required, Triad can provide additional bearing capacity recommendations at specific depths upon request. Recommendations for colluvial soils are provided below:

STRATA	BOTTOM OF FOUNDATION	ALLOWABLE BEARING CAPACITY (psf)	K (pci)
Colluvium	4	4,000	100

If needed to provide consistent bearing as discussed above a 4-foot over-excavation should be performed. The over-excavation should extend a minimum of 5 feet beyond the building perimeter on all sides.

Uplift Considerations

We anticipate that the tower planned for the site will be subjected to uplift forces. The uplift capacity for pad and pier foundations is obtained from the weight of the concrete foundation and the weight of equipment and/or backfill above the foundation. We recommend that unit weights of 145 pcf for concrete and 125 pcf for compacted backfill be used to compute uplift resistance. The weight of the equipment placed above the foundation should be obtained from the equipment manufacturer. A factor of safety of 1.5 should be applied to uplift determinations for foundations.

Lateral Load Considerations

We anticipate that the tower planned for the site will be subjected to lateral loads. Lateral load resistance of foundations can be obtained using friction along the base of the foundation and passive resistance of the materials immediately adjacent to the foundation. In designing the foundation to resist lateral loads, we recommend the use of a frictional resistance value (coefficient of friction) of 0.50 and active and passive lateral earth pressure coefficients of 0.33 and 3.0, respectively. When computing the lateral resistance due to earth pressure, the resistance due to active earth pressure must be subtracted from the passive earth pressure. A factor of safety of 1.5 should be used to determine the allowable lateral load resistance.

Settlement Considerations

For the pad and pier foundation, settlements due to structural loading were estimated based on the results of the test borings, the recommended allowable bearing pressure and our past experience with similar conditions. Based on this information, we estimate that foundation settlement for the proposed tower could be on the order of 1 inch. Differential settlement which could occur between individual similarly loaded column foundations is estimated to be on the order of approximately ½ inch. If structural loads require foundations larger than the minimum widths for individual column footings recommended in this report, we should be contacted to re-evaluate our settlement estimates using the actual structural loads and proposed foundation dimensions.

Seismic Site Classification

The subsurface profile was evaluated and classified according to ASCE/SEI 7-22. This code establishes the criteria for project site evaluation and determination of several seismic design parameters. ASCE/SEI 7-22, Chapter 20 outlines the procedure for determination of the site classification based on the average shear wave velocity for materials to a depth of 100 feet. Table 20.2-1 includes ranges of estimated shear wave velocities for each class (type) of material, and those classes are determined as the result of soil type and in-situ consistencies and/or relative densities reflected by SPT testing in the borings. Based on the results of the test borings and our assumptions, the site has an average shear wave velocity of 1,867 feet per second (fps). Using this information along with knowledge of the site geologic setting, the seismic site class and additional seismic information is as follows:

PARAMETER DESCRIPTION	SEISMIC RESULT
Seismic Site Class	C
Soil Profile	Very Dense Soil and Soft Rock
MCE_R (5% damped, short periods), S_{MS}	0.12
MCE_R (5% damped, 1.0 second period), S_{M1}	0.055
Design (5% damped, short periods), S_{DS}	0.078
Design (5% damped, 1.0 second period), S_{D1}	0.037

Based on results from the test borings, published regional geologic information and the probable maximum strength of earthquake, it is our opinion that liquefaction potential for the on-site soils during seismic activity is relatively low. Seismic parameters to be considered for structural design of the project are provided in Appendix D of this report.

CONSTRUCTION RECOMMENDATIONS

Site Preparation

Initial preparation of the site for construction should include installation of sediment and erosion control measures and any upslope diversion ditching or berms that are required. Existing utilities that conflict with proposed foundations and/or new utility alignments should be relocated as necessary.

Site Excavations

It is anticipated that most of the on-site soil and weathered bedrock can be effectively removed with conventional earth-moving equipment such as backhoes and dozers. Except for the deep foundations, it is assumed that excavations required for the project will likely not extend to

depths sufficient to encounter harder bedrock. However, harder bedrock that is encountered may require rock removal techniques such as hoe-ram chipping or hydraulic splitting for effective removal.

The means necessary to excavate rock are a function of the consistency/hardness of the material, the type/size of excavation equipment utilized and the effort the contractor is willing to apply. If the plans call for excavation of rock for bidding purposes, potential contractors should be instructed to perform their own investigations as to measures necessary to excavate bedrock encountered.

Excavated materials should not be stockpiled and construction equipment should not be positioned beside open excavations, since the added load may cause a sudden collapse of the excavation side walls. The design and construction of all excavations should comply with applicable local, state, and federal safety regulations, including the current requirements of the Occupational Safety and Health Administration (OSHA). In no case should slope height, slope inclination, or excavation depth exceed those specified by OSHA or any other regulatory agencies or local authorities having jurisdiction at the construction site.

Controlled Fill

Suitable Fill Material

For the backfill beneath the foundation, Triad recommends granular fill from a material supplier such as crusher run or 2A modified. Fill required to attain design grades should be placed as controlled, compacted fill. This fill includes approved on-site excavated materials, off-site borrow material such as residual soils, soil/rock mixtures, and soft weathered rock, or a well-graded commercial stone such as crusher run aggregate. The fill should be free of trash, wood, coal, topsoil, organics, pyritic material with greater than 0.1 percent by weight of pyritic sulfur, frozen material, and pieces of rock greater than 4 inches in any dimension for lift thicknesses of 9 inches or 1½ inches in any dimension for lift thicknesses of 4 inches. Materials classified as MH, CH, OH, OL and Pt based on the Unified Soil Classification System (USCS) are not considered suitable for use as new fill. All fill should be tested and approved prior to placement and compaction.

Fill Placement and Compaction

Before initiating fill placement, any topsoil or other surficial material should be removed. The subgrade surface should be proof-rolled with appropriate rubber-tired construction equipment and/or visually evaluated to locate any soft spots or areas of excessive "pumping." Any such areas should be over-excavated to a firm subgrade and replaced with new, controlled fill material. The engineer should be contacted if excessive over-excavation is required.

During placement, moisten or aerate each layer of fill, as necessary, to obtain the required compaction. Fill should not be placed on surfaces that are muddy, frozen or have not been approved by prior testing and/or proof-rolling. Free water should be prevented from appearing on the surface during or after compaction operations. Fill placed on sloping areas should be

properly benched or “notched” into the slope face such that a smooth transition between the new fill and existing slope face is not present.

Soil material which is removed because it is too wet to permit proper compaction may be spread and allowed to dry. Drying can be facilitated by discing, harrowing, or by pulverizing until the moisture content is reduced to an acceptable level. When the soil is too dry, water may be uniformly applied to the subgrade surface or to the layer to be compacted.

Fill material compacted by heavy compaction equipment should be placed in loose layers not exceeding 9 inches in thickness. Fill compacted with lightweight equipment, such as hand-operated tampers or walk-behind rollers, should be placed in loose layers not exceeding 4 inches in thickness. The compaction equipment utilized should be suitable for the type of material being compacted. Vibratory rollers are best suited to coarse-grained soils, while pad foot (often called sheepsfoot) rollers are appropriate for fine-grained materials. Fill placed adjacent to foundation walls should be compacted using lightweight equipment.

New fill placed within the structure footprint and extending at least five (5) feet beyond its perimeter, or to that extent possible, should be compacted to at least 98 percent of the laboratory maximum dry density as determined by the Standard Proctor method (ASTM D 698). Fill placed outside of these areas should be compacted to at least 95 percent of the maximum dry density as determined by the same standard. The placement moisture content of fill material should be within ±3 percentage points of the optimum moisture content as determined by ASTM D 698, except the structural areas where the moisture content should be within ±2 percent of the optimum moisture content. Granular materials, such as clean sand or aggregate, should be compacted to at least 85% of its relative density, as determined by ASTM D 4253 and D 4254 test methods.

Foundation Construction

Foundation excavations should be cleaned of all loose or otherwise disturbed materials present in the base of the excavations. The excavations should be observed and tested by a qualified geotechnical engineer, or his/her representative, prior to concrete placement to verify that materials capable of providing the recommended bearing capacity are present and that the foundation subbase is a consistent material. Materials exposed in the foundation excavations may be susceptible to softening and/or degradation if exposed to precipitation or surface water runoff. In addition, some foundation excavations could be relatively deep. Consequently, foundation concrete should be placed in the excavations as soon as possible once the excavations have been observed and approved, and only that amount of foundation excavation which can be backfilled with concrete should be opened on any given day. Once foundation walls have been constructed up to final exterior grades, we recommend that the foundation excavations be backfilled with compacted soil fill to prevent ponding of water adjacent to foundations.

Groundwater and Surface Runoff Control

The contractor should be prepared to implement temporary and/or permanent dewatering measures since groundwater conditions can change. We anticipate that sources of subsurface water which may develop during construction can probably be managed and removed by a gravity drainage system, sump pits and pumps or other minor dewatering procedures.

Surface water runoff should be prevented from flowing through the construction area. If necessary, diversion ditches or berms should be installed upslope of the construction area. Ditches should be protected from excessive erosion using riprap, erosion control matting, or vegetation.

Quality Assurance and Control

We recommend that the geotechnical engineer-of-record, Triad, be retained to monitor the construction activities to verify that the field conditions are consistent with the findings of our exploration. If significant variations are encountered, or if the design is altered, we should be notified.

The geotechnical engineer should provide personnel full-time and/or intermittently to:

- Observe and document installation of the drainage features and verify initial subgrade conditions prior to fill placement.
- Observe and test material compaction during fill construction. Field density tests should be performed in accordance with ASTM D 6938 (nuclear method). At least three (3) field density tests should be performed for each lift or at a frequency determined by the geotechnical engineer to be sufficient for the size of the fill area to verify the required soil compaction.
- Examine all subgrade bearing levels to confirm compliance with our recommendations and verify that adequate support is available.
- Test fresh structural concrete placed for the project.

LIMITATIONS

This report has been prepared for the exclusive use of Alleghenies Broadband, Inc. for specific application to the design of the proposed telecommunications tower in Bakers Summit, Bedford County, Pennsylvania. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own investigation of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or reuse of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety.

Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the boring at the site. It is emphasized that subsurface conditions may vary dramatically between borings, and Triad makes no representations as to subsurface conditions other than those encountered at the specific boring location. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, if any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed, and the conclusions are modified or verified in writing by Triad.

It is recommended that we be provided the opportunity to review the final grading plan, overall foundation design, and specifications so that earthwork and foundation recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

We appreciate the opportunity to submit this report and look forward to working with you on the construction of this project. Please contact the undersigned with any questions or concerns you have regarding this report.

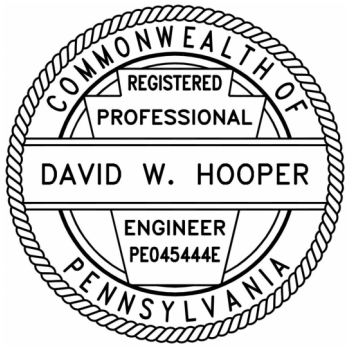
TRIAD ENGINEERING, INC.

Maria af Rolén

Maria af Rolén, P.G.
Senior Geologist

David W. Hooper

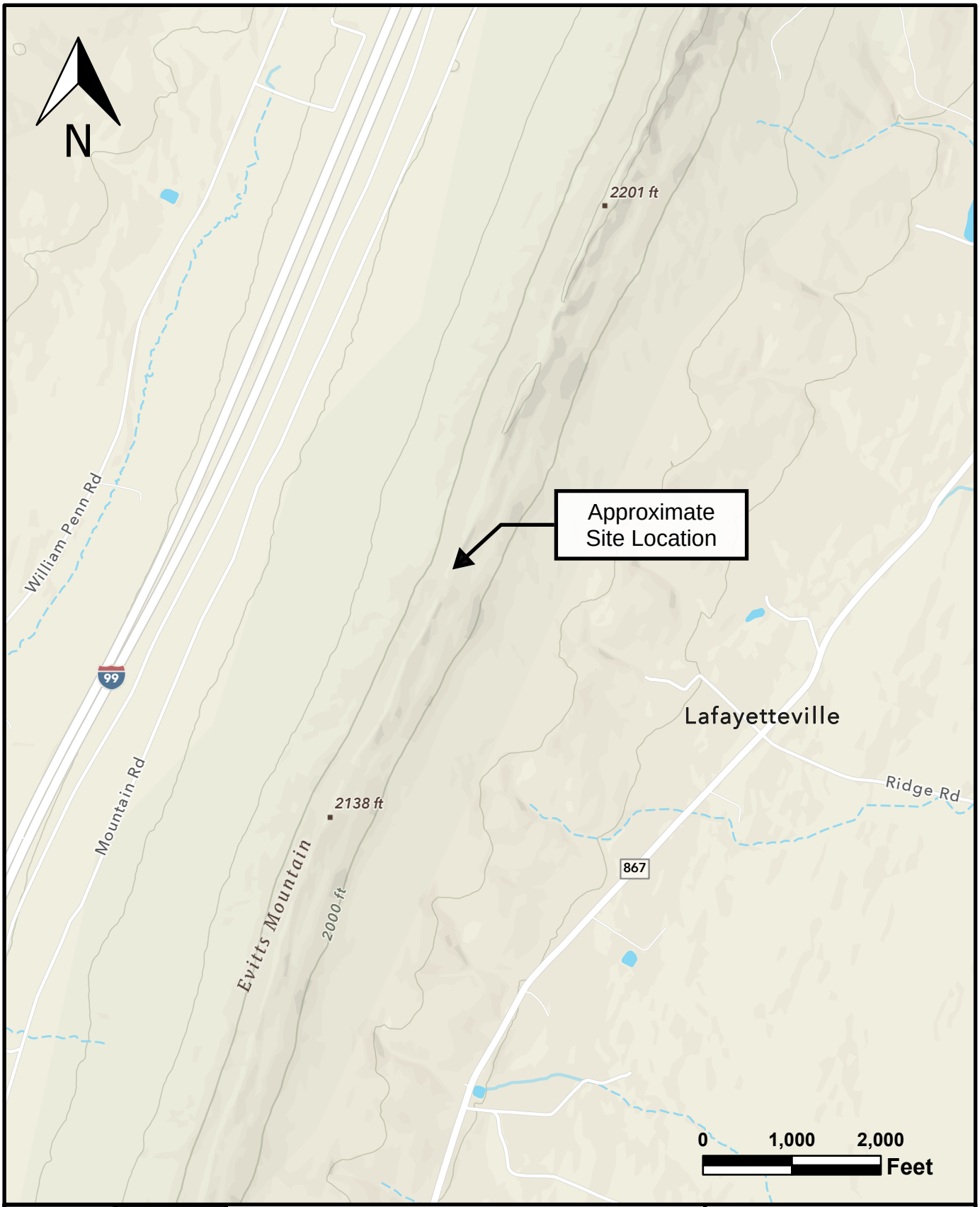
David W. Hooper, P.E.
Principal Engineer



TRIAD ENGINEERING, INC.

APPENDIX A

FIGURES

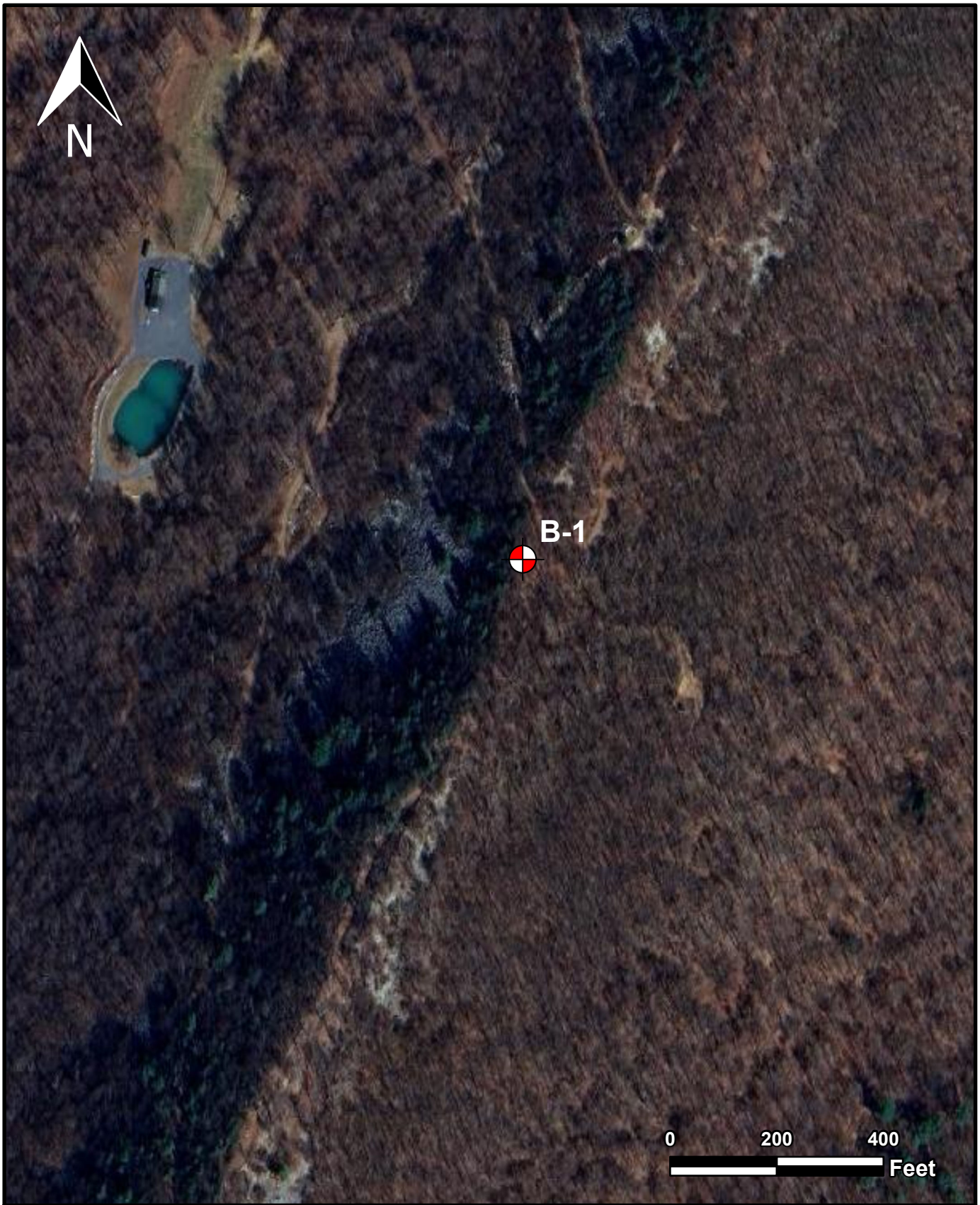


PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-1	

GENERAL SITE VICINITY

Bakers Summit Tower Site
Bedford County, Pennsylvania
Outdoor Map (ESRI)

TRIAD ENGINEERING, INC.
www.triadeng.com



PREPARED BY:	CHECKED BY:
MAR	DWH

PROJECT NUMBER: 01-23-0291

FIGURE A-2

BORING LOCATION PLAN

Bakers Summit Tower Site
Bedford County, Pennsylvania
Google Earth Satellite Imagery (2025)

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APPENDIX B

FIELD EXPLORATION

TRIAD ENGINEERING, INC.

FIELD EXPLORATION

A representative of Triad was present to direct the drill crew, log recovered samples and observe groundwater conditions. The borings were drilled utilizing a Geoprobe 7822DT rotary auger drill rig. Samples of in-situ soil and weathered bedrock were obtained using a split-barrel sampler while performing Standard Penetration Tests (ASTM D 1586). The results of these tests (N-values) are commonly interpreted to provide an index to strength, consistency or relative density of the sampled materials and their ability to support foundations.

Once auger or sampler refusal on harder rock was encountered, select borings were further advanced using rock coring techniques. Continuous rock core samples were obtained from auger/sampler refusal depth to the boring termination depth. The harder rock materials were penetrated and sampled using a conventional, double-tubed core barrel and diamond coring bit, producing a rock core sample a nominal two (2) inches in diameter. The rock coring was performed to assess the type, quality and continuity of the bedrock at the drilled locations. The Rock Quality Designation (RQD) noted on the logs provides an indication of the relative quality and soundness of a specific bedrock stratum by measuring the lengths of intact rock core (unbroken core samples) that are larger than twice the core sample diameter for a specific rock stratum and/or core run and dividing the sum of the cumulative lengths by the thickness of the stratum and/or core run.

Groundwater levels were checked both during and after drilling operations and are recorded on the individual logs. Water levels indicated after rock coring operations are not considered representative of true groundwater levels, due to the introduction of water into the borehole during rock coring. It is emphasized that groundwater levels typically vary and are dependent upon climatic conditions and other environmental factors.

It is also emphasized that the lines shown on the logs are estimates of the changes in material. Actual changes may be gradual and may vary from those indicated on the logs, and the subsurface conditions between the borings may differ from those depicted on the logs. The boreholes were backfilled upon completion of the drilling with auger cuttings. Samples were transported to our office for temporary storage and additional analysis. The samples will be discarded after a period of 60 days unless other arrangements are made.

Figures B-1 and B-2 on the following pages describe the classification system and terminology used on the boring logs.

KEY TO IDENTIFICATION OF SOIL AND WEATHERED BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Primary Component
3	Fractions
4	Moisture
5	Descriptors
6	Plasticity
7	Consistency/ Relative Density
8	Deposition Type

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Primary Component	
Component	Grain Size (USCS)
Boulders	≥ 12 inches
Cobbles	3 to 12 inches
Gravel	#4 to 3 inches
Sand	#200 to #4
Silt/Clay	≤ #200

3. Fractions	
And	≥ 35%
Some	20 to 35%
Little	10 to 20%
Trace	< 10%

4. Moisture	
Dry	Dry to touch
Damp	Slightly moist
Moist	No visible free water
Wet	Visible free water

5. Descriptors	
Fissile	Splits easily along closely spaced parallel planes (breaks into plates)
Hackly	Jagged or irregular fracture planes
Slickensided	Polished and striated surfaces that result from friction along a fault plane
Laminated	Alternating thin layers of varying material or colors less than ¼" thick
Lensed	Inclusion of small pockets of different soils
Saprolitic	Completely weathered rock that retains the appearance of the original rock structure but has only a trace of the original bond strength
Micaceous	Containing mica minerals
Varved	Laminated sediment consisting of alternating layers of fine sand and silt or clay deposited in still water

6. Plasticity of Fine-Grained Soils

Fine-Grained Component	Plasticity	Estimated Plasticity Index (PI)	Smallest Thread Diameter	Thread Characteristics	Dilatancy
Primarily Silt	Non-Plastic	0 - 2%	Ball cracks	Dries rapidly; a 1/8-inch thread cannot be rolled at any water content	Moist ball sheds water when shaken giving a glossy appearance
Primarily Clay	Low Plasticity	3 - 10%	$^1/_8$ to $^1/_4$ inch	Feels powdery when drying out during rolling; thread can barely be rolled	Moist ball retains water or sheds water slowly when shaken
	Medium Plasticity	> 10 - 20%	$^1/_{16}$ inch	Thread cannot be rerolled after reaching plastic limit	
	High Plasticity	> 20%	$^1/_{32}$ inch	Thread can be rerolled after reaching plastic limit	Moist ball retains water when shaken

7a. Relative Density of Granular Coarse-Grained Soils

Descriptor	N-Value
Very Loose	≤ 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

7b. Consistency of Fine-Grained Soils

Descriptor	Pocket Penetrometer (tons/ft^2)	N-Value
Very Soft	≤ 0.25	≤ 2
Soft	≥ 0.25 - 0.5	3 - 4
Medium Stiff	> 0.5 - 1.0	5 - 8
Stiff	> 1.0 - 2.0	9 - 15
Very Stiff	> 2.0 - 4.0	16 - 30
Hard	> 4	≥ 31

8. Type of Deposit	
Alluvium	Sediment deposited by moving water
Colluvium	Sediment deposited by gravity
Fill	Manmade deposit
Fluviomarine	Stratified materials formed by the combined action of river and sea processes
Glacial Outwash	Sediment deposited by glacial meltwater; commonly sand and gravel
Glacial Till	Unsorted sediment deposited by glacier
Glacial Drift	Collective term for all sediment transported and deposited by a glacier or glacial meltwater
Residuum	Insoluble material remaining from weathered rock
Weathered Bedrock	Bedrock that has been weathered

FIGURE B-1

KEY TO IDENTIFICATION OF HARD BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Rock Type
3	Interbedding
4	Descriptors
5	Weathering
6	Fracturing
7	Fracture Angle
8	Hardness

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Rock Type	
Common Regional Rocks	
Sandstone	Siltstone
Mudstone	Shale
Coal	Claystone
Limestone	Dolostone

3. Interbedding/Fractions	
And	≥ 50%
Some	15 to 40%
Few	0 to 15%

4. Descriptors	
Arenaceous	Sedimentary rock containing sand sized particles
Argillaceous	Pertaining to a sedimentary rock which contains an appreciable amount of clay
Calcareous	Containing calcium carbonate; when applied to a rock name, it implies that as much as 50% of the rock is calcium carbonate
Carbonaceous	A rock rich in carbon
Cross Bedded	Original depositional layering is inclined
Ferruginous	A rock having a red or rusty color due to the presence of ferric oxide
Fissile	Splits easily along closely spaced parallel planes
Fossiliferous	Containing fossils
Hackly	Jagged or irregular fracture planes
Micaceous	Containing mica minerals
Nodule	A small rounded mass of a mineral or mineral aggregate different in composition from the enclosing rock
Pyritic	Containing the mineral pyrite
Slickenside	Polished and striated surface that results from friction along a fault plane
Vein	An epigenetic mineral filling of a fault or other fracture
Vuggy	Containing voids usually lined with crystals of a different mineral composition from the enclosing rock

5. Degree of Weathering	
Descriptor	**Criteria**
Fresh	No visible sign of weathering, discoloration, or oxidation
Slightly Weathered	Slight weathering, discoloration, or oxidation **impacting <20% of rock mass**
Weathered	Significant weathering, discoloration, or oxidation **impacting 20 to 60% of rock mass**
Highly Weathered	Major weathering, discoloration, or oxidation **impacting >60% of rock mass**

6. Degree of Fracturing	
Descriptor	**Spacing**
Very Broken	≤ 2 inches
Broken	2 to 8 inches
Blocky	8 inches to 2 feet
Slightly Fractured	2 to 6 feet

7. Angle of Fracture Planes	
Fracture Planes	**Degrees**
Flat	< 5°
Shallow	5 to 15°
Moderate	15 to 30°
Steep	30 to 45°
Very Steep	45 to 60°
Sheer	60 to 90°
Vertical	90°

8. Rock Hardness	
Descriptor	**Test Criteria for Hand Specimen**
Very Soft	Indented with thumb or scratched by fingernail
Soft	Gouged deeply or carved with a knife blade
Medium Hard	Readily scratched by knife blade, scratch leaves heavy trace of dust
Hard	Scratched by knife blade with difficulty, scratch produces little powder and is faintly visible
Very Hard	Not scratched by a knife blade

FIGURE B-2

TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Bakers Summit Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 9/10/25 Drill/Method: Geoprobe 7822DT

Date Completed: 9/10/25 Driller: RU (TERRA) Ground Elev.: 2110

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	S-1		6-8-50/0.2	83%			Gray sandstone **COBBLES** (mechanically broken) and **GRAVEL**, some sand, dry, very dense, **colluvium**				
							- Difficult augering from 1.5 feet				
						3.0	Auger refusal on boulder at 3.0 feet				2107.0
5.0	R-1			70%	0%		Gray sandstone **BOULDERS**, **colluvium**				
						7.0					2103.0
10.0	R-2		PP: 2.5-4.0	26%	0%		Tan **CLAY**, little sand, trace to little angular gravel at random orientations, moist, medium plasticity, very stiff, **colluvium**				
	R-3			74%	10%		- From 12.2 to 12.8 feet: W=17.5%, LL=41, PL=21, PI=19, Gravel=7%, Sand=12%, Fines=81%, CL				
15.0						15.5					2094.5
	R-4			86%	40%		Gray **SANDSTONE**, quartzitic, firmly cemented, weathered, very broken to broken, steep fracture planes, very hard	39%			
20.0							- From 19.4 to 20.2 feet: USC=17,842 psi				

Remarks: Ground surface elevation estimated from USGS 3D Elevation Program (3DEP) data. Borehole dry prior to coring operations. Borehole caved in at 3.0 feet upon completion.

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TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Bakers Summit Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 9/10/25 Drill/Method: Geoprobe 7822DT

Date Completed: 9/10/25 Driller: RU (TERRA) Ground Elev.: 2110

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
25.0	R-5			86%	40%		Gray **SANDSTONE**, quartzitic, firmly cemented, weathered, very broken to broken, steep fracture planes, very hard (continued) - From 22.6 to 23.4 feet: UCS=17,351 psi	39%			
				86%	40%	27.0					2083.0
							Boring terminated at 27.0 feet				
30.0											
35.0											
40.0											

TRIAD ENGINEERING, INC.

Remarks: Ground surface elevation estimated from USGS 3D Elevation Program (3DEP) data. Borehole dry prior to coring operations. Borehole caved in at 3.0 feet upon completion.

ROCK CORE PHOTOGRAPHS

Boring B-1: Box 1 of 2

Boring B-1: Box 2 of 2

TRIAD ENGINEERING, INC.

APPENDIX C

LABORATORY TESTING

TRIAD ENGINEERING, INC.

Laboratory Testing

The samples obtained from the test borings were visually classified in the field by geotechnical engineering personnel from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soils tests were conducted in accordance with applicable ASTM Standards as listed below:

1. Moisture content tests were performed in accordance with ASTM D 2216.

2. Atterberg Limits tests, consisting of the liquid limit, plastic limit, and plasticity index, were performed in accordance with ASTM D 4318.

3. Sieve analyses with washed No. 200 sieve tests were performed in accordance with ASTM D 1140.

4. Rock core compression tests were performed in accordance with ASTM D 7012.

A summary and details of the laboratory test results are included on the following pages of this appendix.

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LABORATORY DATA SUMMARY

BORING NO.	SAMPLE DEPTH (ft)	SAMPLE TYPE	NATURAL MOISTURE (%)	ATTERBERG LIMITS			GRADATION			USCS SOIL CLASS.	UNCONFINED COMPRESSIVE STRENGTH (psi)
				LL	PL	PI	% GRAVEL	% SAND	% FINES		
B-1	12.2 - 12.8	RC	17.5	41	21	19	7	12	81	CL	
B-1	19.4 - 20.2	RC									17842
B-1	22.6 - 23.4	RC									17351

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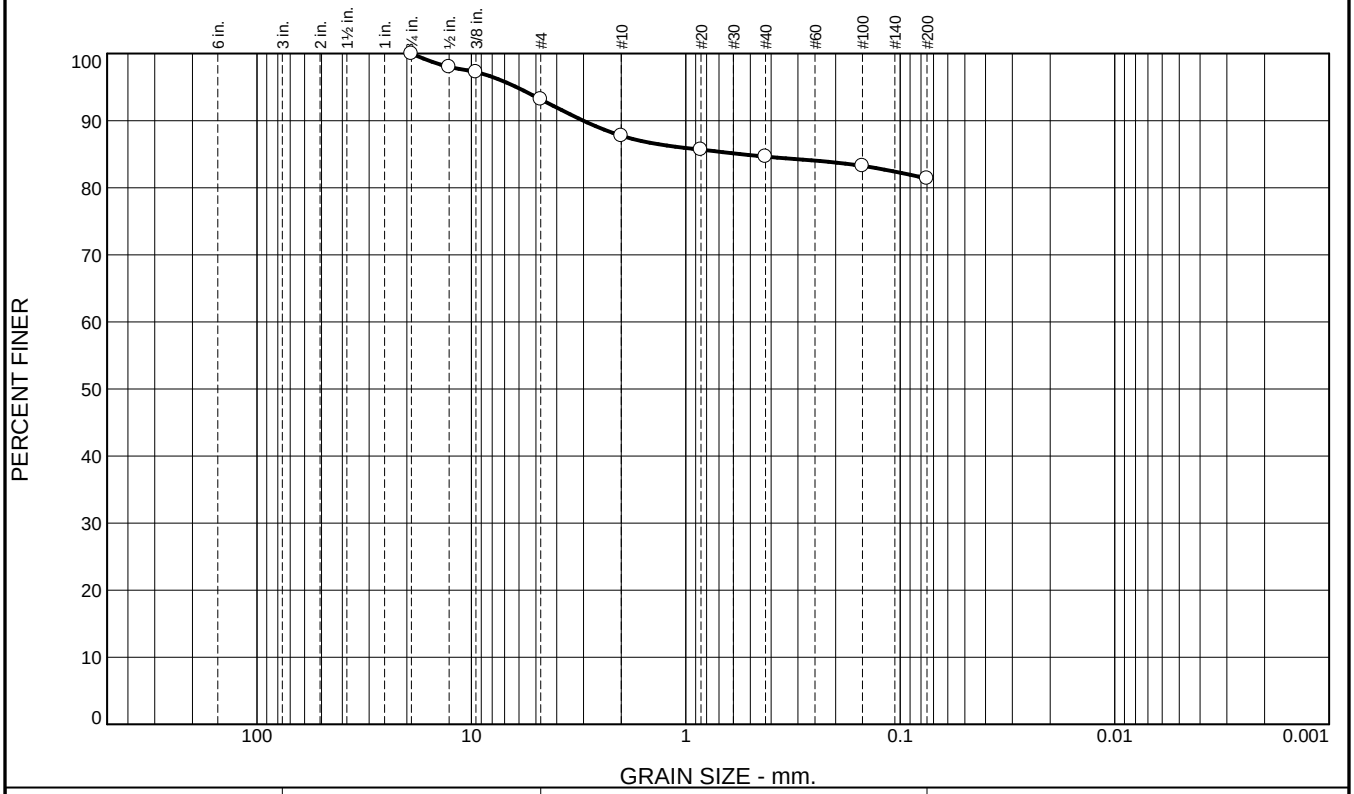
Notes:
1) Soil tests performed in accordance with recognized ASTM testing standards.
2) SS = Split Spoon UD = Undisturbed
RC = Rock Core
3) NV = Non Viscous NP = Non Plastic

PROJECT NUMBER: 01-23-0291
PROJECT NAME: Bakers Summit Tower Site
LOCATION: Bedford County, Pennsylvania

FIGURE C-1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	6.8	5.4	3.2	3.2	81.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.0		
3/8"	97.2		
#4	93.2		
#10	87.8		
#20	85.7		
#40	84.6		
#100	83.3		
#200	81.4		

* (no specification provided)

Material Description

Light brown lean clay with sand

Atterberg Limits

PL= 21.3 LL= 40.6 PI= 19.3

Coefficients

D_{90}= 3.0098 D_{85}= 0.5517 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(16)

Remarks

Source of Sample: B-1 **Depth:** 12.2' - 12.8'
Sample Number: R-3

Date: 9/12/2025

Triad Engineering, Inc.

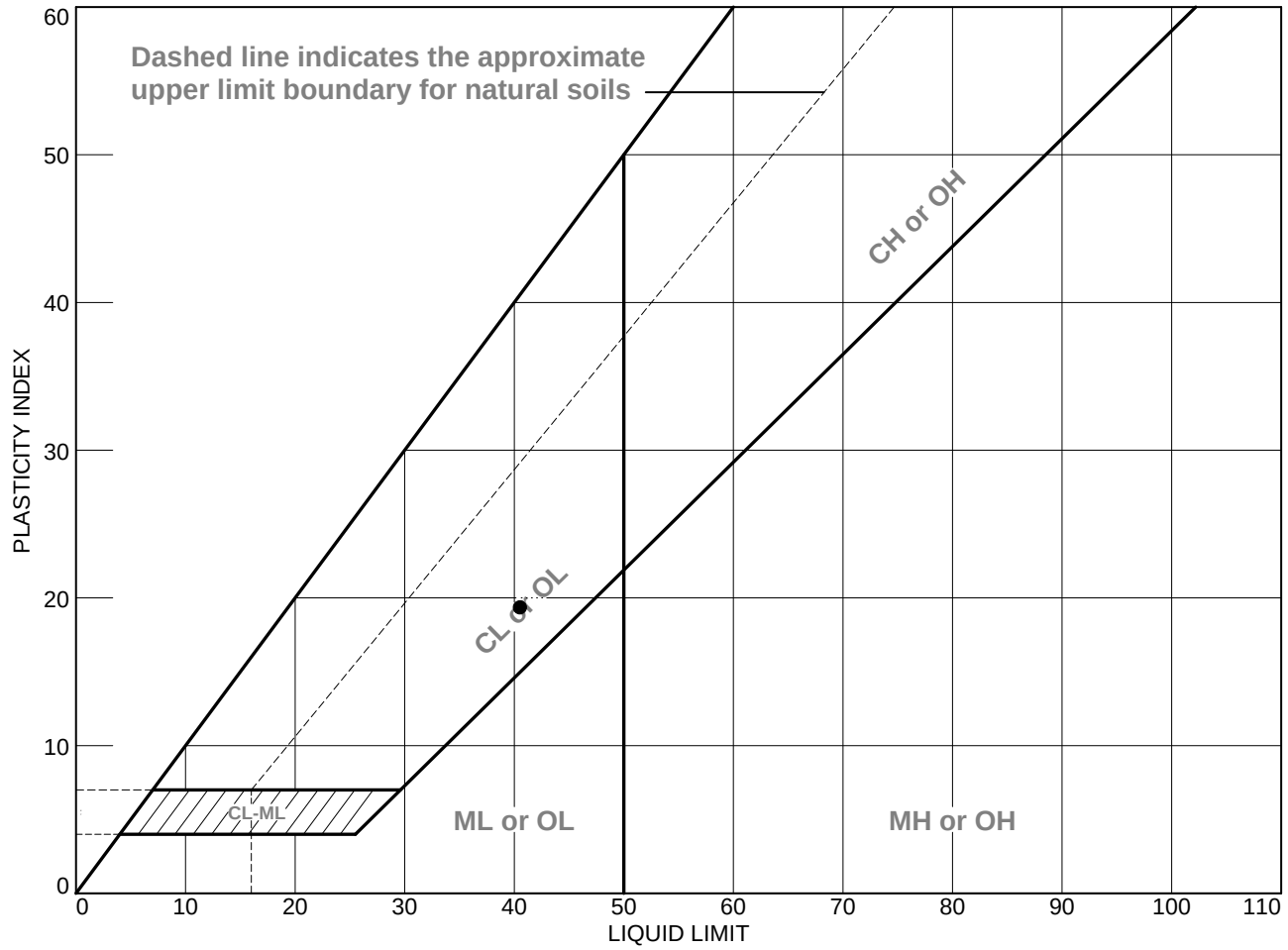
Morgantown, WV

Client: Alleghenies Broadband, Inc.
Project: Bakers Summit

Project No: 01-23-0291 **Figure C-2**

Tested By: LMC **Checked By:** JKM

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-1	R-3	12.2' - 12.8'	17.5	21.3	40.6	19.3	CL

Triad Engineering, Inc.

Morgantown, WV

Client: Alleghenies Broadband, Inc.
Project: Bakers Summit

Project No.: 01-23-0291 **Figure C-3**

Tested By: LMC **Checked By:** JKM

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Bakers Summit

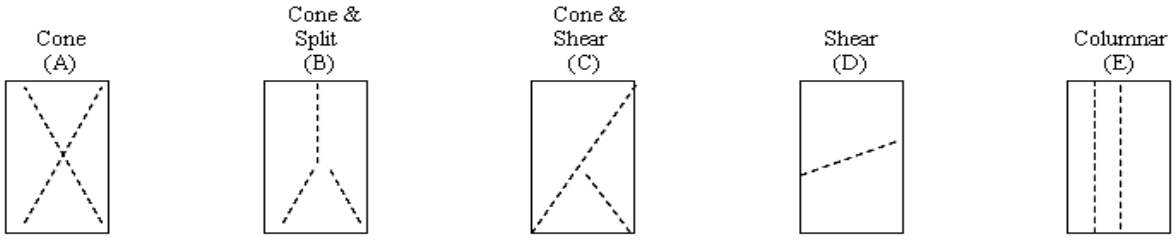
Project # : 01-23-0291 Date : 9/12/2025

Core # : B-1/R-4 Depth: 19.4' - 20.2'

Sample Description: Light gray sandstone

Measurements (inches)		
	Capped Length	Diameter
#1	3.838	1.982
#2	3.823	1.981
#3	3.828	1.981
Avg.	3.830	1.981

Length to Diameter Ratio :	**1.93**		Correction Factor:	**1**
Area:	**3.0832**	in^2	Flatness of Sample:	FLAT
Load:	**55010**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**17842**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**1285**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**17842**	lbs/in^2	Type of Break:	E
Corrected Strength :	**1285**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-4

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Bakers Summit

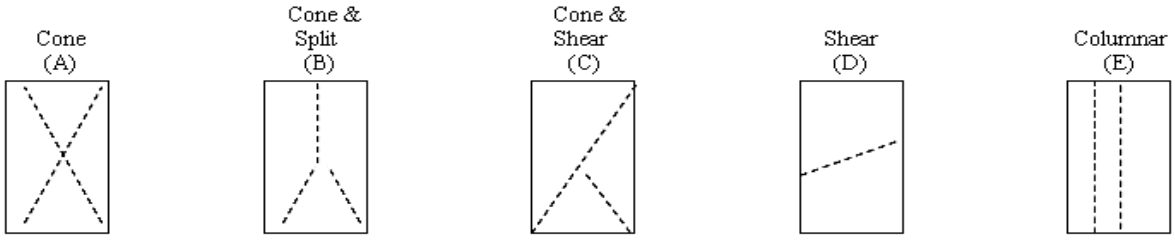
Project # : 01-23-0291 Date : 9/12/2025

Core # : B-1/R-5 Depth: 22.6' - 23.4'

Sample Description: Light gray sandstone

Measurements (inches)		
	Capped Length	Diameter
#1	3.861	1.981
#2	3.868	1.980
#3	3.852	1.981
Avg.	3.860	1.981

Length to Diameter Ratio :	**1.95**		Correction Factor:	**1**
Area:	**3.0811**	in^2	Flatness of Sample:	FLAT
Load:	**53460**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**17351**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**1249**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**17351**	lbs/in^2	Type of Break:	E
Corrected Strength :	**1249**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-5

TRIAD ENGINEERING, INC.

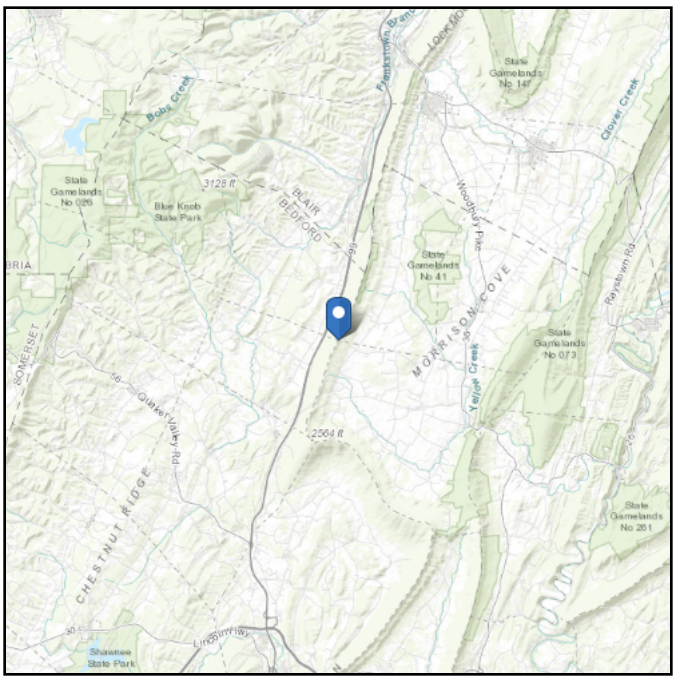
APPENDIX D

SEISMIC INFORMATION

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-22	**Latitude:**	40.206667
Risk Category:	II	**Longitude:**	-78.467222
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	2109.2435054944776 m (NAVD 88)



Seismic

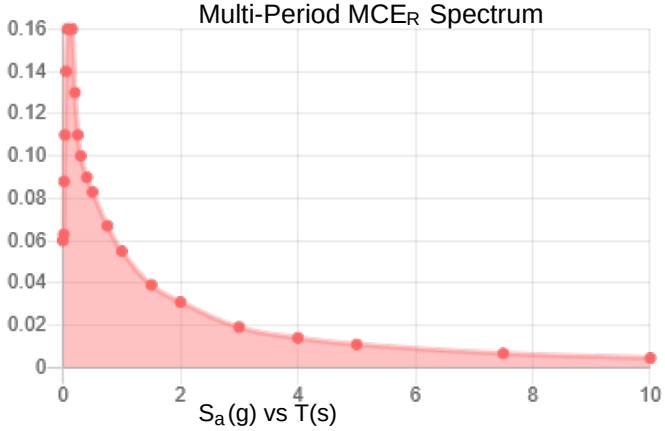
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

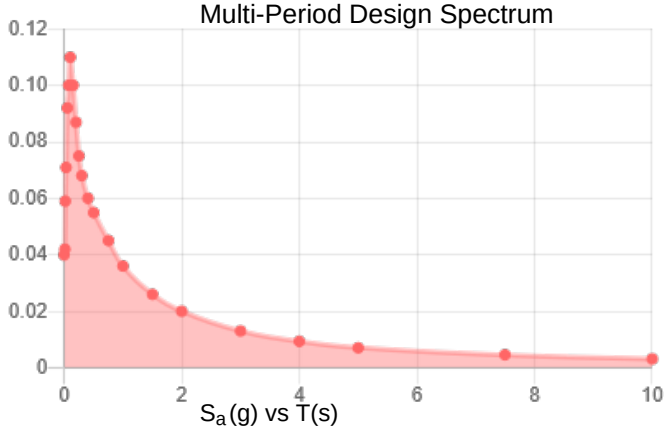
PGA_M :	0.053	T_L :	12
S_{MS} :	0.12	S_S :	0.11
S_{M1} :	0.055	S_1 :	0.042
S_{DS} :	0.078	V_{S30} :	530
S_{D1} :	0.037		

Seismic Design Category: A

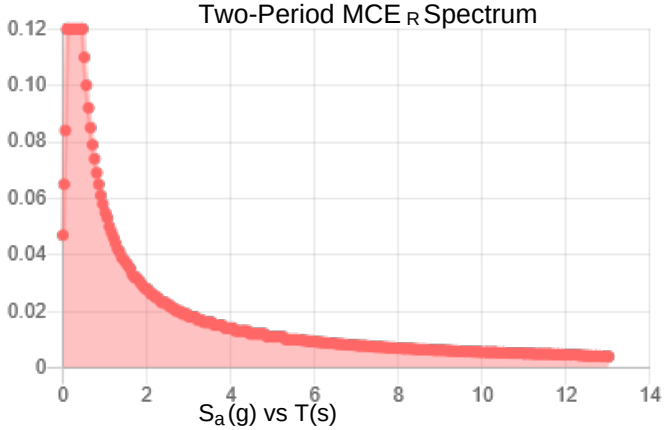
Multi-Period MCE_R Spectrum



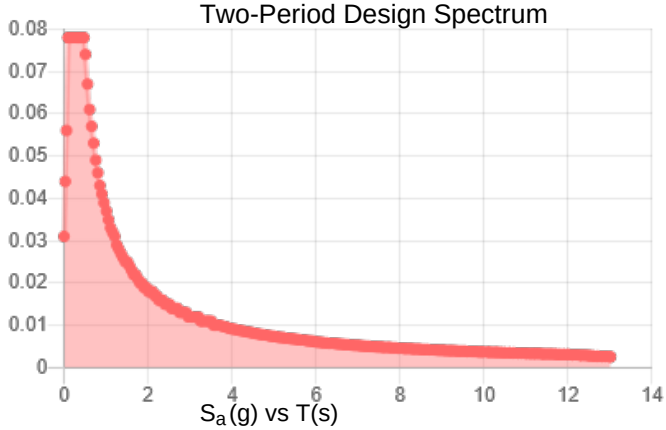
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Fri Sep 12 2025**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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TRIAD ENGINEERING, INC.

Report of Geotechnical Exploration

Triad Project No. 01-23-0291

September 25, 2025

Buck Falls Tower Site
Bedford County, Pennsylvania

Prepared For:
Alleghenies Broadband, Inc.
3900 Industrial Park Drive
Altoona, PA 16602

Prepared By:
Triad Engineering, Inc.
1097 Chaplin Hill Road
Morgantown, WV 26501

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APPENDICES

Report of Geotechnical Exploration
Buck Falls Tower Site
Bedford County, West Virginia

SITE AND PROJECT DESCRIPTION

The project site is located approximately eight miles southwest of Bedford in Bedford County, Pennsylvania. The site consists of a leveled pad on a steep slope mantled with boulder colluvium on the west flank of Evitt Mountain. The approximate location is shown on Figure A-1 in Appendix A.

According to the *Tower Site Exhibit* prepared by Mission Critical Partners, the proposed development will consist of a 180-foot self-supporting telecommunications tower for Alleghenies Broadband, Inc. The project will also include construction of an adjacent 8-foot by 10-foot utility shed, enclosed within a 100-foot by 100-foot security fence. The proposed tower center is located at coordinates 39.911370, -78.563603. Estimates of loads to be supported by the tower foundations have not been provided.

GEOLOGY

Surficial Geology

Based on our review of the *Quaternary Geologic Map of the Blue Ridge 4 Degrees by 6 Degrees Quadrangle*, published in 1991 by the U.S. Geological Survey (USGS) as part of the *Quaternary Geologic Atlas of the United States*, the surficial soils at the site consist of Holocene and Wisconsin quartzite-block loamy colluvium. Colluvium refers to loose, unconsolidated material that accumulates on or at the base of slopes through processes such as gravity movement, rainwash, or gradual downslope creep.

This colluvium is composed of unsorted sand, silt, and clay containing angular to subrounded sandstone blocks and cobbles, which may reach up to about 3 feet in diameter. It typically mantles slopes and ridge crests underlain by quartzitic sandstone. On steeper slopes, it can form talus or debris cones that overlie shale-chip loamy colluvium. At elevations above 2,000 feet, it commonly occurs as block fields and block streams. Rock outcrops are frequent within the unit, and the thickness of the colluvium can range from 3 to 30 feet.

Bedrock Geology

According to the *Geologic Map of Pennsylvania* (Pennsylvania Geological Survey, 1980) and the *Pennsylvania Geologic Data Exploration* system maintained by the Department of Conservation and Natural Resources (PA DCNR), the colluvium at the project site is underlain by the Tuscarora Formation of the Silurian Period. This formation is composed primarily of light- to medium-gray sandstone, with local occurrences of red and green beds, along with orthoquartzite and minor shale and siltstone interbeds. The rock is generally fine- to coarse-grained, very hard, and well cemented, with common crossbedding and localized conglomeratic zones. At its upper contact, it contains the Castanea Member, characterized by alternating red and nonred sandstone. The Tuscarora forms many of the prominent ridges within the Ridge and

Valley province. Bedding is typically thick, although crossbedding can obscure it, and the unit can reach a maximum thickness of roughly 1,500 feet.

Coal Resources

We researched mine maps available through the *Pennsylvania Mine Map Atlas*, the *Pennsylvania Historic Surface Mine Permit Locator*, and the *Pennsylvania Active Underground Bituminous Coal Mining* database, all maintained by the Pennsylvania Department of Environmental Protection (PA DEP), to ascertain what minable coal beds are present below the site and to determine if past surface or underground mining operations have been conducted. In performing this evaluation, we could not identify any documented surface or underground mining directly at or beneath the project site.

It should be noted that the abovementioned PA DEP databases may be incomplete due to the limited number of years requiring permitting and mapping. As such, the lack of identified mines at the subject site does not constitute a guarantee of a mine-free area.

SUBSURFACE EXPLORATION

As requested, Triad drilled one test borings at the proposed tower center from August 26 to September 4, 2025. Triad staked the boring location by using a handheld GPS device. The surface elevation for the boring was obtained from the provided *Tower Site Exhibit* prepared by Mission Critical Partners. Figure A-2 in Appendix A depicts the approximate locations of the test borings drilled for the project.

A geologist from Triad was present full time during the drilling to direct the drilling crew, log all recovered soil samples, and observe groundwater and rock conditions. Triad transported the recovered soil samples to our laboratory for further testing. Detailed descriptions of materials encountered in the test borings are documented on the boring logs in Appendix B. Figures B-1 and B-2 in Appendix B describe the classification system and terminology utilized.

SUBSURFACE CONDITIONS

The materials encountered in the borings are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types, and the actual transitions between boring locations may be gradual.

Colluvium: Colluvium consisting primarily of very hard sandstone cobbles and boulders were encountered to a depth of approximately 19.5 feet. Augers were advanced with difficulty through this material to a depth of 7 feet. Below this depth, rock coring was required to progress through the boulders. Temporary steel casing was installed to stabilize the borehole walls and prevent collapse during coring and sampling.

Bedrock: Once casing refusal was attained, the boring was advanced to a termination depth of 34 feet below the existing grade utilizing rock coring techniques. Bedrock cored in the boring consisted of firmly cemented, quartzitic sandstone. Rock core recovery values ranged from 87 to 100 percent, and Rock Quality Designation (RQD) values ranged from 33 to 58 percent per

core run. Unconfined compressive strength tests were performed on two rock core samples recovered from the boring. The results ranged from 20,452 to 22,184 psi, corresponding to very hard rock.

Groundwater: Groundwater levels were measured both during and after drilling operations. The borehole was dry prior to coring operations. It should be noted that water levels indicated after rock coring operations are not considered representative of true groundwater levels due to the introduction of water into the borehole during rock coring. Upon completion, the borehole caved in at a depth of 17.9 feet, and groundwater was not observed at that depth.

It is emphasized that fluctuations in true groundwater levels can occur due to seasonal, climatic and environmental variations which may not have been evident at the time of the field exploration. Consequently, groundwater levels can vary significantly from those recorded at the time measurements were taken.

LABORATORY TESTING

Triad performed laboratory tests on selected rock samples to aid in classification and provide a basis for estimating their engineering properties. The laboratory tests were performed in general accordance with ASTM standard test methods. Appendix C contains the detailed results. These results are summarized in the following table:

TYPE OF TEST	TEST RESULTS
Unconfined Compressive Strength of Rock	20,452 and 22,184 psi

DISCUSSION

The project site is underlain by approximately 19.5 feet of cobble and boulder colluvium. Refusal in competent bedrock was attained at a depth of about 19.5 feet. Bedrock cored in the boring consisted of very hard, quartzitic sandstone.

Based on these conditions, specifically the hardness of the sandstone, we suggest the use of a pad and pier foundation system to support the proposed tower. Drilling through the sandstone to install shafts is not recommended. It should also be noted that due to the nature of the colluvium and the presence of cobbles and boulders, developing a solid base for the pier may be difficult. The presence of the soil within the loosely nested boulders may result in a varying bearing surface both in elevation and material type. In order to address pockets left by boulders removed during excavation and uneven bearing due to rock and soil zones at the same level, we recommend a 4-foot undercut be included as a contingency in the contract. Backfilling voids left from the removal of cobbles or boulder or the 4-foot deep undercut should be performed using crusher run as defined below. Excavation of rock is not required as part of the 4-foot undercut if implemented.

The following sections of this report include recommendations for the design and construction of the geotechnical elements of the project. Provided that these recommendations are followed, it is our opinion that the site is generally suitable for the proposed construction.

DESIGN RECOMMENDATIONS

The geotechnical engineering evaluation of the site and subsurface conditions at the property, as well as the recommendations for site preparation and foundation support, are based on our site observations, the field data obtained and our understanding of the project information as presented in this report.

Pad and Pier

Based on the subsurface conditions encountered in boring B-1, it is our opinion that the foundation for support of the tower can be a pad and pier type foundation comprised of an isolated foundation and pier extending to the base of the tower. We anticipate that this foundation type may require an excavation on the order of 4 feet below existing grade to meet suitable bearing and be below frost depth. We have assumed a 6-foot square pad for purposes of our analysis. The recommendations provided are acceptable for foundations 6 foot square and larger. For a foundation bearing at 4 feet (cobble and boulder colluvium) below existing grade, we recommend for foundation design on colluvial soil or backfilled undercut. If higher design values are required, Triad can provide additional bearing capacity recommendations at specific depths upon request. Recommendations for colluvial soils are provided below:

STRATA	BOTTOM OF FOUNDATION	ALLOWABLE BEARING CAPACITY (psf)	K (pci)
Cobble and Boulder Colluvium	4	5,000	120

If needed to provide consistent bearing as discussed above a 4-foot over-excavation should be performed. The over-excavation should extend a minimum of 5 feet beyond the building perimeter on all sides.

Uplift Considerations

We anticipate that the tower planned for the site will be subjected to uplift forces. The uplift capacity for pad and pier foundations is obtained from the weight of the concrete foundation and the weight of equipment and/or backfill above the foundation. We recommend that unit weights of 145 pcf for concrete and 125 pcf for compacted backfill be used to compute uplift resistance. The weight of the equipment placed above the foundation should be obtained from the equipment manufacturer. A factor of safety of 1.5 should be applied to uplift determinations for foundations.

Lateral Load Considerations

We anticipate that the tower planned for the site will be subjected to lateral loads. Lateral load resistance of foundations can be obtained using friction along the base of the foundation and passive resistance of the materials immediately adjacent to the foundation. In designing the foundation to resist lateral loads, we recommend the use of a frictional resistance value (coefficient of friction) of 0.50 and active and passive lateral earth pressure coefficients of 0.33 and 3.0, respectively. When computing the lateral resistance due to earth pressure, the resistance due to active earth pressure must be subtracted from the passive earth pressure. A factor of safety of 1.5 should be used to determine the allowable lateral load resistance.

Settlement Considerations

For the pad and pier foundation, settlements due to structural loading were estimated based on the results of the test borings, the recommended allowable bearing pressure and our past experience with similar conditions. Based on this information, we estimate that foundation settlement for the proposed tower could be on the order of 1/2 inch. Differential settlement which could occur between individual similarly loaded column foundations is estimated to be on the order of approximately ½ inch. If structural loads require foundations larger than the minimum widths for individual column footings recommended in this report, we should be contacted to re-evaluate our settlement estimates using the actual structural loads and proposed foundation dimensions.

Seismic Site Classification

The subsurface profile was evaluated and classified according to ASCE/SEI 7-22. This code establishes the criteria for project site evaluation and determination of several seismic design parameters. ASCE/SEI 7-22, Chapter 20 outlines the procedure for determination of the site classification based on the average shear wave velocity for materials to a depth of 100 feet. Table 20.2-1 includes ranges of estimated shear wave velocities for each class (type) of material, and those classes are determined as the result of soil type and in-situ consistencies and/or relative densities reflected by SPT testing in the borings. Based on the results of the test borings and our assumptions, the site has an average shear wave velocity of 1,869 feet per second (fps). Using this information along with knowledge of the site geologic setting, the seismic site class and additional seismic information is as follows:

PARAMETER DESCRIPTION	SEISMIC RESULT
Seismic Site Class	C
Soil Profile	Very Dense Soil and Soft Rock
MCE_R (5% damped, short periods), S_{MS}	0.12
MCE_R (5% damped, 1.0 second period), S_{M1}	0.065

PARAMETER DESCRIPTION	SEISMIC RESULT
Design (5% damped, short periods), S_{DS}	0.083
Design (5% damped, 1.0 second period), S_{D1}	0.043

Based on results from the test borings, published regional geologic information and the probable maximum strength of earthquake, it is our opinion that liquefaction potential for the on-site soils during seismic activity is relatively low. Seismic parameters to be considered for structural design of the project are provided in Appendix D of this report.

CONSTRUCTION RECOMMENDATIONS

Site Preparation

Initial preparation of the site for construction should include installation of sediment and erosion control measures and any upslope diversion ditching or berms that are required. Existing utilities that conflict with proposed foundations and/or new utility alignments should be relocated as necessary.

Site Excavations

It is anticipated that most of the on-site soil and weathered bedrock can be effectively removed with conventional earth-moving equipment such as backhoes and dozers. Except for the deep foundations, it is assumed that excavations required for the project will likely not extend to depths sufficient to encounter harder bedrock. However, harder bedrock that is encountered may require rock removal techniques such as hoe-ram chipping or hydraulic splitting for effective removal.

The means necessary to excavate rock are a function of the consistency/hardness of the material, the type/size of excavation equipment utilized and the effort the contractor is willing to apply. If the plans call for excavation of rock for bidding purposes, potential contractors should be instructed to perform their own investigations as to measures necessary to excavate bedrock encountered.

Excavated materials should not be stockpiled and construction equipment should not be positioned beside open excavations, since the added load may cause a sudden collapse of the excavation side walls. The design and construction of all excavations should comply with applicable local, state, and federal safety regulations, including the current requirements of the Occupational Safety and Health Administration (OSHA). In no case should slope height, slope inclination, or excavation depth exceed those specified by OSHA or any other regulatory agencies or local authorities having jurisdiction at the construction site.

Controlled Fill

Suitable Fill Material

For the backfill beneath the foundation, Triad recommends granular fill from a material supplier such as crusher run or 2A modified. Fill required to attain design grades outside the pad and on top of it should be placed as controlled, compacted fill. This fill includes approved on-site excavated materials, off-site borrow material such as residual soils, soil/rock mixtures, and soft weathered rock, or a well-graded commercial stone such as crusher run aggregate. The fill should be free of trash, wood, coal, topsoil, organics, pyritic material with greater than 0.1 percent by weight of pyritic sulfur, frozen material, and pieces of rock greater than 4 inches in any dimension for lift thicknesses of 9 inches or 1½ inches in any dimension for lift thicknesses of 4 inches. Materials classified as MH, CH, OH, OL and Pt based on the Unified Soil Classification System (USCS) are not considered suitable for use as new fill. All fill should be tested and approved prior to placement and compaction.

Fill Placement and Compaction

Before initiating fill placement, any topsoil or other surficial material should be removed. The subgrade surface should be proof-rolled with appropriate rubber-tired construction equipment and/or visually evaluated to locate any soft spots or areas of excessive "pumping." Any such areas should be over-excavated to a firm subgrade and replaced with new, controlled fill material. The engineer should be contacted if excessive over-excavation is required.

During placement, moisten or aerate each layer of fill, as necessary, to obtain the required compaction. Fill should not be placed on surfaces that are muddy, frozen or have not been approved by prior testing and/or proof-rolling. Free water should be prevented from appearing on the surface during or after compaction operations. Fill placed on sloping areas should be properly benched or “notched” into the slope face such that a smooth transition between the new fill and existing slope face is not present.

Soil material which is removed because it is too wet to permit proper compaction may be spread and allowed to dry. Drying can be facilitated by discing, harrowing, or by pulverizing until the moisture content is reduced to an acceptable level. When the soil is too dry, water may be uniformly applied to the subgrade surface or to the layer to be compacted.

Fill material compacted by heavy compaction equipment should be placed in loose layers not exceeding 9 inches in thickness. Fill compacted with lightweight equipment, such as hand-operated tampers or walk-behind rollers, should be placed in loose layers not exceeding 4 inches in thickness. The compaction equipment utilized should be suitable for the type of material being compacted. Vibratory rollers are best suited to coarse-grained soils, while pad foot (often called sheepsfoot) rollers are appropriate for fine-grained materials. Fill placed adjacent to foundation walls should be compacted using lightweight equipment.

New fill placed within the structure footprint and extending at least five (5) feet beyond its perimeter, or to that extent possible, should be compacted to at least 98 percent of the laboratory maximum dry density as determined by the Standard Proctor method (ASTM D 698).

Fill placed outside of these areas should be compacted to at least 95 percent of the maximum dry density as determined by the same standard. The placement moisture content of fill material should be within ±3 percentage points of the optimum moisture content as determined by ASTM D 698, except the structural areas where the moisture content should be within ±2 percent of the optimum moisture content. Granular materials, such as clean sand or aggregate, should be compacted to at least 85% of its relative density, as determined by ASTM D 4253 and D 4254 test methods.

Foundation Construction

Foundation excavations should be cleaned of all loose or otherwise disturbed materials present in the base of the excavations. The excavations should be observed and tested by a qualified geotechnical engineer, or his/her representative, prior to concrete placement to verify that materials capable of providing the recommended bearing capacity are present and that the foundation subbase is a consistent material. Materials exposed in the foundation excavations may be susceptible to softening and/or degradation if exposed to precipitation or surface water runoff. In addition, some foundation excavations could be relatively deep. Consequently, foundation concrete should be placed in the excavations as soon as possible once the excavations have been observed and approved, and only that amount of foundation excavation which can be backfilled with concrete should be opened on any given day. Once foundation walls have been constructed up to final exterior grades, we recommend that the foundation excavations be backfilled with compacted soil fill to prevent ponding of water adjacent to foundations.

Groundwater and Surface Runoff Control

The contractor should be prepared to implement temporary and/or permanent dewatering measures since groundwater conditions can change. We anticipate that sources of subsurface water which may develop during construction can probably be managed and removed by a gravity drainage system, sump pits and pumps or other minor dewatering procedures.

Surface water runoff should be prevented from flowing through the construction area. If necessary, diversion ditches or berms should be installed upslope of the construction area. Ditches should be protected from excessive erosion using riprap, erosion control matting, or vegetation.

Quality Assurance and Control

We recommend that the geotechnical engineer-of-record, Triad, be retained to monitor the construction activities to verify that the field conditions are consistent with the findings of our exploration. If significant variations are encountered, or if the design is altered, we should be notified.

The geotechnical engineer should provide personnel full-time and/or intermittently to:

- Observe and document installation of the drainage features and verify initial subgrade conditions prior to fill placement.
- Observe and test material compaction during fill construction. Field density tests should be performed in accordance with ASTM D 6938 (nuclear method). At least three (3) field density tests should be performed for each lift or at a frequency determined by the geotechnical engineer to be sufficient for the size of the fill area to verify the required soil compaction.
- Examine all subgrade bearing levels to confirm compliance with our recommendations and verify that adequate support is available.
- Test fresh structural concrete placed for the project.

LIMITATIONS

This report has been prepared for the exclusive use of Alleghenies Broadband, Inc. for specific application to the design of the proposed telecommunications tower in Buck Falls, Bedford County, Pennsylvania. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own investigation of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or reuse of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety. Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the boring at the site. It is emphasized that subsurface conditions may vary dramatically between borings, and Triad makes no representations as to subsurface conditions other than those encountered at the specific boring location. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, if any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed, and the conclusions are modified or verified in writing by Triad.

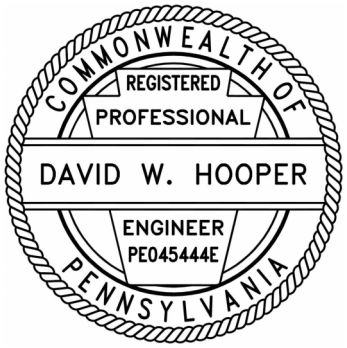
It is recommended that we be provided the opportunity to review the final grading plan, overall foundation design, and specifications so that earthwork and foundation recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

We appreciate the opportunity to submit this report and look forward to working with you on the construction of this project. Please contact the undersigned with any questions or concerns you have regarding this report.

TRIAD ENGINEERING, INC.

Maria af Rolén, P.G.
Senior Geologist

David W. Hooper, P.E.
Principal Engineer



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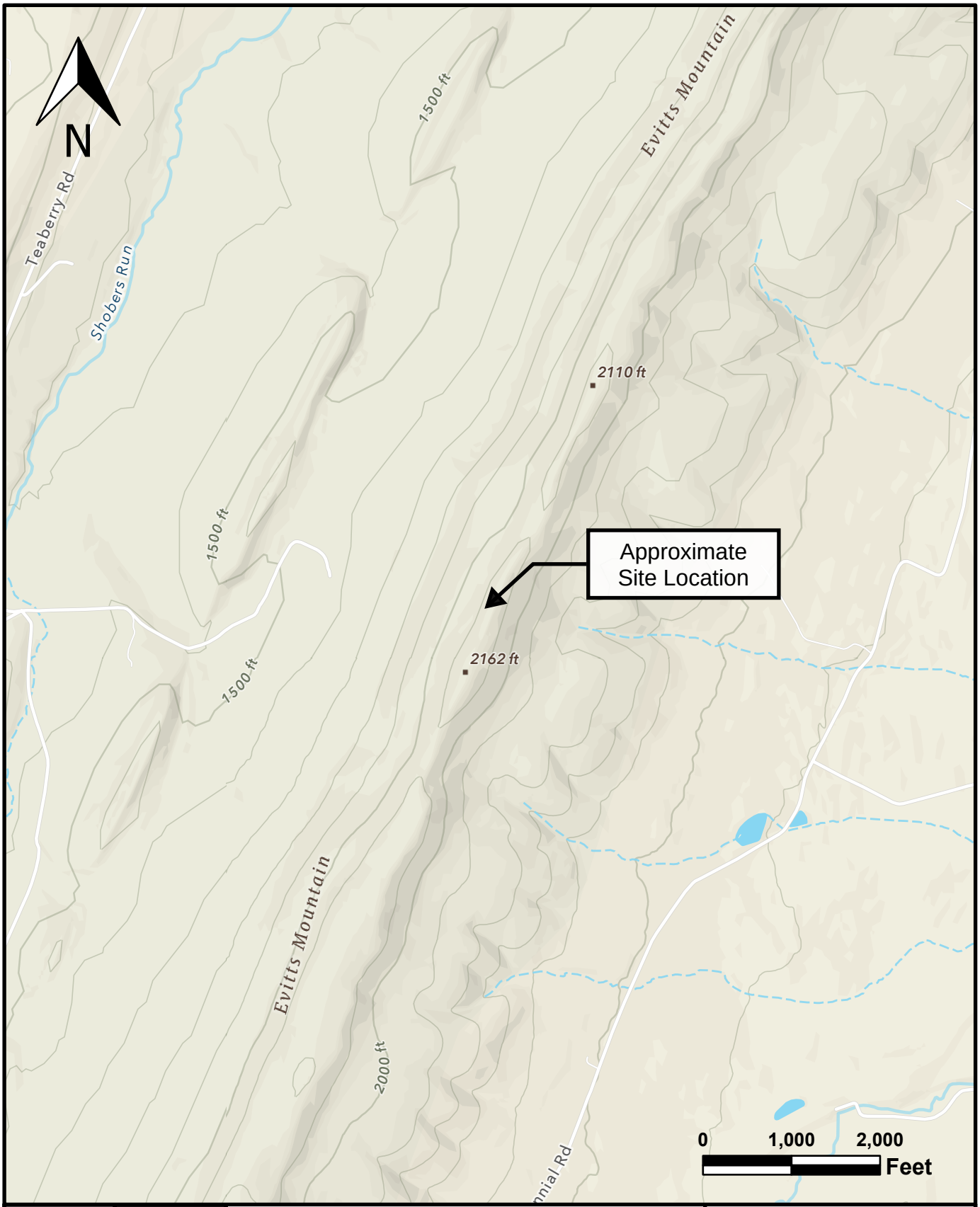
APPENDIX A

FIGURES



PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-1	

GENERAL SITE VICINITY

Buck Falls Tower Site
Bedford County, Pennsylvania
Outdoor Map (ESRI)

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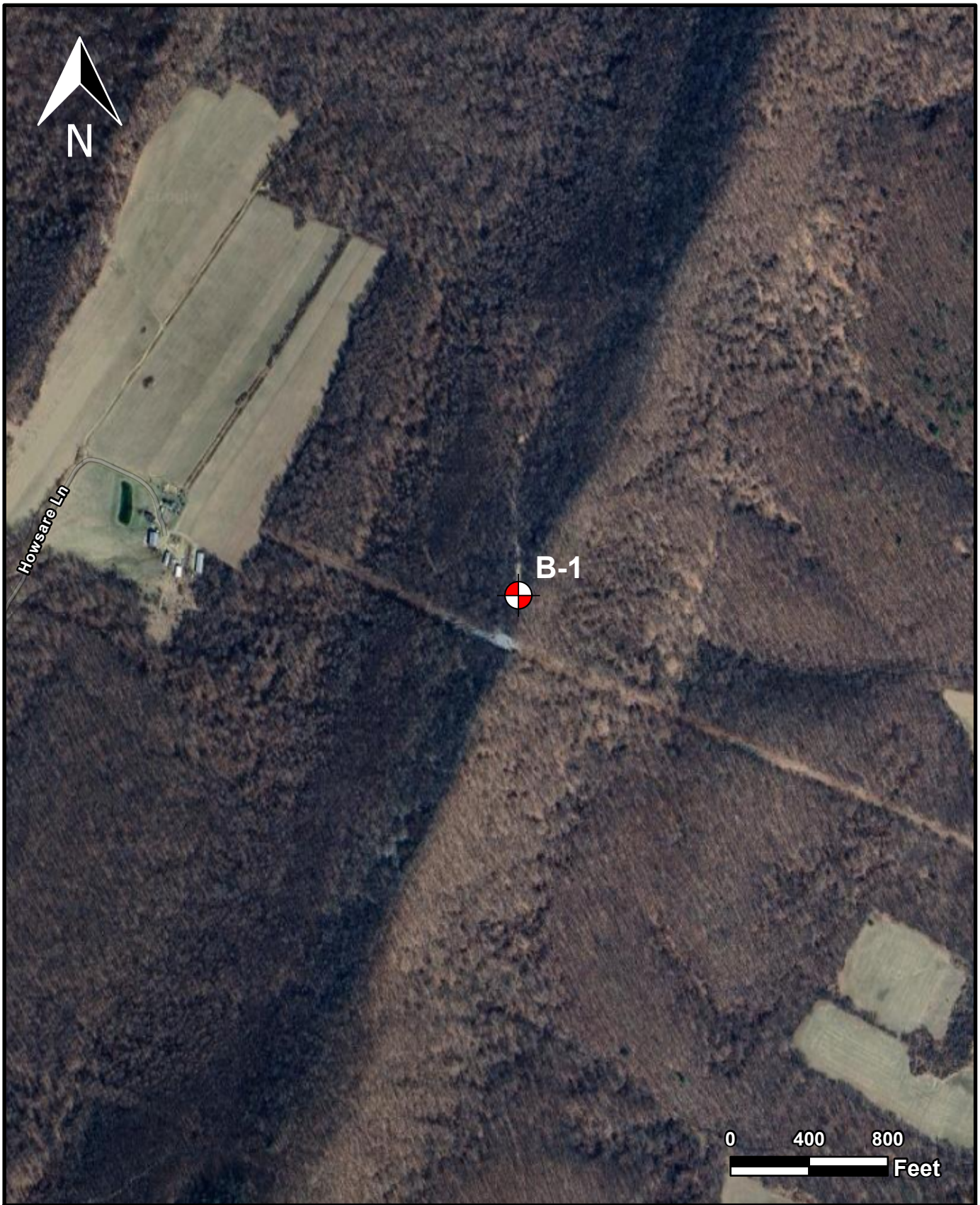

PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-2	

BORING LOCATION PLAN

Buck Falls Tower Site
Bedford County, Pennsylvania
Google Earth Satellite Imagery (2025)

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APPENDIX B

FIELD EXPLORATION

TRIAD ENGINEERING, INC.

FIELD EXPLORATION

A representative of Triad was present to direct the drill crew, log recovered samples and observe groundwater conditions. The borings were drilled utilizing a Geoprobe 7822DT rotary auger drill rig. Samples of in-situ soil and weathered bedrock were obtained using a split-barrel sampler while performing Standard Penetration Tests (ASTM D 1586). The results of these tests (N-values) are commonly interpreted to provide an index to strength, consistency or relative density of the sampled materials and their ability to support foundations.

Once auger or sampler refusal on harder rock was encountered, select borings were further advanced using rock coring techniques. Continuous rock core samples were obtained from auger/sampler refusal depth to the boring termination depth. The harder rock materials were penetrated and sampled using a conventional, double-tubed core barrel and diamond coring bit, producing a rock core sample a nominal two (2) inches in diameter. The rock coring was performed to assess the type, quality and continuity of the bedrock at the drilled locations. The Rock Quality Designation (RQD) noted on the logs provides an indication of the relative quality and soundness of a specific bedrock stratum by measuring the lengths of intact rock core (unbroken core samples) that are larger than twice the core sample diameter for a specific rock stratum and/or core run and dividing the sum of the cumulative lengths by the thickness of the stratum and/or core run.

Groundwater levels were checked both during and after drilling operations and are recorded on the individual logs. Water levels indicated after rock coring operations are not considered representative of true groundwater levels, due to the introduction of water into the borehole during rock coring. It is emphasized that groundwater levels typically vary and are dependent upon climatic conditions and other environmental factors.

It is also emphasized that the lines shown on the logs are estimates of the changes in material. Actual changes may be gradual and may vary from those indicated on the logs, and the subsurface conditions between the borings may differ from those depicted on the logs. The boreholes were backfilled upon completion of the drilling with auger cuttings. Samples were transported to our office for temporary storage and additional analysis. The samples will be discarded after a period of 60 days unless other arrangements are made.

Figures B-1 and B-2 on the following pages describe the classification system and terminology used on the boring logs.

KEY TO IDENTIFICATION OF SOIL AND WEATHERED BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Primary Component
3	Fractions
4	Moisture
5	Descriptors
6	Plasticity
7	Consistency/ Relative Density
8	Deposition Type

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Primary Component	
Component	Grain Size (USCS)
Boulders	≥ 12 inches
Cobbles	3 to 12 inches
Gravel	#4 to 3 inches
Sand	#200 to #4
Silt/Clay	≤ #200

3. Fractions	
And	≥ 35%
Some	20 to 35%
Little	10 to 20%
Trace	< 10%

4. Moisture	
Dry	Dry to touch
Damp	Slightly moist
Moist	No visible free water
Wet	Visible free water

5. Descriptors	
Fissile	Splits easily along closely spaced parallel planes (breaks into plates)
Hackly	Jagged or irregular fracture planes
Slickensided	Polished and striated surfaces that result from friction along a fault plane
Laminated	Alternating thin layers of varying material or colors less than ¼" thick
Lensed	Inclusion of small pockets of different soils
Saprolitic	Completely weathered rock that retains the appearance of the original rock structure but has only a trace of the original bond strength
Micaceous	Containing mica minerals
Varved	Laminated sediment consisting of alternating layers of fine sand and silt or clay deposited in still water

6. Plasticity of Fine-Grained Soils

Fine-Grained Component	Plasticity	Estimated Plasticity Index (PI)	Smallest Thread Diameter	Thread Characteristics	Dilatancy
Primarily Silt	Non-Plastic	0 - 2%	Ball cracks	Dries rapidly; a 1/8-inch thread cannot be rolled at any water content	Moist ball sheds water when shaken giving a glossy appearance
Primarily Clay	Low Plasticity	3 - 10%	$^1/_8$ to $^1/_4$ inch	Feels powdery when drying out during rolling; thread can barely be rolled	Moist ball retains water or sheds water slowly when shaken
	Medium Plasticity	> 10 - 20%	$^1/_{16}$ inch	Thread cannot be rerolled after reaching plastic limit	
	High Plasticity	> 20%	$^1/_{32}$ inch	Thread can be rerolled after reaching plastic limit	Moist ball retains water when shaken

7a. Relative Density of Granular Coarse-Grained Soils

Descriptor	N-Value
Very Loose	≤ 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

7b. Consistency of Fine-Grained Soils

Descriptor	Pocket Penetrometer (tons/ft^2)	N-Value
Very Soft	≤ 0.25	≤ 2
Soft	≥ 0.25 - 0.5	3 - 4
Medium Stiff	> 0.5 - 1.0	5 - 8
Stiff	> 1.0 - 2.0	9 - 15
Very Stiff	> 2.0 - 4.0	16 - 30
Hard	> 4	≥ 31

8. Type of Deposit	
Alluvium	Sediment deposited by moving water
Colluvium	Sediment deposited by gravity
Fill	Manmade deposit
Fluviomarine	Stratified materials formed by the combined action of river and sea processes
Glacial Outwash	Sediment deposited by glacial meltwater; commonly sand and gravel
Glacial Till	Unsorted sediment deposited by glacier
Glacial Drift	Collective term for all sediment transported and deposited by a glacier or glacial meltwater
Residuum	Insoluble material remaining from weathered rock
Weathered Bedrock	Bedrock that has been weathered

FIGURE B-1

KEY TO IDENTIFICATION OF HARD BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Rock Type
3	Interbedding
4	Descriptors
5	Weathering
6	Fracturing
7	Fracture Angle
8	Hardness

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Rock Type	
Common Regional Rocks	
Sandstone	Siltstone
Mudstone	Shale
Coal	Claystone
Limestone	Dolostone

3. Interbedding/Fractions	
And	≥ 50%
Some	15 to 40%
Few	0 to 15%

4. Descriptors	
Arenaceous	Sedimentary rock containing sand sized particles
Argillaceous	Pertaining to a sedimentary rock which contains an appreciable amount of clay
Calcareous	Containing calcium carbonate; when applied to a rock name, it implies that as much as 50% of the rock is calcium carbonate
Carbonaceous	A rock rich in carbon
Cross Bedded	Original depositional layering is inclined
Ferruginous	A rock having a red or rusty color due to the presence of ferric oxide
Fissile	Splits easily along closely spaced parallel planes
Fossiliferous	Containing fossils
Hackly	Jagged or irregular fracture planes
Micaceous	Containing mica minerals
Nodule	A small rounded mass of a mineral or mineral aggregate different in composition from the enclosing rock
Pyritic	Containing the mineral pyrite
Slickenside	Polished and striated surface that results from friction along a fault plane
Vein	An epigenetic mineral filling of a fault or other fracture
Vuggy	Containing voids usually lined with crystals of a different mineral composition from the enclosing rock

5. Degree of Weathering	
Descriptor	**Criteria**
Fresh	No visible sign of weathering, discoloration, or oxidation
Slightly Weathered	Slight weathering, discoloration, or oxidation **impacting <20% of rock mass**
Weathered	Significant weathering, discoloration, or oxidation **impacting 20 to 60% of rock mass**
Highly Weathered	Major weathering, discoloration, or oxidation **impacting >60% of rock mass**

6. Degree of Fracturing	
Descriptor	**Spacing**
Very Broken	≤ 2 inches
Broken	2 to 8 inches
Blocky	8 inches to 2 feet
Slightly Fractured	2 to 6 feet

7. Angle of Fracture Planes	
Fracture Planes	**Degrees**
Flat	< 5°
Shallow	5 to 15°
Moderate	15 to 30°
Steep	30 to 45°
Very Steep	45 to 60°
Sheer	60 to 90°
Vertical	90°

8. Rock Hardness	
Descriptor	**Test Criteria for Hand Specimen**
Very Soft	Indented with thumb or scratched by fingernail
Soft	Gouged deeply or carved with a knife blade
Medium Hard	Readily scratched by knife blade, scratch leaves heavy trace of dust
Hard	Scratched by knife blade with difficulty, scratch produces little powder and is faintly visible
Very Hard	Not scratched by a knife blade

FIGURE B-2

TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Buck Falls Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 8/26/25 Drill/Method: Geoprobe 7822DT

Date Completed: 9/4/25 Driller: RU (TERRA) Ground Elev.: 2135.4

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	S-1		22-18-10	33%			Gray sandstone **COBBLES** (mechanically broken), some gravel, some sand, evidence of boulders, dry to damp, medium dense, **colluvium**				
	S-2		2-5-11	53%			- Difficult augering from 0.0 to 7.0 feet				
5.0							- Spoon refusal on boulder at 6.5 feet				
	S-3		25-50/0.5	100%		7.0	Auger refusal on boulder at 7.0 feet				2128.4
							Gray sandstone **COBBLES** and **BOULDERS**, little gravel, **colluvium**				
10.0	R-1			12%	0%						
	R-2			83%	0%						
15.0							- Core barrel continuously blocked off by cobbles and boulders caving in from side of borehole, casing advanced through colluvium to 16 feet to secure borehole, and subsequently to 19.5 feet				
	R-3			100%	0%						
						19.5	Casing advancer refusal at 19.5 feet				2115.9
20.0	R-4			100%	57%		Gray **SANDSTONE**, quartzitic, firmly cemented, slightly weathered, broken to blocky, very steep fracture planes, very hard	48%			
							- From 19.5 to 20.3 feet: UCS=22,184 psi				
				92%	46%		- Vertical fracture from 22.5 to 23.1 feet				
25.0											

Remarks: Ground surface elevation obtained from "Tower Site Exhibit" prepared by Mission Critical Partners. Borehole dry prior to coring operations. Borehole caved in at 17.9 feet upon completion.

TRIAD ENGINEERING, INC.

TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Buck Falls Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 8/26/25 Drill/Method: Geoprobe 7822DT

Date Completed: 9/4/25 Driller: RU (TERRA) Ground Elev.: 2135.4

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
30.0	R-5			92%	46%		Gray **SANDSTONE**, quartzitic, firmly cemented, slightly weathered, broken to blocky, very steep fracture planes, very hard (continued) - From 27.5 to 28.5 feet: UCS=20,452 psi	48%			
	R-6			100%	48%						
	R-7			87%	33%	34.0					2101.4
35.0							Boring terminated at 34.0 feet				
40.0											
45.0											
50.0											

Remarks: Ground surface elevation obtained from "Tower Site Exhibit" prepared by Mission Critical Partners. Borehole dry prior to coring operations. Borehole caved in at 17.9 feet upon completion.

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ROCK CORE PHOTOGRAPHS

Boring B-1: Box 1 of 3

Boring B-1: Box 2 of 3

ROCK CORE PHOTOGRAPHS

Boring B-1: Box 3 of 3

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APPENDIX C

LABORATORY TESTING

TRIAD ENGINEERING, INC.

Laboratory Testing

The samples obtained from the test borings were visually classified in the field by geotechnical engineering personnel from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soils tests were conducted in accordance with applicable ASTM Standards as listed below:

1. Rock core compression tests were performed in accordance with ASTM D 7012.

A summary and details of the laboratory test results are included on the following pages of this appendix.

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LABORATORY DATA SUMMARY

BORING NO.	SAMPLE DEPTH (ft)	SAMPLE TYPE	NATURAL MOISTURE (%)	ATTERBERG LIMITS			GRADATION			USCS SOIL CLASS.	UNCONFINED COMPRESSIVE STRENGTH (psi)
				LL	PL	PI	% GRAVEL	% SAND	% FINES		
B-1	19.5 - 20.3	RC									22184
B-1	27.5 - 28.5	RC									20452

TRIAD ENGINEERING, INC.

Notes:
1) Soil tests performed in accordance with recognized ASTM testing standards.
2) SS = Split Spoon UD = Undisturbed
RC = Rock Core
3) NV = Non Viscous NP = Non Plastic

PROJECT NUMBER: 01-23-0291
PROJECT NAME: Buck Falls Tower Site
LOCATION: Bedford County, Pennsylvania

FIGURE C-1

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Buck Falls

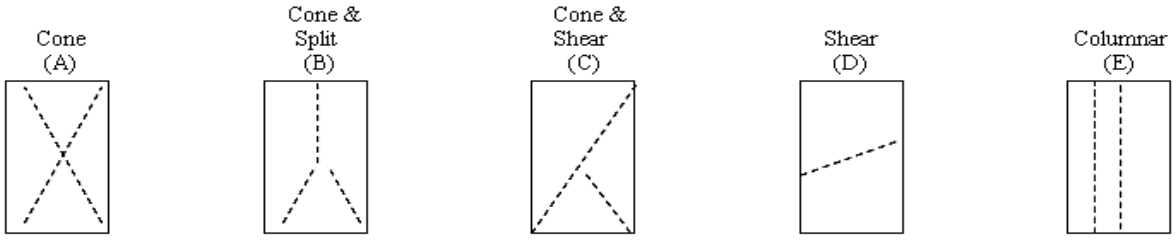
Project # : 01-23-0291 Date : 9/8/2025

Core # : B-1/R-4 Depth: 19.5' - 20.3'

Sample Description: Light gray sandstone

Measurements (inches)		
	Capped Length	Diameter
#1	3.866	1.981
#2	3.859	1.982
#3	3.871	1.978
Avg.	3.865	1.980

Length to Diameter Ratio :	**1.95**		Correction Factor:	**1**
Area:	**3.0801**	in^2	Flatness of Sample:	FLAT
Load:	**68330**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**22184**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**1597**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**22184**	lbs/in^2	Type of Break:	E
Corrected Strength :	**1597**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-2

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Buck Falls

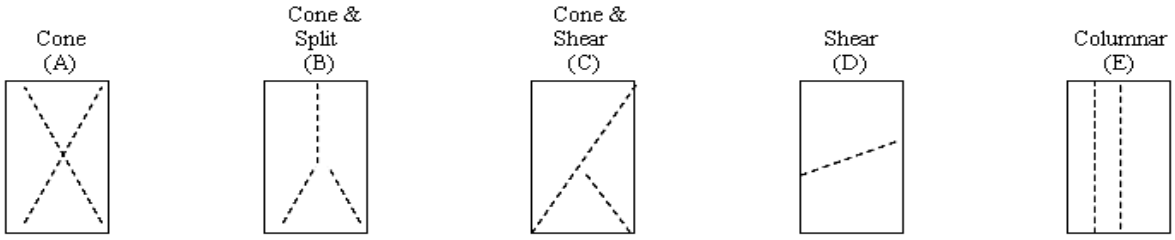
Project # : 01-23-0291 Date : 9/8/2025

Core # : B-1/R-6 Depth: 27.5' - 28.5'

Sample Description: Light gray sandstone

Measurements (inches)		
	Capped Length	Diameter
#1	3.827	1.982
#2	3.829	1.982
#3	3.829	1.982
Avg.	3.828	1.982

Length to Diameter Ratio :	**1.93**		Correction Factor:	**1**
Area:	**3.0853**	in^2	Flatness of Sample:	FLAT
Load:	**63100**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**20452**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**1473**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**20452**	lbs/in^2	Type of Break:	E
Corrected Strength :	**1473**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-3

TRIAD ENGINEERING, INC.

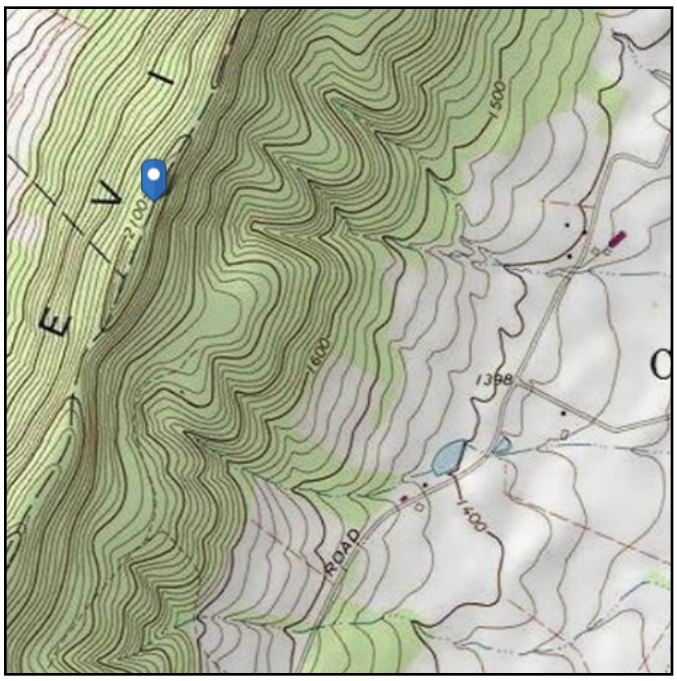
APPENDIX D

SEISMIC INFORMATION

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-22	**Latitude:**	39.91137
Risk Category:	II	**Longitude:**	-78.563603
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	2136.5014707335304 ft (NAVD 88)



Seismic

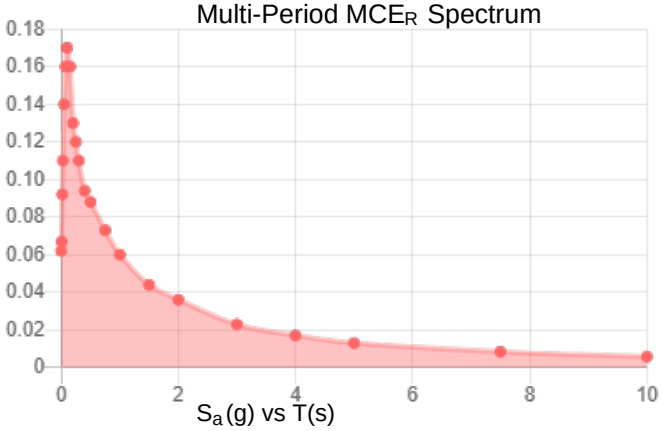
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

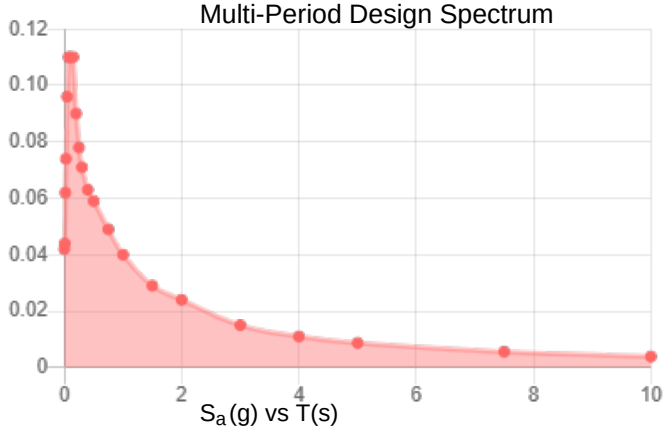
PGA_M :	0.055	T_L :	12
S_{MS} :	0.12	S_S :	0.12
S_{M1} :	0.065	S_1 :	0.047
S_{DS} :	0.081	V_{S30} :	530
S_{D1} :	0.043		

Seismic Design Category: A

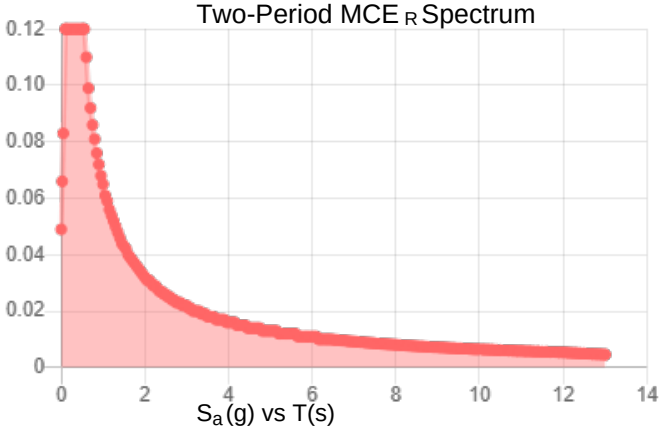
Multi-Period MCE_R Spectrum



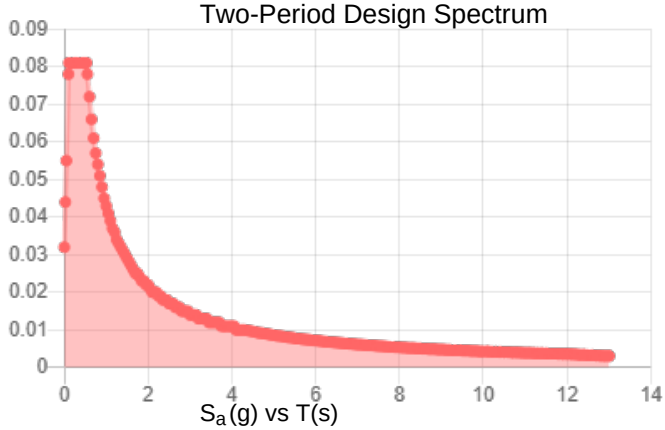
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: Thu Sep 18 2025

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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

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TRIAD ENGINEERING, INC.

Report of Geotechnical Exploration

Triad Project No. 01-23-0291

September 19, 2025

Chaneysville Tower Site
Bedford County, Pennsylvania

Prepared For:
Alleghenies Broadband, Inc.
3900 Industrial Park Drive
Altoona, PA 16602

Prepared By:
Triad Engineering, Inc.
1097 Chaplin Hill Road
Morgantown, WV 26501

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Report of Geotechnical Exploration
Chaneysville Tower Site
Bedford County, Pennsylvania

SITE AND PROJECT DESCRIPTION

The project site is located approximately one mile southeast of Chaneysville in Bedford County, Pennsylvania. The site consists of a gently sloping, undeveloped wooded area on the northern end of Polish Mountain. The approximate location is shown on Figure A-1 in Appendix A.

According to the *Tower Site Exhibit* prepared by Mission Critical Partners, the proposed development will consist of a 180-foot self-supporting telecommunications tower for Alleghenies Broadband, Inc. The project will also include construction of an adjacent 8-foot by 10-foot utility shed, enclosed within a 100-foot by 100-foot security fence. The proposed tower center is located at coordinates 39.814470, -78.478368. Estimates of loads to be supported by the tower foundations have not been provided.

GEOLOGY

Bedrock Geology

According to the *Geologic Map of Pennsylvania* (Pennsylvania Geological Survey, 1980) and the Pennsylvania Geologic Data Exploration system maintained by the Department of Conservation and Natural Resources (PA DCNR), the project site lies near the mapped contact between the Devonian-aged Foreknobs and Scherr Formations.

The Foreknobs Formation is characterized primarily by brownish-gray sandstone, siltstone, and shale, with localized occurrences of quartz-pebble conglomerate and reddish-gray nonmarine siltstone. Fossils are present within the unit, which exhibits massive, well-developed bedding. The formation reaches a maximum reported thickness of approximately 2,300 feet.

Beneath the Foreknobs, the Scherr Formation consists of interbedded siltstone, shale, sandstone, and mudstone. The siltstone and sandstone are typically olive-gray to greenish-gray and may include quartz-rich turbidite deposits ranging from about one inch to 1.5 feet thick, often with sharply defined bases, gradational tops, and features such as sole marks and slumping. The shale is medium gray, micaceous, and has smooth to hackly bedding planes, while the mudstone is medium to greenish-gray and locally shows evidence of burrowing and bioturbation. Small coquinite lenses are also present. The maximum thickness of the Scherr Formation is on the order of 1,900 feet.

Coal Resources

We researched mine maps available through the *Pennsylvania Mine Map Atlas*, the *Pennsylvania Historic Surface Mine Permit Locator*, and the *Pennsylvania Active Underground Bituminous Coal Mining* database, all maintained by the Pennsylvania Department of Environmental Protection (PA DEP), to ascertain what minable coal beds are present below the site and to determine if past surface or underground mining operations have been conducted. In

performing this evaluation, we could not identify any documented surface or underground mining directly at or beneath the project site.

It should be noted that the abovementioned PA DEP databases may be incomplete due to the limited number of years requiring permitting and mapping. As such, the lack of identified mines at the subject site does not constitute a guarantee of a mine-free area.

SUBSURFACE EXPLORATION

As requested, Triad drilled one test borings at the proposed tower center from August 25 to 26, 2025. The boring location was staked by others prior to Triad arriving at the site, and the surface elevation for the boring was obtained from the provided *Tower Site Exhibit* prepared by Mission Critical Partners. Figure A-2 in Appendix A depicts the approximate locations of the test borings drilled for the project.

A geologist from Triad was present full time during the drilling to direct the drilling crew, log all recovered soil samples, and observe groundwater and rock conditions. Triad transported the recovered soil samples to our laboratory for further testing. Detailed descriptions of materials encountered in the test borings are documented on the boring logs in Appendix B. Figures B-1 and B-2 in Appendix B describe the classification system and terminology utilized.

SUBSURFACE CONDITIONS

The materials encountered in the borings are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types, and the actual transitions between boring locations may be gradual.

Residuum: Residual soils were observed down to a depth of approximately 12.5 feet in the boring. The residual soils consisted of saprolitic sandstone and siltstone gravel with lesser amounts of sand, silt, and clay. Standard Penetration Test (SPT) N-values obtained within the residuum indicated a relative density ranging from medium dense to very dense.

Weathered Bedrock: Sampler refusal in weathered siltstone was observed at a depth of 12.5 feet. SPT N-values obtained within the weathered siltstone were in excess of 50 blows per foot, which indicates a very dense relative density. The weathered siltstone extended to a depth of approximately 15.2 feet.

Bedrock: Once two sampler refusals were attained, the boring was further advanced to a termination depth of 36 feet utilizing rock coring techniques. Bedrock cored in the boring primarily consisted of shale down to a depth of about 35.4 feet. Sandstone was observed at the bottom of the boring from 35.4 to 36 feet. Rock core recovery values ranged from 50 to 100 percent, and Rock Quality Designation (RQD) values were 0 percent per core run.

Groundwater: Groundwater levels were measured both during and after drilling operations. Groundwater levels are documented on the boring logs in Appendix B. The boring was dry prior to coring operations. It should be noted that water levels indicated after rock coring operations

are not considered representative of true groundwater levels due to the introduction of water into the borehole during rock coring.

It is emphasized that fluctuations in true groundwater levels can occur due to seasonal, climatic and environmental variations which may not have been evident at the time of the field exploration. Consequently, groundwater levels can vary significantly from those recorded at the time measurements were taken.

LABORATORY TESTING

Triad performed laboratory tests on selected soil and rock samples to aid in classification and provide a basis for estimating their engineering properties. The laboratory tests were performed in general accordance with ASTM standard test methods. Appendix C contains the detailed results. These results are summarized in the following table:

TYPE OF TEST	TEST RESULTS
Moisture Content	5.8%
Atterberg Limits	Liquid Limit: 28 Plasticity Index: 10
Percent Passing No. 200 Sieve	23%

DISCUSSION

The project site is underlain by approximately 12.5 feet of medium dense to very dense coarse-grained residual soils. The residual soils are underlain by a layer of weathered siltstone. Refusal in more competent bedrock was attained at a depth of about 15 feet. Bedrock cored in the boring consisted primarily of soft shale.

Based on these conditions, we suggest two options for consideration to support the proposed tower. Option 1 includes a pier and pad foundation bearing on residual soils. Option 2 includes caissons that will transfer loads down to the more competent bedrock at the site and can be used to resist uplift forces.

The following sections of this report include recommendations for the design and construction of the geotechnical elements of the project. Provided that these recommendations are followed, it is our opinion that the site is generally suitable for the proposed construction.

DESIGN RECOMMENDATIONS

The geotechnical engineering evaluation of the site and subsurface conditions at the property, as well as the recommendations for site preparation and foundation support, are based on our site observations, the field data obtained and our understanding of the project information as presented in this report.

Option 1: Pad and Pier

Based on the subsurface conditions encountered in boring B-1, it is our opinion that the foundation for support of the tower can be a pad and pier type foundation comprised of an isolated foundation and pier extending to the base of the tower. We anticipate that this foundation type may require an excavation on the order of 4 feet below existing grade to meet suitable bearing and be below frost depth. We have assumed a 6-foot square pad for purposes of our analysis. The recommendations provided are acceptable for foundations 6 foot square and larger. For a foundation bearing at 4 feet (dense coarse-grained residuum) below existing grade, we recommend for foundation design on residual soil. If higher design values are required, we recommend over-excavating foundations to weathered bedrock or top of bedrock. Recommendations for residual soils, weathered bedrock, and top of bedrock are provided below:

STRATA	BOTTOM OF FOUNDATION	ALLOWABLE BEARING CAPACITY (psf)	K (pci)
Dense Coarse-Grained Residuum	4	3000	100
Weathered Siltstone	12.5	5000	130
Top of Bedrock	15.2	12,000	170

Uplift Considerations

We anticipate that the tower planned for the site will be subjected to uplift forces. The uplift capacity for pad and pier foundations is obtained from the weight of the concrete foundation and the weight of equipment and/or backfill above the foundation. We recommend that unit weights of 145 pcf for concrete and 125 pcf for compacted backfill be used to compute uplift resistance. The weight of the equipment placed above the foundation should be obtained from the equipment manufacturer. A factor of safety of 1.5 should be applied to uplift determinations for foundations.

Lateral Load Considerations

We anticipate that the tower planned for the site will be subjected to lateral loads. Lateral load resistance of foundations can be obtained using friction along the base of the foundation and passive resistance of the materials immediately adjacent to the foundation. In designing the foundation to resist lateral loads, we recommend the use of a frictional resistance value (coefficient of friction) of 0.50 and active and passive lateral earth pressure coefficients of 0.33 and 3.0, respectively. When computing the lateral resistance due to earth pressure, the resistance due to active earth pressure must be subtracted from the passive earth pressure. A factor of safety of 1.5 should be used to determine the allowable lateral load resistance.

Option 2: Drilled Shafts (Caissons)

We recommend that drilled shafts (caissons) should be extended through the soil overburden and weathered bedrock to bear a minimum of one caisson diameter in the harder bedrock encountered at a depth of approximately 15 feet. For caissons bearing in shale, we recommend that a maximum factored end bearing capacity of 20 ksf be utilized for design. Additionally, we recommend using a factored side resistance value of 5 ksf for the shale bedrock.

It is emphasized that conditions can vary from those depicted by the borings. Consequently, caisson bearing depths may require adjustment during construction. As such, we recommend that a representative from our office be present during caisson construction to verify that appropriate bearing conditions are present.

Lateral Analysis of Deep Foundations

The ultimate lateral load capacity was not evaluated for the anticipated caissons. A full analysis of the lateral capacity should be evaluated by the structural engineer during the design phase of the tower foundations. In order to aid in this evaluation, the following parameters are provided. The given parameters are from the LPILE computer program.

DEPTH (feet)	MATERIAL TYPE	MATERIAL MODELED AS	EFFECTIVE UNIT WEIGHT γ (pcf)	FRICTION ANGLE ϕ (°)	UNDRAINED COHESION (psf)	K STATIC/ CYCLIC (pci)	ξ_{50}	k_{rm}	INITIAL MODULUS OF ROCK MASS (psi)	UCS (psi)	RQD (%)
0-9	Gravel, some sand, some clay	Sand (Reese)	105	33	N/A	800	N/A	N/A	N/A	N/A	N/A
9-12.5	Very dense sand and gravel	Sand (Reese)	115	36	N/A	600	N/A	N/A	N/A	N/A	N/A
12.5-15	Weathered siltstone	Weak rock (Reese)	140	N/A	N/A	N/A	N/A	0.00009	10,000	200	0
15-35	Shale	Strong rock	145	N/A	N/A	N/A	0.001	0.0003	40,000	2500	0

Settlement Considerations

For the pad and pier foundation, settlements due to structural loading were estimated based on the results of the test borings, the recommended allowable bearing pressure of 3,000 psf, laboratory test results and our past experience with similar conditions. Based on this information, we estimate that foundation settlement for the proposed tower could be on the order of 1 inch. Differential settlement which could occur between individual similarly loaded column foundations is estimated to be on the order of approximately ½ inch. If structural loads require foundations larger than the minimum widths for individual column footings recommended in this report, we should be contacted to re-evaluate our settlement estimates using the actual structural loads and proposed foundation dimensions.

Seismic Site Classification

The subsurface profile was evaluated and classified according to ASCE/SEI 7-22. This code establishes the criteria for project site evaluation and determination of several seismic design parameters. ASCE/SEI 7-22, Chapter 20 outlines the procedure for determination of the site classification based on the average shear wave velocity for materials to a depth of 100 feet. Table 20.2-1 includes ranges of estimated shear wave velocities for each class (type) of material, and those classes are determined as the result of soil type and in-situ consistencies and/or relative densities reflected by SPT testing in the borings. Based on the results of the test borings and our assumptions, the site has an average shear wave velocity of 1,869 feet per second (fps). Using this information along with knowledge of the site geologic setting, the seismic site class and additional seismic information is as follows:

PARAMETER DESCRIPTION	SEISMIC RESULT
Seismic Site Class	C
Soil Profile	Very Dense Soil and Soft Rock
MCE_R (5% damped, short periods), S_{MS}	0.12
MCE_R (5% damped, 1.0 second period), S_{M1}	0.065
Design (5% damped, short periods), S_{DS}	0.083
Design (5% damped, 1.0 second period), S_{D1}	0.043

Based on results from the test borings, published regional geologic information and the probable maximum strength of earthquake, it is our opinion that liquefaction potential for the on-site soils during seismic activity is relatively low. Seismic parameters to be considered for structural design of the project are provided in Appendix D of this report.

CONSTRUCTION RECOMMENDATIONS

Site Preparation

Initial preparation of the site for construction should include installation of sediment and erosion control measures and any upslope diversion ditching or berms that are required. Existing utilities that conflict with proposed foundations and/or new utility alignments should be relocated as necessary.

Site Excavations

It is anticipated that most of the on-site soil and weathered bedrock can be effectively removed with conventional earth-moving equipment such as backhoes and dozers. Except for the deep foundations, it is assumed that excavations required for the project will likely not extend to

depths sufficient to encounter harder bedrock. However, harder bedrock that is encountered may require rock removal techniques such as hoe-ram chipping or hydraulic splitting for effective removal.

The means necessary to excavate rock are a function of the consistency/hardness of the material, the type/size of excavation equipment utilized and the effort the contractor is willing to apply. If the plans call for excavation of rock for bidding purposes, potential contractors should be instructed to perform their own investigations as to measures necessary to excavate bedrock encountered.

Excavated materials should not be stockpiled and construction equipment should not be positioned beside open excavations, since the added load may cause a sudden collapse of the excavation side walls. The design and construction of all excavations should comply with applicable local, state, and federal safety regulations, including the current requirements of the Occupational Safety and Health Administration (OSHA). In no case should slope height, slope inclination, or excavation depth exceed those specified by OSHA or any other regulatory agencies or local authorities having jurisdiction at the construction site.

Controlled Fill

Suitable Fill Material

Fill required to attain design grades should be placed as controlled, compacted fill. Satisfactory fill includes approved on-site excavated materials, off-site borrow material such as residual soils, soil/rock mixtures, and soft weathered rock, or a well-graded commercial stone such as crusher run aggregate. The fill should be free of trash, wood, coal, topsoil, organics, pyritic material with greater than 0.1 percent by weight of pyritic sulfur, frozen material, and pieces of rock greater than 4 inches in any dimension for lift thicknesses of 9 inches or 1½ inches in any dimension for lift thicknesses of 4 inches. Materials classified as MH, CH, OH, OL and Pt based on the Unified Soil Classification System (USCS) are not considered suitable for use as new fill. All fill should be tested and approved prior to placement and compaction.

Fill Placement and Compaction

Before initiating fill placement, the topsoil or other surficial material should be removed. The subgrade surface should be proof-rolled with appropriate rubber-tired construction equipment and/or visually evaluated to locate any soft spots or areas of excessive "pumping." Any such areas should be over-excavated to a firm subgrade and replaced with new, controlled fill material. The engineer should be contacted if excessive over-excavation is required.

During placement, moisten or aerate each layer of fill, as necessary, to obtain the required compaction. Fill should not be placed on surfaces that are muddy, frozen or have not been approved by prior testing and/or proof-rolling. Free water should be prevented from appearing on the surface during or after compaction operations. Fill placed on sloping areas should be properly benched or “notched” into the slope face such that a smooth transition between the new fill and existing slope face is not present.

Soil material which is removed because it is too wet to permit proper compaction may be spread and allowed to dry. Drying can be facilitated by discing, harrowing, or by pulverizing until the moisture content is reduced to an acceptable level. When the soil is too dry, water may be uniformly applied to the subgrade surface or to the layer to be compacted.

Fill material compacted by heavy compaction equipment should be placed in loose layers not exceeding 9 inches in thickness. Fill compacted with lightweight equipment, such as hand-operated tampers or walk-behind rollers, should be placed in loose layers not exceeding 4 inches in thickness. The compaction equipment utilized should be suitable for the type of material being compacted. Vibratory rollers are best suited to coarse-grained soils, while pad foot (often called sheepsfoot) rollers are appropriate for fine-grained materials. Fill placed adjacent to foundation walls should be compacted using lightweight equipment.

New fill placed within the structure footprint and extending at least five (5) feet beyond its perimeter, or to that extent possible, should be compacted to at least 98 percent of the laboratory maximum dry density as determined by the Standard Proctor method (ASTM D 698). Fill placed outside of these areas should be compacted to at least 95 percent of the maximum dry density as determined by the same standard. The placement moisture content of fill material should be within ±3 percentage points of the optimum moisture content as determined by ASTM D 698, except the structural areas where the moisture content should be within ±2 percent of the optimum moisture content. Granular materials, such as clean sand or aggregate, should be compacted to at least 85% of its relative density, as determined by ASTM D 4253 and D 4254 test methods.

Foundation Construction

Foundation excavations should be cleaned of all loose or otherwise disturbed materials present in the base of the excavations. The excavations should be observed and tested by a qualified geotechnical engineer, or his/her representative, prior to concrete placement to verify that materials capable of providing the recommended bearing capacity are present. Materials exposed in the foundation excavations may be susceptible to softening and/or degradation if exposed to precipitation or surface water runoff. In addition, some foundation excavations could be relatively deep. Consequently, foundation concrete should be placed in the excavations as soon as possible once the excavations have been observed and approved, and only that amount of foundation excavation which can be backfilled with concrete should be opened on any given day. Once foundation walls have been constructed up to final exterior grades, we recommend that the foundation excavations be backfilled with compacted soil fill to prevent ponding of water adjacent to foundations.

Caisson Construction

Caissons should be constructed as straight shafts, plumb to within one (1) percent of their drilled lengths. Caissons should penetrate through the soils and very weathered underlying bedrock materials encountered in each test boring, in order that they will attain a suitable bearing material capable of supporting the recommended maximum allowable bearing pressure

as previously identified. It is likely that rock augers and core barrels will be required to achieve the recommended bearing elevations. Temporary casing may be needed during the drilling operations to support the in-situ soils and to produce a seal along the soil-rock contact to reduce infiltration of groundwater into the excavation.

After the caissons have been drilled, the caisson bottom should be prepared to receive concrete. This will require cleaning the hole with drilling equipment. To facilitate smooth placement of concrete, we recommend that the concrete slump range be between 5 and 7 inches for the drilled caissons, provided that a suitable mix design is developed to provide the necessary strength at the appropriate water-to-cement ratio.

The caisson bottom must be clean of debris and have less than 2 inches of standing water prior to placement of concrete. If groundwater in the caisson becomes problematic, the concrete may need to be placed with a tremie tube, placing the concrete near the bottom, and forcing the water out of the caisson hole. The caisson bottom should not be left open longer than 24 hours to help prevent deterioration of the bearing conditions. During withdraw of temporary casings care should be taken to maintain the concrete a minimum of 5 feet above the bottom of the casing. We do not recommend down hole inspections of the bearing material at this site. However, we do recommend that a representative from Triad be on site during the caisson construction to verify the bearing conditions in the bottom of each caisson.

Groundwater and Surface Runoff Control

The contractor should be prepared to implement temporary and/or permanent dewatering measures since groundwater conditions can change. We anticipate that sources of subsurface water which may develop during construction can probably be managed and removed by a gravity drainage system, sump pits and pumps or other minor dewatering procedures.

Surface water runoff should be prevented from flowing through the construction area. If necessary, diversion ditches or berms should be installed upslope of the construction area. Ditches should be protected from excessive erosion using riprap, erosion control matting, or vegetation.

Quality Assurance and Control

We recommend that the geotechnical engineer-of-record, Triad, be retained to monitor the construction activities to verify that the field conditions are consistent with the findings of our exploration. If significant variations are encountered, or if the design is altered, we should be notified.

The geotechnical engineer should provide personnel full-time and/or intermittently to:

- Observe and document installation of the drainage features and verify initial subgrade conditions prior to fill placement.
- Observe and test material compaction during fill construction. Field density tests should be performed in accordance with ASTM D 6938 (nuclear method). At

least three (3) field density tests should be performed for each lift or at a frequency determined by the geotechnical engineer to be sufficient for the size of the fill area to verify the required soil compaction.

- Observe drilling and placement of concrete for caissons to confirm compliance with our recommendations.
- Examine all subgrade bearing levels to confirm compliance with our recommendations and verify that adequate support is available.
- Test fresh structural concrete placed for the project.

LIMITATIONS

This report has been prepared for the exclusive use of Alleghenies Broadband, Inc. for specific application to the design of the proposed telecommunications tower in Chaneysville, Bedford County, Pennsylvania. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own investigation of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or reuse of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety. Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the boring at the site. It is emphasized that subsurface conditions may vary dramatically between borings, and Triad makes no representations as to subsurface conditions other than those encountered at the specific boring location. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, if any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed, and the conclusions are modified or verified in writing by Triad.

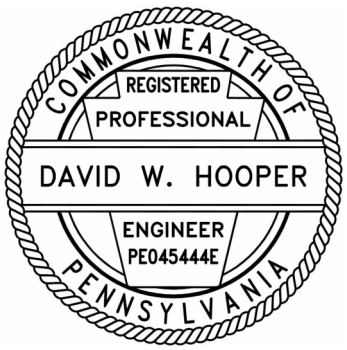
It is recommended that we be provided the opportunity to review the final grading plan, overall foundation design, and specifications so that earthwork and foundation recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

We appreciate the opportunity to submit this report and look forward to working with you on the construction of this project. Please contact the undersigned with any questions or concerns you have regarding this report

TRIAD ENGINEERING, INC.

Maria af Rolén, P.G.
Senior Geologist

David W. Hooper, P.E.
Principal Engineer



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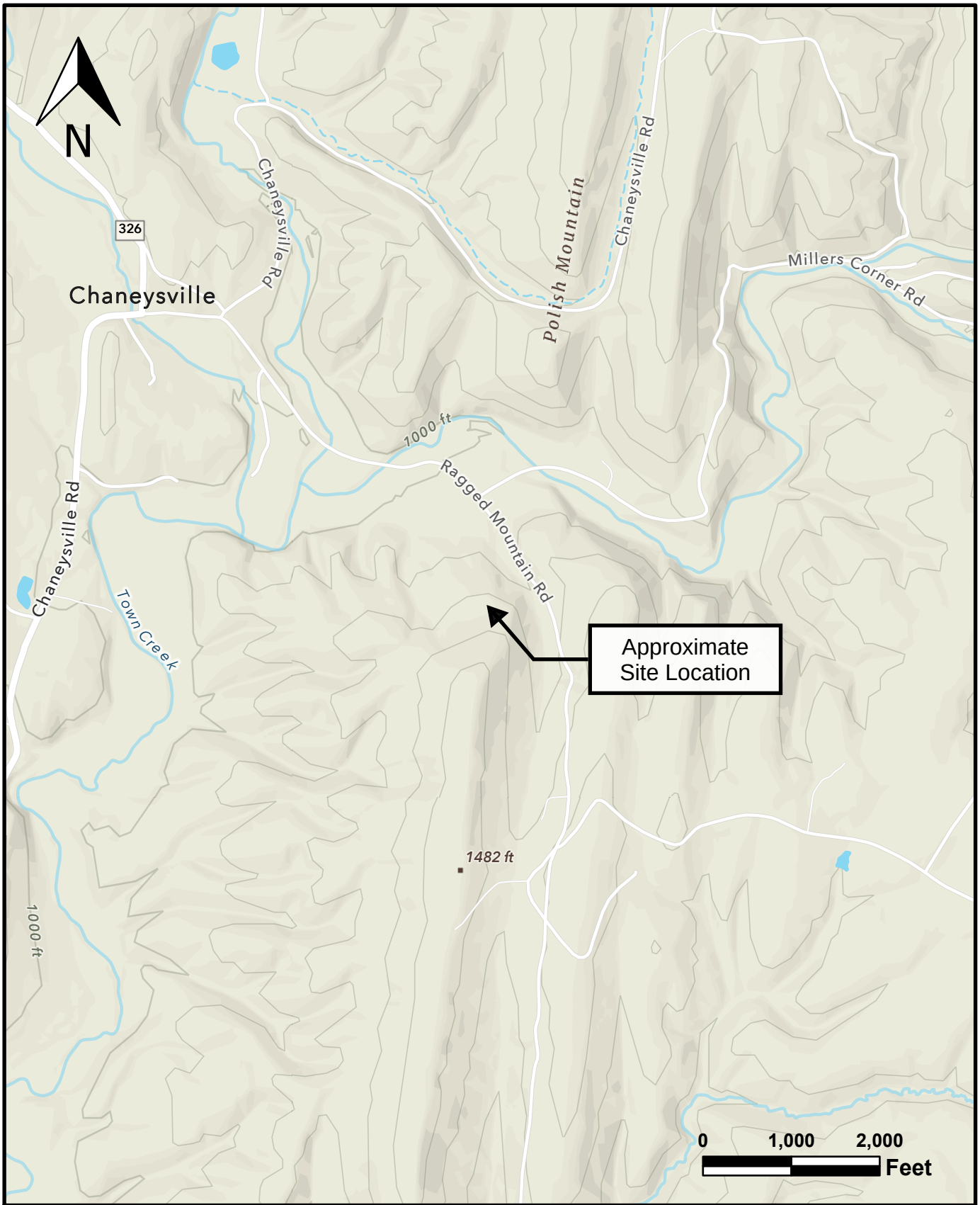
APPENDIX A

FIGURES



PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-1	

GENERAL SITE VICINITY

Chaneysville Tower Site
Bedford County, Pennsylvania
Outdoor Map (ESRI)

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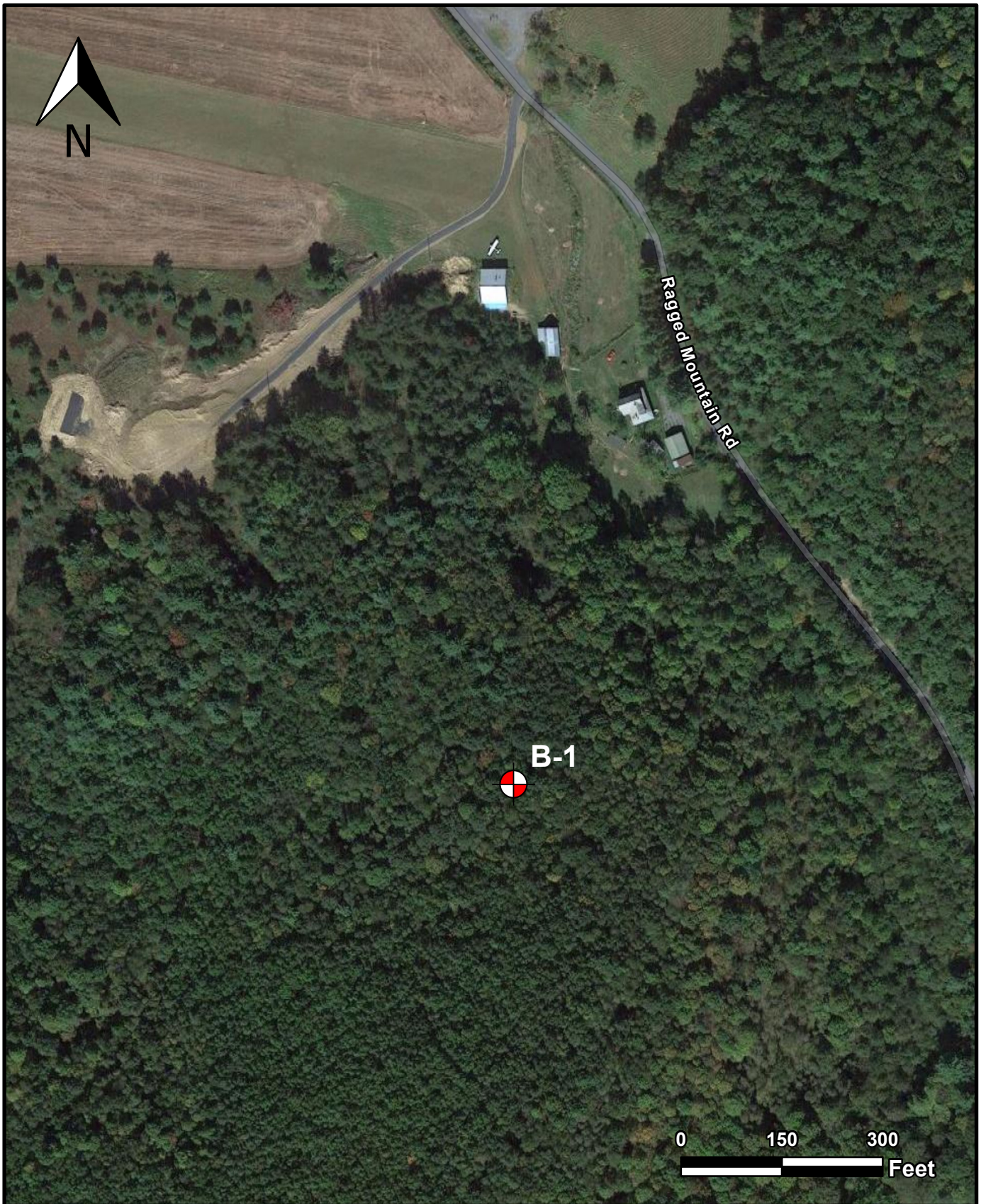

PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-2	

BORING LOCATION PLAN

Chaneysville Tower Site
Bedford County, Pennsylvania
Google Earth Satellite Imagery (2016)

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APPENDIX B

FIELD EXPLORATION

TRIAD ENGINEERING, INC.

FIELD EXPLORATION

A representative of Triad was present to direct the drill crew, log recovered samples and observe groundwater conditions. The borings were drilled utilizing a Geoprobe 7822DT rotary auger drill rig. Samples of in-situ soil and weathered bedrock were obtained using a split-barrel sampler while performing Standard Penetration Tests (ASTM D 1586). The results of these tests (N-values) are commonly interpreted to provide an index to strength, consistency or relative density of the sampled materials and their ability to support foundations.

Once auger or sampler refusal on harder rock was encountered, select borings were further advanced using rock coring techniques. Continuous rock core samples were obtained from auger/sampler refusal depth to the boring termination depth. The harder rock materials were penetrated and sampled using a conventional, double-tubed core barrel and diamond coring bit, producing a rock core sample a nominal two (2) inches in diameter. The rock coring was performed to assess the type, quality and continuity of the bedrock at the drilled locations. The Rock Quality Designation (RQD) noted on the logs provides an indication of the relative quality and soundness of a specific bedrock stratum by measuring the lengths of intact rock core (unbroken core samples) that are larger than twice the core sample diameter for a specific rock stratum and/or core run and dividing the sum of the cumulative lengths by the thickness of the stratum and/or core run.

Groundwater levels were checked both during and after drilling operations and are recorded on the individual logs. Water levels indicated after rock coring operations are not considered representative of true groundwater levels, due to the introduction of water into the borehole during rock coring. It is emphasized that groundwater levels typically vary and are dependent upon climatic conditions and other environmental factors.

It is also emphasized that the lines shown on the logs are estimates of the changes in material. Actual changes may be gradual and may vary from those indicated on the logs, and the subsurface conditions between the borings may differ from those depicted on the logs. The boreholes were backfilled upon completion of the drilling with auger cuttings. Samples were transported to our office for temporary storage and additional analysis. The samples will be discarded after a period of 60 days unless other arrangements are made.

Figures B-1 and B-2 on the following pages describe the classification system and terminology used on the boring logs.

KEY TO IDENTIFICATION OF SOIL AND WEATHERED BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Primary Component
3	Fractions
4	Moisture
5	Descriptors
6	Plasticity
7	Consistency/ Relative Density
8	Deposition Type

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Primary Component	
Component	Grain Size (USCS)
Boulders	≥ 12 inches
Cobbles	3 to 12 inches
Gravel	#4 to 3 inches
Sand	#200 to #4
Silt/Clay	≤ #200

3. Fractions	
And	≥ 35%
Some	20 to 35%
Little	10 to 20%
Trace	< 10%

4. Moisture	
Dry	Dry to touch
Damp	Slightly moist
Moist	No visible free water
Wet	Visible free water

5. Descriptors	
Fissile	Splits easily along closely spaced parallel planes (breaks into plates)
Hackly	Jagged or irregular fracture planes
Slickensided	Polished and striated surfaces that result from friction along a fault plane
Laminated	Alternating thin layers of varying material or colors less than ¼" thick
Lensed	Inclusion of small pockets of different soils
Saprolitic	Completely weathered rock that retains the appearance of the original rock structure but has only a trace of the original bond strength
Micaceous	Containing mica minerals
Varved	Laminated sediment consisting of alternating layers of fine sand and silt or clay deposited in still water

6. Plasticity of Fine-Grained Soils

Fine-Grained Component	Plasticity	Estimated Plasticity Index (PI)	Smallest Thread Diameter	Thread Characteristics	Dilatancy
Primarily Silt	Non-Plastic	0 - 2%	Ball cracks	Dries rapidly; a 1/8-inch thread cannot be rolled at any water content	Moist ball sheds water when shaken giving a glossy appearance
Primarily Clay	Low Plasticity	3 - 10%	$^1/_8$ to $^1/_4$ inch	Feels powdery when drying out during rolling; thread can barely be rolled	Moist ball retains water or sheds water slowly when shaken
	Medium Plasticity	> 10 - 20%	$^1/_{16}$ inch	Thread cannot be rerolled after reaching plastic limit	
	High Plasticity	> 20%	$^1/_{32}$ inch	Thread can be rerolled after reaching plastic limit	Moist ball retains water when shaken

7a. Relative Density of Granular Coarse-Grained Soils

Descriptor	N-Value
Very Loose	≤ 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

7b. Consistency of Fine-Grained Soils

Descriptor	Pocket Penetrometer (tons/ft^2)	N-Value
Very Soft	≤ 0.25	≤ 2
Soft	≥ 0.25 - 0.5	3 - 4
Medium Stiff	> 0.5 - 1.0	5 - 8
Stiff	> 1.0 - 2.0	9 - 15
Very Stiff	> 2.0 - 4.0	16 - 30
Hard	> 4	≥ 31

8. Type of Deposit	
Alluvium	Sediment deposited by moving water
Colluvium	Sediment deposited by gravity
Fill	Manmade deposit
Fluviomarine	Stratified materials formed by the combined action of river and sea processes
Glacial Outwash	Sediment deposited by glacial meltwater; commonly sand and gravel
Glacial Till	Unsorted sediment deposited by glacier
Glacial Drift	Collective term for all sediment transported and deposited by a glacier or glacial meltwater
Residuum	Insoluble material remaining from weathered rock
Weathered Bedrock	Bedrock that has been weathered

FIGURE B-1

KEY TO IDENTIFICATION OF HARD BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Rock Type
3	Interbedding
4	Descriptors
5	Weathering
6	Fracturing
7	Fracture Angle
8	Hardness

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Rock Type	
Common Regional Rocks	
Sandstone	Siltstone
Mudstone	Shale
Coal	Claystone
Limestone	Dolostone

3. Interbedding/Fractions	
And	≥ 50%
Some	15 to 40%
Few	0 to 15%

4. Descriptors	
Arenaceous	Sedimentary rock containing sand sized particles
Argillaceous	Pertaining to a sedimentary rock which contains an appreciable amount of clay
Calcareous	Containing calcium carbonate; when applied to a rock name, it implies that as much as 50% of the rock is calcium carbonate
Carbonaceous	A rock rich in carbon
Cross Bedded	Original depositional layering is inclined
Ferruginous	A rock having a red or rusty color due to the presence of ferric oxide
Fissile	Splits easily along closely spaced parallel planes
Fossiliferous	Containing fossils
Hackly	Jagged or irregular fracture planes
Micaceous	Containing mica minerals
Nodule	A small rounded mass of a mineral or mineral aggregate different in composition from the enclosing rock
Pyritic	Containing the mineral pyrite
Slickenside	Polished and striated surface that results from friction along a fault plane
Vein	An epigenetic mineral filling of a fault or other fracture
Vuggy	Containing voids usually lined with crystals of a different mineral composition from the enclosing rock

5. Degree of Weathering	
Descriptor	**Criteria**
Fresh	No visible sign of weathering, discoloration, or oxidation
Slightly Weathered	Slight weathering, discoloration, or oxidation **impacting <20% of rock mass**
Weathered	Significant weathering, discoloration, or oxidation **impacting 20 to 60% of rock mass**
Highly Weathered	Major weathering, discoloration, or oxidation **impacting >60% of rock mass**

6. Degree of Fracturing	
Descriptor	**Spacing**
Very Broken	≤ 2 inches
Broken	2 to 8 inches
Blocky	8 inches to 2 feet
Slightly Fractured	2 to 6 feet

7. Angle of Fracture Planes	
Fracture Planes	**Degrees**
Flat	< 5°
Shallow	5 to 15°
Moderate	15 to 30°
Steep	30 to 45°
Very Steep	45 to 60°
Sheer	60 to 90°
Vertical	90°

8. Rock Hardness	
Descriptor	**Test Criteria for Hand Specimen**
Very Soft	Indented with thumb or scratched by fingernail
Soft	Gouged deeply or carved with a knife blade
Medium Hard	Readily scratched by knife blade, scratch leaves heavy trace of dust
Hard	Scratched by knife blade with difficulty, scratch produces little powder and is faintly visible
Very Hard	Not scratched by a knife blade

FIGURE B-2

TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Chaneysville Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 8/25/25 Drill/Method: Geoprobe 7822DT

Date Completed: 8/26/25 Driller: RU (TERRA) Ground Elev.: 1218.4

Shelby Tube | Standard Split Spoon | Water Level Upon Completion 11.0 ft.

Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	S-1		6-10-8	67%			Tan sandstone **GRAVEL**, some sand, some clay, damp, saprolitic, medium dense to dense, **residuum**				
	S-2		20-22-18	73%			- From 3.0 to 7.5 feet: W=5.8%, LL=28, PL=18, PI=10, Gravel=54%, Sand=23%, Fines=23%, GC				
5.0	S-3		15-10-10	100%							
						9.0					1209.4
10.0	S-4		25-28-37	100%			Tan siltstone **GRAVEL**, some sand, some silt, damp, saprolitic, very dense, **residuum**				
	S-5		25-50/0.5	100%		12.5					1205.9
15.0							Tan **SILTSTONE**, damp, very dense, **weathered bedrock**				
	S-6		50/0.2	100%		15.2					1203.2
	R-1			89%	0%		Tan to gray **SHALE**, highly weathered, very broken, steep fracture planes, soft	0%			
	R-2			50%	0%						
20.0											

Remarks: Ground surface elevation obtained from "Tower Site Exhibit" prepared by Mission Critical Partners. Borehole dry prior to coring operations.

TRIAD ENGINEERING, INC.

TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Chaneysville Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 8/25/25 Drill/Method: Geoprobe 7822DT

Date Completed: 8/26/25 Driller: RU (TERRA) Ground Elev.: 1218.4

Shelby Tube | Standard Split Spoon | Water Level Upon Completion 11.0 ft.

Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
				50%	0%		Tan to gray **SHALE**, highly weathered, very broken, steep fracture planes, soft (continued)				
25.0	R-3			100%	0%						
							- Very soft claystone interbed from 27.8 to 28.8 feet	0%			
30.0	R-4			76%	0%						
							- Very soft claystone interbed from 32.0 to 35.4 feet				
	R-5			58%	0%						
35.0						35.4					1183.0
						36.0	Gray **SANDSTONE**, micaceous, slightly weathered, broken, very steep fracture planes, hard	0%			1182.4
							Boring terminated at 36.0 feet				
40.0											

Remarks: Ground surface elevation obtained from "Tower Site Exhibit" prepared by Mission Critical Partners. Borehole dry prior to coring operations.

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ROCK CORE PHOTOGRAPHS

Boring B-1: Box 1 of 2

Boring B-1: Box 2 of 2

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APPENDIX C

LABORATORY TESTING

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Laboratory Testing

The samples obtained from the test borings were visually classified in the field by geotechnical engineering personnel from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soils tests were conducted in accordance with applicable ASTM Standards as listed below:

1. Moisture content tests were performed in accordance with ASTM D 2216.

2. Atterberg Limits tests, consisting of the liquid limit, plastic limit, and plasticity index, were performed in accordance with ASTM D 4318.

3. Sieve analyses with washed No. 200 sieve tests were performed in accordance with ASTM D 1140.

A summary and details of the laboratory test results are included on the following pages of this appendix.

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LABORATORY DATA SUMMARY

BORING NO.	SAMPLE DEPTH (ft)	SAMPLE TYPE	NATURAL MOISTURE (%)	ATTERBERG LIMITS			GRADATION			USCS SOIL CLASS.	ADDITIONAL TESTS
				LL	PL	PI	% GRAVEL	% SAND	% FINES		
B-1	3.0 - 7.5	SS	5.8	28	18	10	54	23	23	GC	

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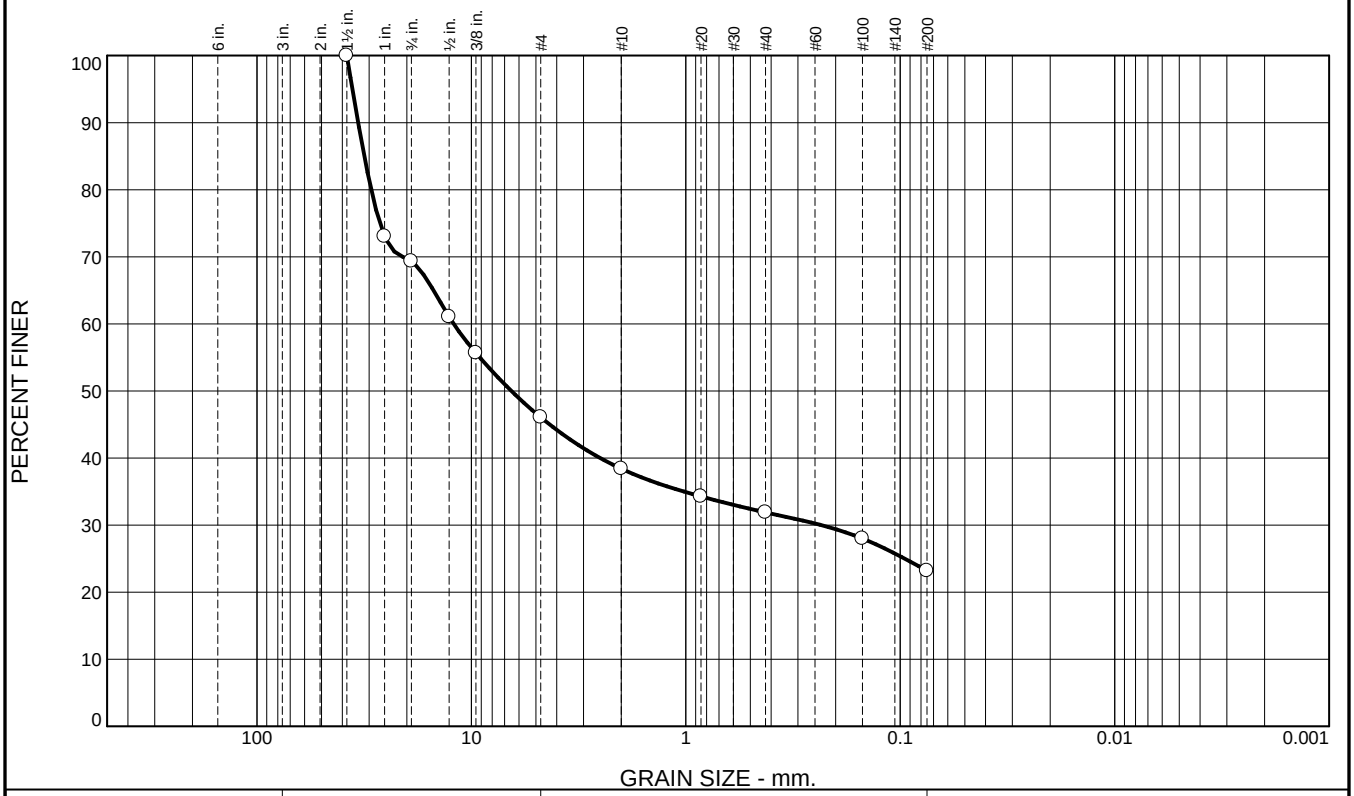
Notes:
1) Soil tests performed in accordance with recognized ASTM testing standards.
2) SS = Split Spoon UD = Undisturbed RC = Rock Core
3) NV = Non Viscous NP = Non Plastic

PROJECT NUMBER: 01-23-0291
PROJECT NAME: Chaneysville Tower Site
LOCATION: Bedford County, Pennsylvania

FIGURE C-1

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	30.7	23.2	7.7	6.5	8.7	23.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5"	100.0		
1"	73.0		
3/4"	69.3		
1/2"	61.0		
3/8"	55.7		
#4	46.1		
#10	38.4		
#20	34.3		
#40	31.9		
#100	28.0		
#200	23.2		

* (no specification provided)

Material Description

Light brown clayey gravel with sand

Atterberg Limits

PL= 17.9 LL= 27.8 PI= 9.9

Coefficients

D_{90}= 33.7221 D_{85}= 31.5723 D_{60}= 12.0956
D_{50}= 6.5102 D_{30}= 0.2340 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= GC AASHTO= A-2-4(0)

Remarks

Source of Sample: B-1 **Depth:** 3.0' - 7.5'
Sample Number: S-2, S-3

Date: 9/3/2025

Triad Engineering, Inc.

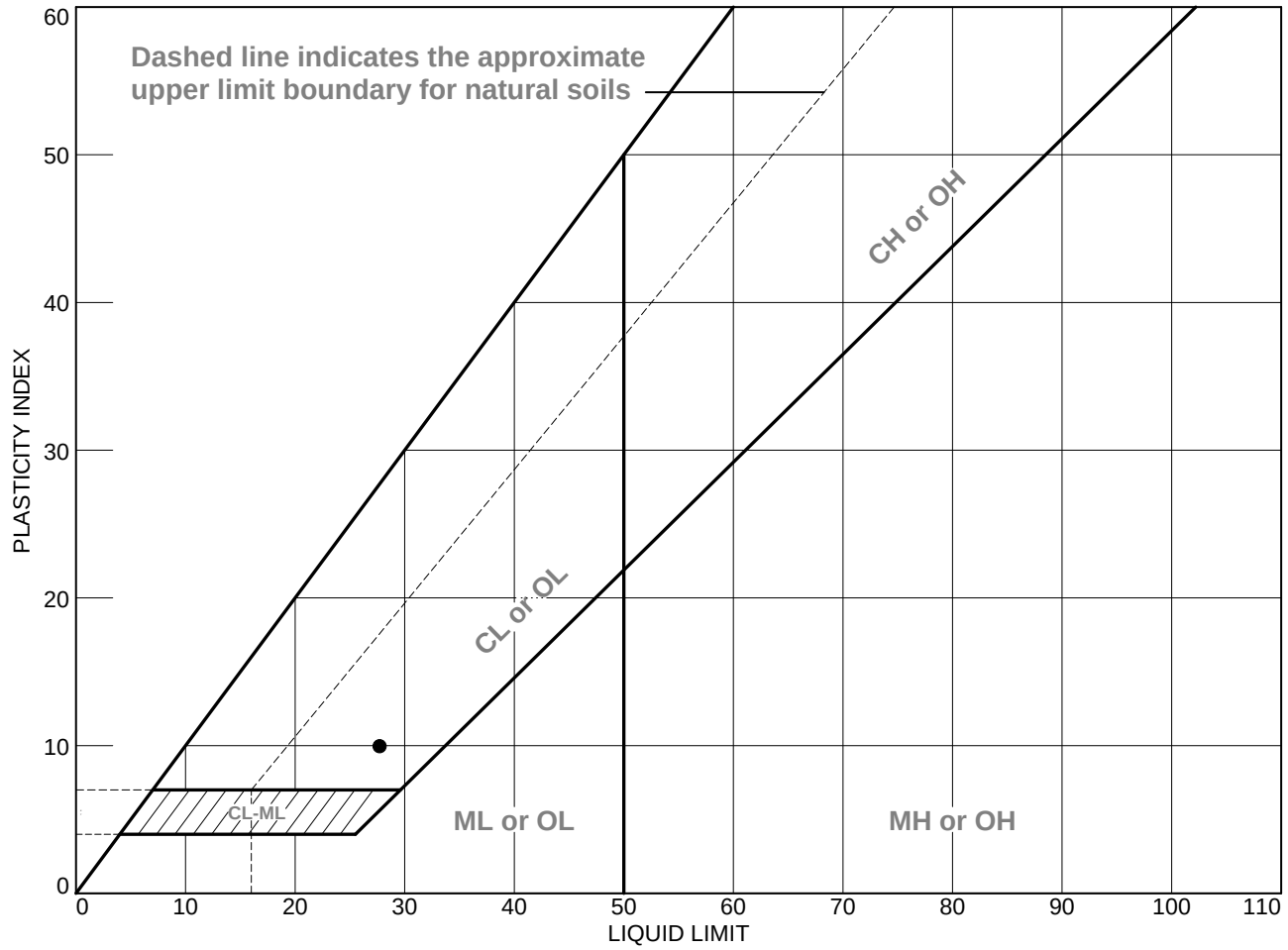
Morgantown, WV

Client: Alleghenies Broadband, Inc.
Project: Chaneysville - ABI Telecomunication Tower

Project No: 01-23-0291 **Figure C-2**

Tested By: LMC **Checked By:** JKM

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-1	S-2, S-3	3.0' - 7.5'	5.8	17.9	27.8	9.9	GC

Triad Engineering, Inc.

Morgantown, WV

Client: Alleghenies Broadband, Inc.
Project: Chaneysville - ABI Telecomunication Tower

Project No.: 01-23-0291 **Figure C-3**

Tested By: LMC **Checked By:** JKM

TRIAD ENGINEERING, INC.

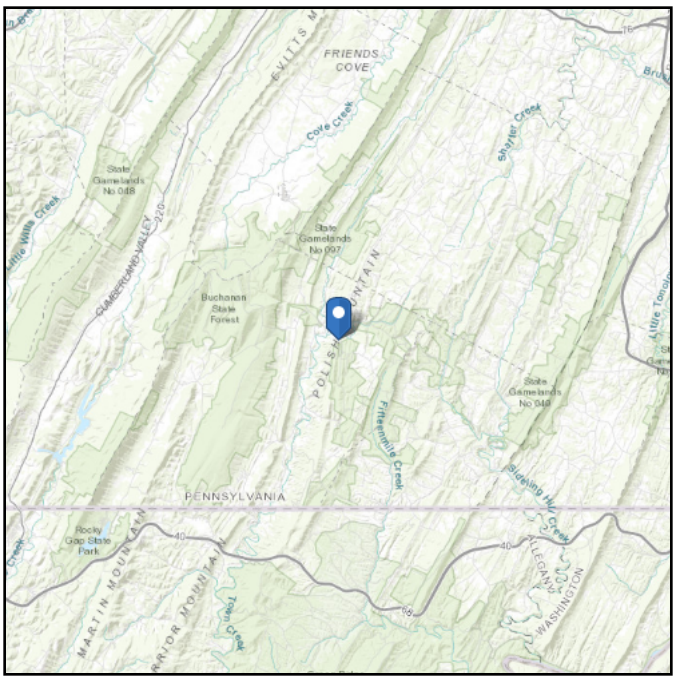
APPENDIX D

SEISMIC INFORMATION

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-22	**Latitude:**	39.814536
Risk Category:	II	**Longitude:**	-78.47822
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	1216.6627887757277 ft (NAVD 88)



Seismic

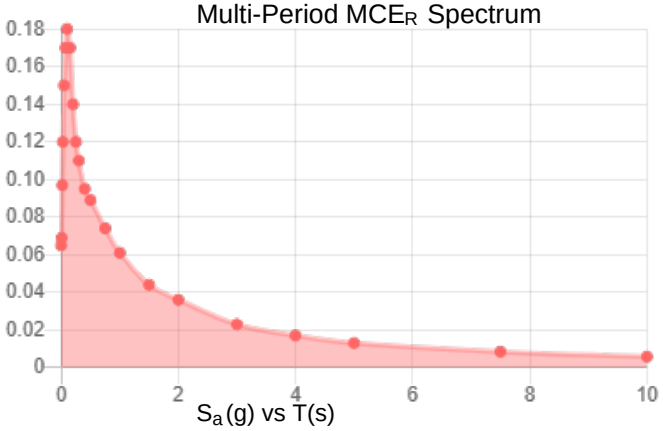
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

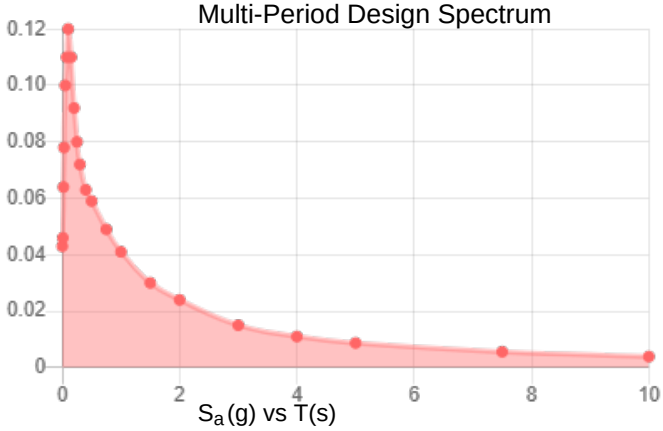
PGA_M :	0.057	T_L :	12
S_{MS} :	0.12	S_S :	0.12
S_{M1} :	0.065	S_1 :	0.047
S_{DS} :	0.083	V_{S30} :	530
S_{D1} :	0.043		

Seismic Design Category: A

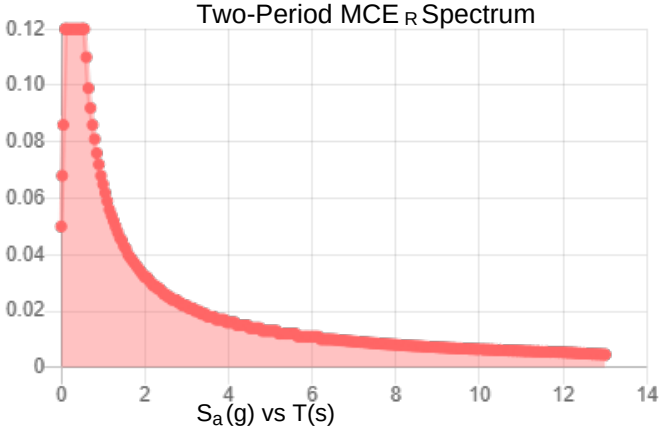
Multi-Period MCE_R Spectrum



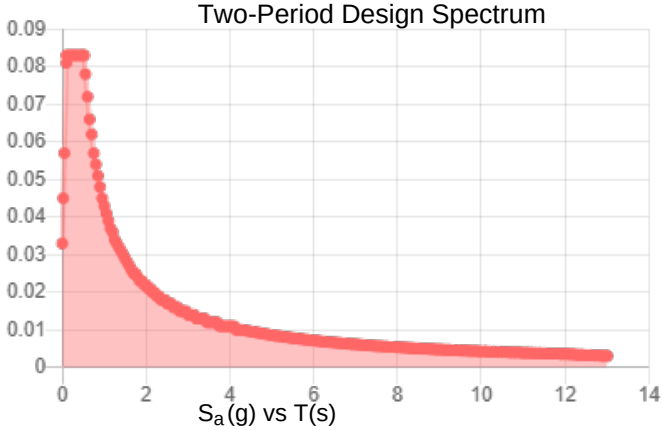
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Tue Sep 02 2025**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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TRIAD ENGINEERING, INC.

Report of Geotechnical Exploration

Triad Project No. 01-23-0291

September 26, 2025

Dutch Corner Tower Site
Bedford County, Pennsylvania

Prepared For:
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Prepared By:
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Report of Geotechnical Exploration
Dutch Corner Tower Site
Bedford County, Pennsylvania

SITE AND PROJECT DESCRIPTION

The project site is located approximately seven miles northeast of Bedford in Bedford County, Pennsylvania. The site consists of a relatively level area on the ridge of Evitts Mountain. The approximate location is shown on Figure A-1 in Appendix A.

According to the *Tower Site Exhibit* prepared by Mission Critical Partners, the proposed development will consist of a 180-foot self-supporting telecommunications tower for Alleghenies Broadband, Inc. The project will also include construction of an adjacent 8-foot by 10-foot utility shed, enclosed within a 100-foot by 100-foot security fence. The proposed tower center is located at coordinates 40.112194, -78.422472. Estimates of loads to be supported by the tower foundations have not been provided.

GEOLOGY

Surficial Geology

Based on the *Quaternary Geologic Map of the Lake Erie 4 Degrees by 6 Degrees Quadrangle*, published in 1991 by the U.S. Geological Survey as part of the Quaternary Geologic Atlas of the United States, the surficial soils at the site are mapped as Holocene and Wisconsin bouldery colluvium and rock waste. Colluvium and rock waste are loose, unconsolidated deposits that accumulate below cliffs or on steep slopes by processes such as rockfall, creep, or rainwash.

This unit consists of angular to subangular blocks, boulders, and cobbles of quartzitic sandstone, sandstone, or conglomerate. On upper slopes it commonly occurs as rock waste with little or no soil matrix, coarsely sorted both vertically and laterally, with block sizes that increase downslope and upward within the deposit. Clasts are generally randomly oriented, and crude imbrication with long axes dipping upslope is common where secondary creep has occurred. Individual boulders may be unstable; boulders can reach diameters of more than 20 feet, with size controlled by bedding thickness and joint spacing in the parent rock. On steep slopes, the deposits form talus cones and aprons, as well as debris cones, and may locally develop into block fields and block streams more than 2,800 feet long. Downslope, the unit may grade into bouldery colluvium with a sandy or loamy matrix, or into loamy to clayey colluvium with scattered boulders. The deposits are most extensive on south-facing slopes and can mantle entire slopes as a continuous cover. Rock outcrops are uncommon within the unit. Thickness is generally less than 10 feet on upper slopes, less than 50 feet on lower slopes, and may exceed 100 feet in places.

Bedrock Geology

According to the *Geologic Map of Pennsylvania* (Pennsylvania Geological Survey, 1980) and the *Pennsylvania Geologic Data Exploration* system maintained by the Department of Conservation and Natural Resources (PA DCNR), the colluvium at the project site is underlain

by the Tuscarora Formation of the Silurian Period. This formation is composed primarily of light- to medium-gray sandstone, with local occurrences of red and green beds, along with orthoquartzite and minor shale and siltstone interbeds. The rock is generally fine- to coarse-grained, very hard, and well cemented, with common crossbedding and localized conglomeratic zones. At its upper contact, it contains the Castanea Member, characterized by alternating red and nonred sandstone. The Tuscarora forms many of the prominent ridges within the Ridge and Valley province. Bedding is typically thick, although crossbedding can obscure it, and the unit can reach a maximum thickness of roughly 1,500 feet.

Coal Resources

We researched mine maps available through the *Pennsylvania Mine Map Atlas*, the *Pennsylvania Historic Surface Mine Permit Locator*, and the *Pennsylvania Active Underground Bituminous Coal Mining* database, all maintained by the Pennsylvania Department of Environmental Protection (PA DEP), to ascertain what minable coal beds are present below the site and to determine if past surface or underground mining operations have been conducted. In performing this evaluation, we could not identify any documented surface or underground mining directly at or beneath the project site.

It should be noted that the abovementioned PA DEP databases may be incomplete due to the limited number of years requiring permitting and mapping. As such, the lack of identified mines at the subject site does not constitute a guarantee of a mine-free area.

SUBSURFACE EXPLORATION

As requested, Triad drilled one test borings at the proposed tower center on September 9, 2025. The boring location was staked by others prior to Triad arriving at the site, and the surface elevation for the boring was obtained from the provided *Tower Site Exhibit* prepared by Mission Critical Partners. Figure A-2 in Appendix A depicts the approximate locations of the test borings drilled for the project.

A geologist from Triad was present full time during the drilling to direct the drilling crew, log all recovered soil samples, and observe groundwater and rock conditions. Triad transported the recovered soil samples to our laboratory for further testing. Detailed descriptions of materials encountered in the test borings are documented on the boring logs in Appendix B. Figures B-1 and B-2 in Appendix B describe the classification system and terminology utilized.

SUBSURFACE CONDITIONS

The materials encountered in the borings are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types, and the actual transitions between boring locations may be gradual.

Colluvium: Colluvium consisting primarily of sand with lesser amounts of silt and gravel was observed in the boring to a depth of approximately 1.5 feet. Standard Penetration Test N-values obtained within this material indicated a loose relative density.

Augering became difficult at depth of 1.5 feet, and auger refusal on a boulder was noted at a depth of 3 feet. Rock coring was required to advance through the colluvium at this point. From 3 to 7 feet, the colluvium consisted of gravel and cobbles with evidence of boulders. Finer grained matrix may have been washed out with the water used in the coring process. Overall, the colluvial material extended to a depth of approximately 7 feet.

Bedrock: Competent bedrock was encountered at a depth of about 7 feet, and the boring was advanced through the bedrock utilizing rock coring techniques to a depth of 24 feet. Bedrock cored in the boring consisted primarily of firmly cemented, quartzitic sandstone. A 2-foot interbed of red claystone was encountered from approximately 16 to 18 feet. Rock core recovery values ranged from 60 to 92 percent, and Rock Quality Designation (RQD) values ranged from 35 to 66 percent per core run. Unconfined compressive strength tests were performed on two samples of the sandstone core recovered from the boring. The results ranged from 8,619 to 17,526 psi, corresponding to hard to very hard rock.

Groundwater: Groundwater levels were measured both during and after drilling operations. The borehole was dry prior to coring operations. It should be noted that water levels indicated after rock coring operations are not considered representative of true groundwater levels due to the introduction of water into the borehole during rock coring. Upon completion, the borehole caved in at a depth of 3 feet, and groundwater was not observed at that depth.

It is emphasized that fluctuations in true groundwater levels can occur due to seasonal, climatic and environmental variations which may not have been evident at the time of the field exploration. Consequently, groundwater levels can vary significantly from those recorded at the time measurements were taken.

LABORATORY TESTING

Triad performed laboratory tests on selected rock samples to aid in classification and provide a basis for estimating their engineering properties. The laboratory tests were performed in general accordance with ASTM standard test methods. Appendix C contains the detailed results. These results are summarized in the following table:

TYPE OF TEST	TEST RESULTS
Unconfined Compressive Strength of Rock	8,619 and 17,526 psi

DISCUSSION

The project site is underlain by approximately 7 feet of colluvium consisting of a mixture of sand, silt, gravel, cobbles, and boulders. Competent bedrock was encountered at a depth of about 7 feet. Bedrock cored in the boring consisted of very hard, quartzitic sandstone to a depth of 24 feet, with an interbed of red claystone from approximately 16 to 18 feet.

Based on these conditions, specifically the hardness of the sandstone, difficult drilling conditions for our equipment and close proximity to bedrock, we suggest the use of a pad and pier

foundation system to support the proposed tower. Drilling through the sandstone to install shafts is not recommended. It should also be noted that due to the nature of the colluvium and the presence of cobbles and boulders, developing a solid base for the pier may be difficult. The presence of the soil within the loosely nested boulders may result in a varying bearing surface both in elevation and material type. In order to address pockets left by boulders removed during excavation and uneven bearing due to rock and soil zones at the same level, we recommend a undercut to bedrock to be included as a contingency in the contract. Backfilling voids left from the removal of cobbles or boulder or the undercut to bedrock should be performed using crusher run as defined below. Excavation of rock is not required as part of the undercut if implemented.

The following sections of this report include recommendations for the design and construction of the geotechnical elements of the project. Provided that these recommendations are followed, it is our opinion that the site is generally suitable for the proposed construction.

DESIGN RECOMMENDATIONS

The geotechnical engineering evaluation of the site and subsurface conditions at the property, as well as the recommendations for site preparation and foundation support, are based on our site observations, the field data obtained and our understanding of the project information as presented in this report.

Pad and Pier

Based on the subsurface conditions encountered in boring B-1, it is our opinion that the foundation for support of the tower can be a pad and pier type foundation comprised of an isolated foundation and pier extending to the base of the tower. We anticipate that this foundation type may require an excavation on the order of 4 feet below existing grade to meet suitable bearing and be below frost depth. We have assumed a 6-foot square pad for purposes of our analysis. The recommendations provided are acceptable for foundations 6 foot square and larger. For a foundation bearing at 4 feet (cobble and boulder colluvium) below existing grade, we recommend for foundation design on colluvial soil. If higher design values are required, we recommend over-excavating foundations to top of bedrock. Recommendations for colluvial soils and top of bedrock are provided below:

STRATA	BOTTOM OF FOUNDATION	ALLOWABLE BEARING CAPACITY (psf)	K (pci)
Gravel, Cobble, and Boulder Colluvium	4	5	120
Top of Bedrock	7	12,000	170

Uplift Considerations

We anticipate that the tower planned for the site will be subjected to uplift forces. The uplift capacity for pad and pier foundations is obtained from the weight of the concrete foundation and the weight of equipment and/or backfill above the foundation. We recommend that unit weights of 145 pcf for concrete and 125 pcf for compacted backfill be used to compute uplift resistance. The weight of the equipment placed above the foundation should be obtained from the equipment manufacturer. A factor of safety of 1.5 should be applied to uplift determinations for foundations.

Lateral Load Considerations

We anticipate that the tower planned for the site will be subjected to lateral loads. Lateral load resistance of foundations can be obtained using friction along the base of the foundation and passive resistance of the materials immediately adjacent to the foundation. In designing the foundation to resist lateral loads, we recommend the use of a frictional resistance value (coefficient of friction) of 0.50 and active and passive lateral earth pressure coefficients of 0.33 and 3.0, respectively. When computing the lateral resistance due to earth pressure, the resistance due to active earth pressure must be subtracted from the passive earth pressure. A factor of safety of 1.5 should be used to determine the allowable lateral load resistance.

Settlement Considerations

For the pad and pier foundation, settlements due to structural loading were estimated based on the results of the test borings, the recommended allowable bearing pressure of 3,000 psf, laboratory test results and our past experience with similar conditions. Based on this information, we estimate that foundation settlement for the proposed tower could be on the order of 1 inch. Differential settlement which could occur between individual similarly loaded column foundations is estimated to be on the order of approximately ½ inch. If structural loads require foundations larger than the minimum widths for individual column footings recommended in this report, we should be contacted to re-evaluate our settlement estimates using the actual structural loads and proposed foundation dimensions.

Seismic Site Classification

The subsurface profile was evaluated and classified according to ASCE/SEI 7-22. This code establishes the criteria for project site evaluation and determination of several seismic design parameters. ASCE/SEI 7-22, Chapter 20 outlines the procedure for determination of the site classification based on the average shear wave velocity for materials to a depth of 100 feet. Table 20.2-1 includes ranges of estimated shear wave velocities for each class (type) of material, and those classes are determined as the result of soil type and in-situ consistencies and/or relative densities reflected by SPT testing in the borings. Based on the results of the test borings and our assumptions, the site has an average shear wave velocity of 1,885 feet per second (fps). Using this information along with knowledge of the site geologic setting, the seismic site class and additional seismic information is as follows:

PARAMETER DESCRIPTION	SEISMIC RESULT
Seismic Site Class	C
Soil Profile	Very Dense Soil and Soft Rock
MCE_R (5% damped, short periods), S_{MS}	0.12
MCE_R (5% damped, 1.0 second period), S_{M1}	0.055
Design (5% damped, short periods), S_{DS}	0.079
Design (5% damped, 1.0 second period), S_{D1}	0.037

Based on results from the test borings, published regional geologic information and the probable maximum strength of earthquake, it is our opinion that liquefaction potential for the on-site soils during seismic activity is relatively low. Seismic parameters to be considered for structural design of the project are provided in Appendix D of this report.

CONSTRUCTION RECOMMENDATIONS

Site Preparation

Initial preparation of the site for construction should include installation of sediment and erosion control measures and any upslope diversion ditching or berms that are required. Existing utilities that conflict with proposed foundations and/or new utility alignments should be relocated as necessary.

Site Excavations

It is anticipated that most of the on-site soil and weathered bedrock can be effectively removed with conventional earth-moving equipment such as backhoes and dozers. Except for the deep foundations, it is assumed that excavations required for the project will likely not extend to depths sufficient to encounter harder bedrock. However, harder bedrock that is encountered may require rock removal techniques such as hoe-ram chipping or hydraulic splitting for effective removal.

The means necessary to excavate rock are a function of the consistency/hardness of the material, the type/size of excavation equipment utilized and the effort the contractor is willing to apply. If the plans call for excavation of rock for bidding purposes, potential contractors should be instructed to perform their own investigations as to measures necessary to excavate bedrock encountered.

Excavated materials should not be stockpiled and construction equipment should not be positioned beside open excavations, since the added load may cause a sudden collapse of the excavation side walls. The design and construction of all excavations should comply with

applicable local, state, and federal safety regulations, including the current requirements of the Occupational Safety and Health Administration (OSHA). In no case should slope height, slope inclination, or excavation depth exceed those specified by OSHA or any other regulatory agencies or local authorities having jurisdiction at the construction site.

Controlled Fill

Suitable Fill Material

Fill required to attain design grades should be placed as controlled, compacted fill. Satisfactory fill includes approved on-site excavated materials, off-site borrow material such as residual soils, soil/rock mixtures, and soft weathered rock, or a well-graded commercial stone such as crusher run aggregate. The fill should be free of trash, wood, coal, topsoil, organics, pyritic material with greater than 0.1 percent by weight of pyritic sulfur, frozen material, and pieces of rock greater than 4 inches in any dimension for lift thicknesses of 9 inches or 1½ inches in any dimension for lift thicknesses of 4 inches. Materials classified as MH, CH, OH, OL and Pt based on the Unified Soil Classification System (USCS) are not considered suitable for use as new fill. All fill should be tested and approved prior to placement and compaction.

Fill Placement and Compaction

Before initiating fill placement, any topsoil or other surficial material should be removed. The subgrade surface should be proof-rolled with appropriate rubber-tired construction equipment and/or visually evaluated to locate any soft spots or areas of excessive "pumping." Any such areas should be over-excavated to a firm subgrade and replaced with new, controlled fill material. The engineer should be contacted if excessive over-excavation is required.

During placement, moisten or aerate each layer of fill, as necessary, to obtain the required compaction. Fill should not be placed on surfaces that are muddy, frozen or have not been approved by prior testing and/or proof-rolling. Free water should be prevented from appearing on the surface during or after compaction operations. Fill placed on sloping areas should be properly benched or “notched” into the slope face such that a smooth transition between the new fill and existing slope face is not present.

Soil material which is removed because it is too wet to permit proper compaction may be spread and allowed to dry. Drying can be facilitated by discing, harrowing, or by pulverizing until the moisture content is reduced to an acceptable level. When the soil is too dry, water may be uniformly applied to the subgrade surface or to the layer to be compacted.

Fill material compacted by heavy compaction equipment should be placed in loose layers not exceeding 9 inches in thickness. Fill compacted with lightweight equipment, such as hand-operated tampers or walk-behind rollers, should be placed in loose layers not exceeding 4 inches in thickness. The compaction equipment utilized should be suitable for the type of material being compacted. Vibratory rollers are best suited to coarse-grained soils, while pad foot (often called sheepsfoot) rollers are appropriate for fine-grained materials. Fill placed adjacent to foundation walls should be compacted using lightweight equipment.

New fill placed within the structure footprint and extending at least five (5) feet beyond its perimeter, or to that extent possible, should be compacted to at least 98 percent of the laboratory maximum dry density as determined by the Standard Proctor method (ASTM D 698). Fill placed outside of these areas should be compacted to at least 95 percent of the maximum dry density as determined by the same standard. The placement moisture content of fill material should be within ±3 percentage points of the optimum moisture content as determined by ASTM D 698, except the structural areas where the moisture content should be within ±2 percent of the optimum moisture content. Granular materials, such as clean sand or aggregate, should be compacted to at least 85% of its relative density, as determined by ASTM D 4253 and D 4254 test methods.

Foundation Construction

Foundation excavations should be cleaned of all loose or otherwise disturbed materials present in the base of the excavations. The excavations should be observed and tested by a qualified geotechnical engineer, or his/her representative, prior to concrete placement to verify that materials capable of providing the recommended bearing capacity are present. Materials exposed in the foundation excavations may be susceptible to softening and/or degradation if exposed to precipitation or surface water runoff. In addition, some foundation excavations could be relatively deep. Consequently, foundation concrete should be placed in the excavations as soon as possible once the excavations have been observed and approved, and only that amount of foundation excavation which can be backfilled with concrete should be opened on any given day. Once foundation walls have been constructed up to final exterior grades, we recommend that the foundation excavations be backfilled with compacted soil fill to prevent ponding of water adjacent to foundations.

Groundwater and Surface Runoff Control

The contractor should be prepared to implement temporary and/or permanent dewatering measures since groundwater conditions can change. We anticipate that sources of subsurface water which may develop during construction can probably be managed and removed by a gravity drainage system, sump pits and pumps or other minor dewatering procedures.

Surface water runoff should be prevented from flowing through the construction area. If necessary, diversion ditches or berms should be installed upslope of the construction area. Ditches should be protected from excessive erosion using riprap, erosion control matting, or vegetation.

Quality Assurance and Control

We recommend that the geotechnical engineer-of-record, Triad, be retained to monitor the construction activities to verify that the field conditions are consistent with the findings of our exploration. If significant variations are encountered, or if the design is altered, we should be notified.

The geotechnical engineer should provide personnel full-time and/or intermittently to:

- Observe and document installation of the drainage features and verify initial subgrade conditions prior to fill placement.
- Observe and test material compaction during fill construction. Field density tests should be performed in accordance with ASTM D 6938 (nuclear method). At least three (3) field density tests should be performed for each lift or at a frequency determined by the geotechnical engineer to be sufficient for the size of the fill area to verify the required soil compaction.
- Examine all subgrade bearing levels to confirm compliance with our recommendations and verify that adequate support is available.
- Test fresh structural concrete placed for the project.

LIMITATIONS

This report has been prepared for the exclusive use of Alleghenies Broadband, Inc. for specific application to the design of the proposed telecommunications tower in Dutch Corner, Bedford County, Pennsylvania. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own investigation of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or reuse of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety. Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the boring at the site. It is emphasized that subsurface conditions may vary dramatically between borings, and Triad makes no representations as to subsurface conditions other than those encountered at the specific boring location. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, if any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed, and the conclusions are modified or verified in writing by Triad.

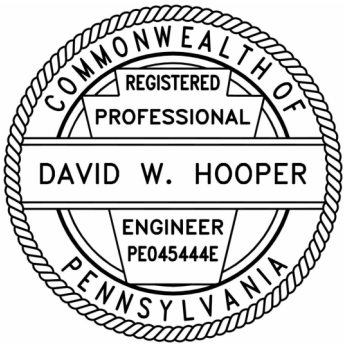
It is recommended that we be provided the opportunity to review the final grading plan, overall foundation design, and specifications so that earthwork and foundation recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

We appreciate the opportunity to submit this report and look forward to working with you on the construction of this project. Please contact the undersigned with any questions or concerns you have regarding this report.

TRIAD ENGINEERING, INC.

Maria af Rolén, P.G.
Senior Geologist

David W. Hooper, P.E.
Principal Engineer



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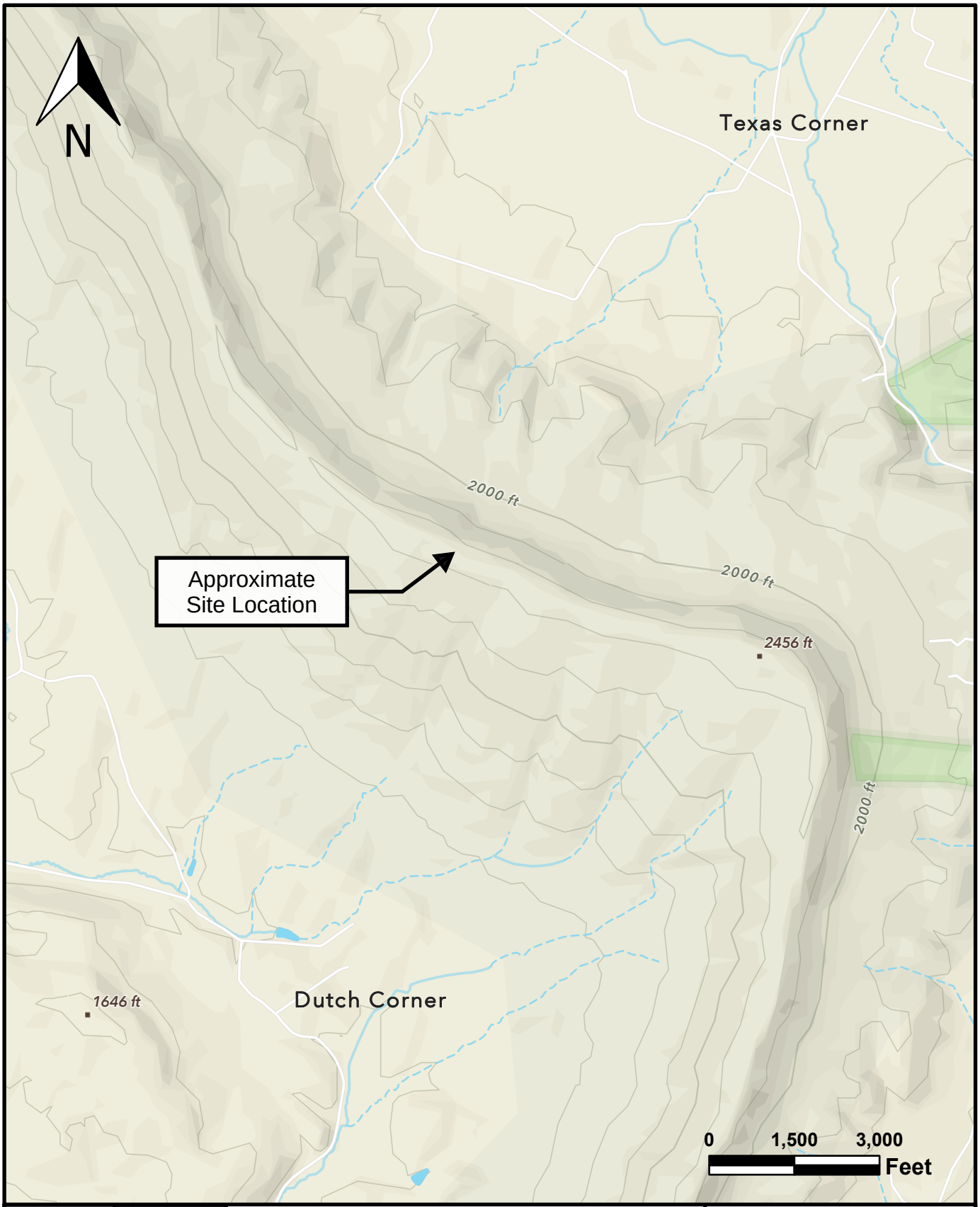
APPENDIX A

FIGURES



PREPARED BY:	CHECKED BY:
MAR	DWH

PROJECT NUMBER:
01-23-0291

FIGURE A-1

GENERAL SITE VICINITY

Dutch Corner Tower Site
Bedford County, Pennsylvania
Outdoor Map (ESRI)

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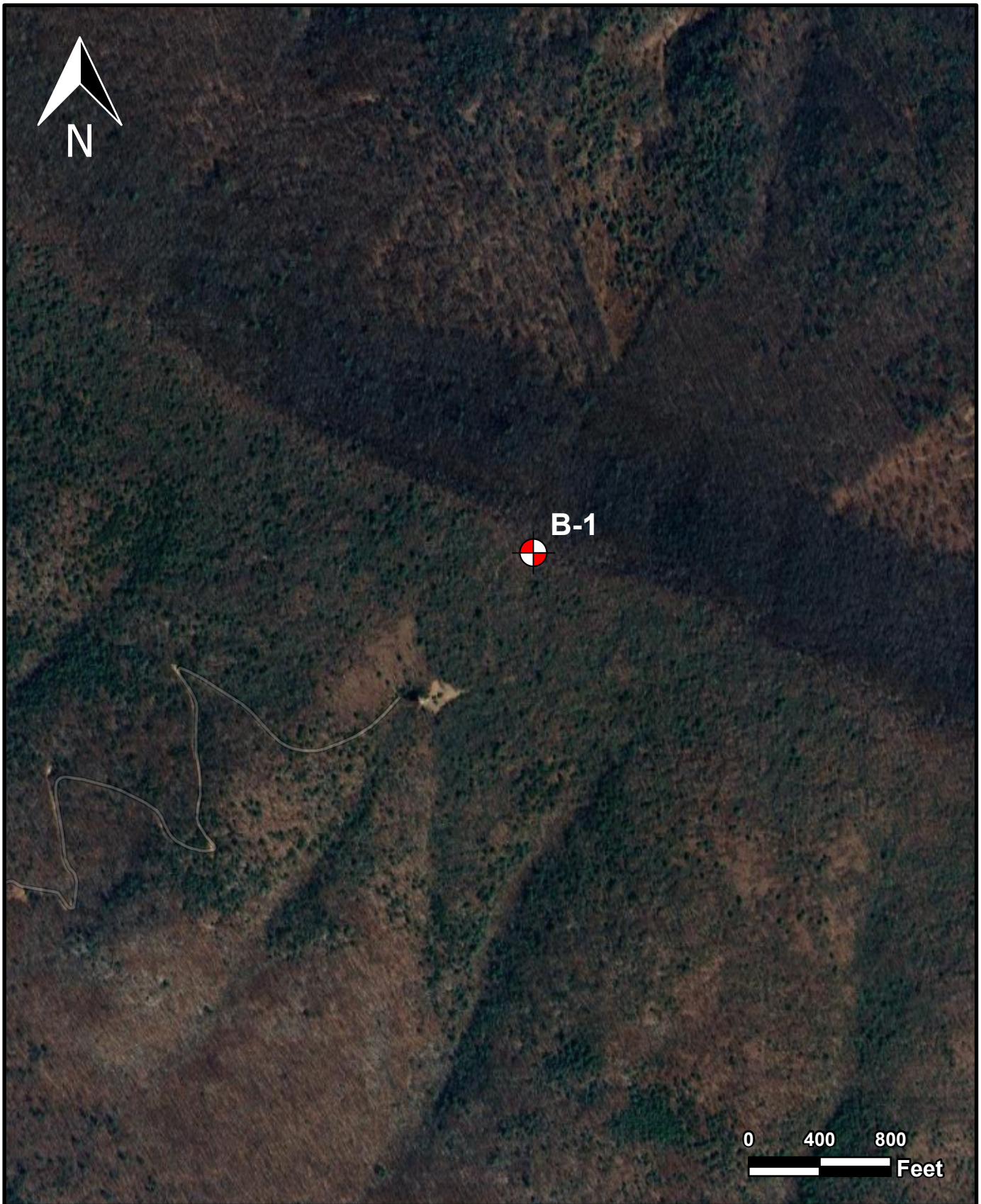

PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-2	

BORING LOCATION PLAN

Dutch Corner Tower Site
Bedford County, Pennsylvania
Google Earth Satellite Imagery (2025)

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APPENDIX B

FIELD EXPLORATION

TRIAD ENGINEERING, INC.

FIELD EXPLORATION

A representative of Triad was present to direct the drill crew, log recovered samples and observe groundwater conditions. The borings were drilled utilizing a Geoprobe 7822DT rotary auger drill rig. Samples of in-situ soil and weathered bedrock were obtained using a split-barrel sampler while performing Standard Penetration Tests (ASTM D 1586). The results of these tests (N-values) are commonly interpreted to provide an index to strength, consistency or relative density of the sampled materials and their ability to support foundations.

Once auger or sampler refusal on harder rock was encountered, select borings were further advanced using rock coring techniques. Continuous rock core samples were obtained from auger/sampler refusal depth to the boring termination depth. The harder rock materials were penetrated and sampled using a conventional, double-tubed core barrel and diamond coring bit, producing a rock core sample a nominal two (2) inches in diameter. The rock coring was performed to assess the type, quality and continuity of the bedrock at the drilled locations. The Rock Quality Designation (RQD) noted on the logs provides an indication of the relative quality and soundness of a specific bedrock stratum by measuring the lengths of intact rock core (unbroken core samples) that are larger than twice the core sample diameter for a specific rock stratum and/or core run and dividing the sum of the cumulative lengths by the thickness of the stratum and/or core run.

Groundwater levels were checked both during and after drilling operations and are recorded on the individual logs. Water levels indicated after rock coring operations are not considered representative of true groundwater levels, due to the introduction of water into the borehole during rock coring. It is emphasized that groundwater levels typically vary and are dependent upon climatic conditions and other environmental factors.

It is also emphasized that the lines shown on the logs are estimates of the changes in material. Actual changes may be gradual and may vary from those indicated on the logs, and the subsurface conditions between the borings may differ from those depicted on the logs. The boreholes were backfilled upon completion of the drilling with auger cuttings. Samples were transported to our office for temporary storage and additional analysis. The samples will be discarded after a period of 60 days unless other arrangements are made.

Figures B-1 and B-2 on the following pages describe the classification system and terminology used on the boring logs.

KEY TO IDENTIFICATION OF SOIL AND WEATHERED BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Primary Component
3	Fractions
4	Moisture
5	Descriptors
6	Plasticity
7	Consistency/ Relative Density
8	Deposition Type

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Primary Component	
Component	Grain Size (USCS)
Boulders	≥ 12 inches
Cobbles	3 to 12 inches
Gravel	#4 to 3 inches
Sand	#200 to #4
Silt/Clay	≤ #200

3. Fractions	
And	≥ 35%
Some	20 to 35%
Little	10 to 20%
Trace	< 10%

4. Moisture	
Dry	Dry to touch
Damp	Slightly moist
Moist	No visible free water
Wet	Visible free water

5. Descriptors	
Fissile	Splits easily along closely spaced parallel planes (breaks into plates)
Hackly	Jagged or irregular fracture planes
Slickensided	Polished and striated surfaces that result from friction along a fault plane
Laminated	Alternating thin layers of varying material or colors less than ¼" thick
Lensed	Inclusion of small pockets of different soils
Saprolitic	Completely weathered rock that retains the appearance of the original rock structure but has only a trace of the original bond strength
Micaceous	Containing mica minerals
Varved	Laminated sediment consisting of alternating layers of fine sand and silt or clay deposited in still water

6. Plasticity of Fine-Grained Soils

Fine-Grained Component	Plasticity	Estimated Plasticity Index (PI)	Smallest Thread Diameter	Thread Characteristics	Dilatancy
Primarily Silt	Non-Plastic	0 - 2%	Ball cracks	Dries rapidly; a 1/8-inch thread cannot be rolled at any water content	Moist ball sheds water when shaken giving a glossy appearance
Primarily Clay	Low Plasticity	3 - 10%	$^1/_8$ to $^1/_4$ inch	Feels powdery when drying out during rolling; thread can barely be rolled	Moist ball retains water or sheds water slowly when shaken
	Medium Plasticity	> 10 - 20%	$^1/_{16}$ inch	Thread cannot be rerolled after reaching plastic limit	
	High Plasticity	> 20%	$^1/_{32}$ inch	Thread can be rerolled after reaching plastic limit	Moist ball retains water when shaken

7a. Relative Density of Granular Coarse-Grained Soils

Descriptor	N-Value
Very Loose	≤ 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

7b. Consistency of Fine-Grained Soils

Descriptor	Pocket Penetrometer (tons/ft^2)	N-Value
Very Soft	≤ 0.25	≤ 2
Soft	≥ 0.25 - 0.5	3 - 4
Medium Stiff	> 0.5 - 1.0	5 - 8
Stiff	> 1.0 - 2.0	9 - 15
Very Stiff	> 2.0 - 4.0	16 - 30
Hard	> 4	≥ 31

8. Type of Deposit	
Alluvium	Sediment deposited by moving water
Colluvium	Sediment deposited by gravity
Fill	Manmade deposit
Fluviomarine	Stratified materials formed by the combined action of river and sea processes
Glacial Outwash	Sediment deposited by glacial meltwater; commonly sand and gravel
Glacial Till	Unsorted sediment deposited by glacier
Glacial Drift	Collective term for all sediment transported and deposited by a glacier or glacial meltwater
Residuum	Insoluble material remaining from weathered rock
Weathered Bedrock	Bedrock that has been weathered

FIGURE B-1

KEY TO IDENTIFICATION OF HARD BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Rock Type
3	Interbedding
4	Descriptors
5	Weathering
6	Fracturing
7	Fracture Angle
8	Hardness

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Rock Type	
Common Regional Rocks	
Sandstone	Siltstone
Mudstone	Shale
Coal	Claystone
Limestone	Dolostone

3. Interbedding/Fractions	
And	≥ 50%
Some	15 to 40%
Few	0 to 15%

4. Descriptors	
Arenaceous	Sedimentary rock containing sand sized particles
Argillaceous	Pertaining to a sedimentary rock which contains an appreciable amount of clay
Calcareous	Containing calcium carbonate; when applied to a rock name, it implies that as much as 50% of the rock is calcium carbonate
Carbonaceous	A rock rich in carbon
Cross Bedded	Original depositional layering is inclined
Ferruginous	A rock having a red or rusty color due to the presence of ferric oxide
Fissile	Splits easily along closely spaced parallel planes
Fossiliferous	Containing fossils
Hackly	Jagged or irregular fracture planes
Micaceous	Containing mica minerals
Nodule	A small rounded mass of a mineral or mineral aggregate different in composition from the enclosing rock
Pyritic	Containing the mineral pyrite
Slickenside	Polished and striated surface that results from friction along a fault plane
Vein	An epigenetic mineral filling of a fault or other fracture
Vuggy	Containing voids usually lined with crystals of a different mineral composition from the enclosing rock

5. Degree of Weathering	
Descriptor	**Criteria**
Fresh	No visible sign of weathering, discoloration, or oxidation
Slightly Weathered	Slight weathering, discoloration, or oxidation **impacting <20% of rock mass**
Weathered	Significant weathering, discoloration, or oxidation **impacting 20 to 60% of rock mass**
Highly Weathered	Major weathering, discoloration, or oxidation **impacting >60% of rock mass**

6. Degree of Fracturing	
Descriptor	**Spacing**
Very Broken	≤ 2 inches
Broken	2 to 8 inches
Blocky	8 inches to 2 feet
Slightly Fractured	2 to 6 feet

7. Angle of Fracture Planes	
Fracture Planes	**Degrees**
Flat	< 5°
Shallow	5 to 15°
Moderate	15 to 30°
Steep	30 to 45°
Very Steep	45 to 60°
Sheer	60 to 90°
Vertical	90°

8. Rock Hardness	
Descriptor	**Test Criteria for Hand Specimen**
Very Soft	Indented with thumb or scratched by fingernail
Soft	Gouged deeply or carved with a knife blade
Medium Hard	Readily scratched by knife blade, scratch leaves heavy trace of dust
Hard	Scratched by knife blade with difficulty, scratch produces little powder and is faintly visible
Very Hard	Not scratched by a knife blade

FIGURE B-2

TEST BORING LOG

Sheet 1 of 1

Project Number: **01-23-0291** Project Name: **Dutch Corner Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 9/9/25 Drill/Method: Geoprobe 7822DT

Date Completed: 9/9/25 Driller: RU (TERRA) Ground Elev.: 2449.6

Shelby Tube | Standard Split Spoon | Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	S-1		1-3-6	40%			Orange-tan **SAND**, some silt, trace gravel, moist to wet, loose, **colluvium**				
							- Difficult augering from 1.5 feet				
						3.0	Auger refusal on boulder at 3.0 feet				2446.6
5.0	R-1			22%	0%		Gray sandstone **GRAVEL** and **COBBLES**, evidence of boulders, **colluvium**				
						7.0					2442.6
10.0	R-2			92%	66%		Gray and purple **SANDSTONE**, quartzitic, firmly cemented, slightly weathered, broken to blocky, shallow to moderate fracture planes, hard				
							- Vertical fracture (partially cemented) from 7.0 to 8.6 feet				
							- From 10.1 to 11.1 feet: UCS=8,619 psi	71%			
15.0	R-3			92%	60%						
						15.9	Red **CLAYSTONE**, weathered, very broken, hackly fracture planes, very soft				2433.7
							- Interbedded claystone and sandstone from 17.0 to 17.9 feet	0%			
						17.9					2431.7
20.0	R-4			82%	40%		Gray **SANDSTONE**, quartzitic, firmly cemented, slightly weathered, broken to blocky, shallow and vertical fracture planes, very hard				
							- From 20.7 to 21.4 feet: UCS=17,526 psi	44%			
	R-5			60%	35%		- Impregnated drill bit refused at 24.0 feet. Maximum down pressure was applied (enough to lift the tracks on the rig off the ground), but the bit would not advance.				
						24.0					2425.6
25.0							Boring terminated at 24.0 feet				

Remarks: Ground surface elevation obtained from "Tower Site Exhibit" prepared by Mission Critical Partners. Borehole dry prior to coring operations. Borehole caved in at 3.0 feet upon completion.

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ROCK CORE PHOTOGRAPHS

Boring B-1: Box 1 of 2

Boring B-1: Box 2 of 2

TRIAD ENGINEERING, INC.

APPENDIX C

LABORATORY TESTING

TRIAD ENGINEERING, INC.

Laboratory Testing

The samples obtained from the test borings were visually classified in the field by geotechnical engineering personnel from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soils tests were conducted in accordance with applicable ASTM Standards as listed below:

1. Rock core compression tests were performed in accordance with ASTM D 7012.

A summary and details of the laboratory test results are included on the following pages of this appendix.

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LABORATORY DATA SUMMARY

BORING NO.	SAMPLE DEPTH (ft)	SAMPLE TYPE	NATURAL MOISTURE (%)	ATTERBERG LIMITS			GRADATION			USCS SOIL CLASS.	UNCONFINED COMPRESSIVE STRENGTH (psi)
				LL	PL	PI	% GRAVEL	% SAND	% FINES		
B-1	10.1 - 11.1	RC									8619
B-1	20.7 - 21.4	RC									17526

TRIAD ENGINEERING, INC.

Notes:
1) Soil tests performed in accordance with recognized ASTM testing standards.
2) SS = Split Spoon UD = Undisturbed
RC = Rock Core
3) NV = Non Viscous NP = Non Plastic

PROJECT NUMBER: 01-23-0291
PROJECT NAME: Dutch Corner Tower Site
LOCATION: Bedford County, Pennsylvania

FIGURE C-1

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Dutch Corner

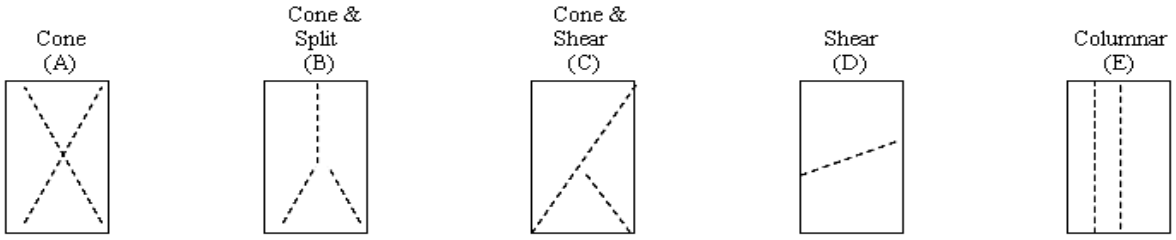
Project # : 01-23-0291 Date : 9/12/2025

Core # : B-1/R-2 Depth: 10.1' - 11.1'

Sample Description: Light brown sandstone

Measurements (inches)		
	Capped Length	Diameter
#1	3.875	1.981
#2	3.872	1.979
#3	3.887	1.980
Avg.	3.878	1.980

Length to Diameter Ratio :	**1.96**		Correction Factor:	**1**
Area:	**3.0791**	in^2	Flatness of Sample:	FLAT
Load:	**26540**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**8619**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**621**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**8619**	lbs/in^2	Type of Break:	E
Corrected Strength :	**621**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-2

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Dutch Corner

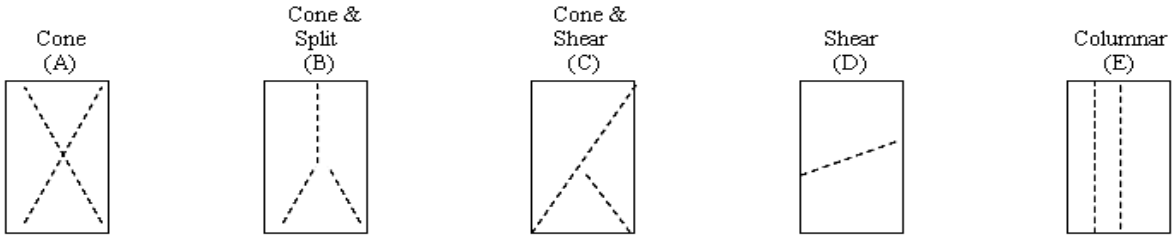
Project # : 01-23-0291 Date : 9/12/2025

Core # : B-1/R-5 Depth: 20.7' - 21.4'

Sample Description: Light gray sandstone

Measurements (inches)		
	Capped Length	Diameter
#1	3.876	1.983
#2	3.886	1.983
#3	3.880	1.982
Avg.	3.881	1.983

Length to Diameter Ratio :	**1.96**		Correction Factor:	**1**
Area:	**3.0874**	in^2	Flatness of Sample:	FLAT
Load:	**54110**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**17526**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**1262**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**17526**	lbs/in^2	Type of Break:	E
Corrected Strength :	**1262**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-3

TRIAD ENGINEERING, INC.

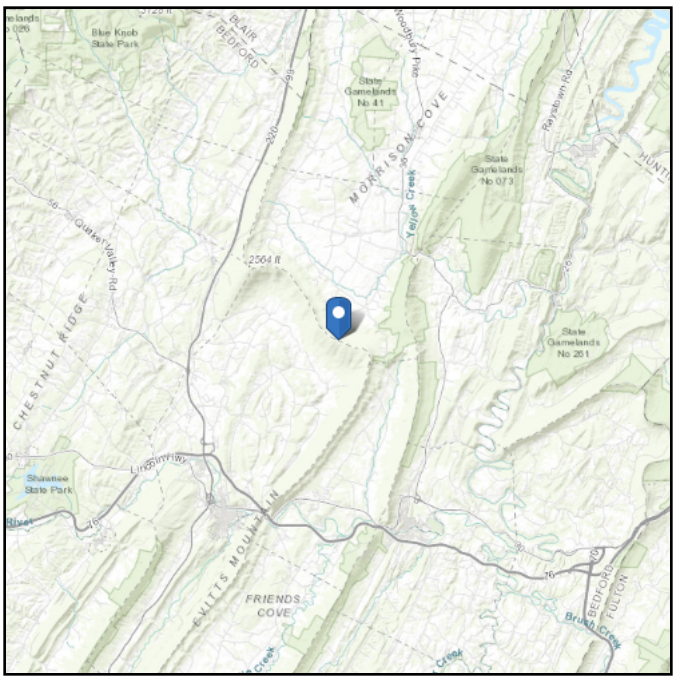
APPENDIX D

SEISMIC INFORMATION

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-22	**Latitude:**	40.112194
Risk Category:	II	**Longitude:**	-78.422472
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	2451.1685492444776 m (NAVD 88)



Seismic

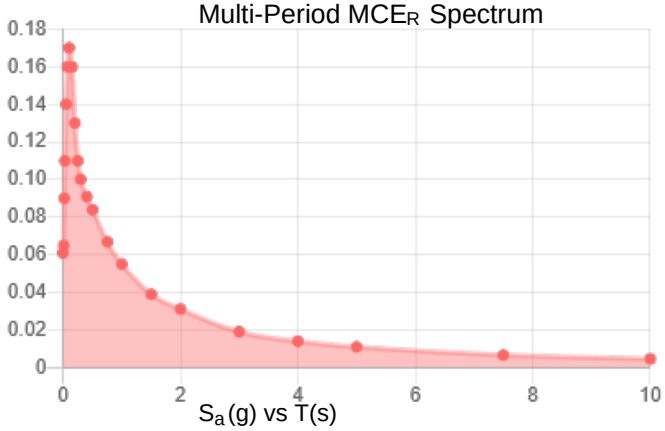
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

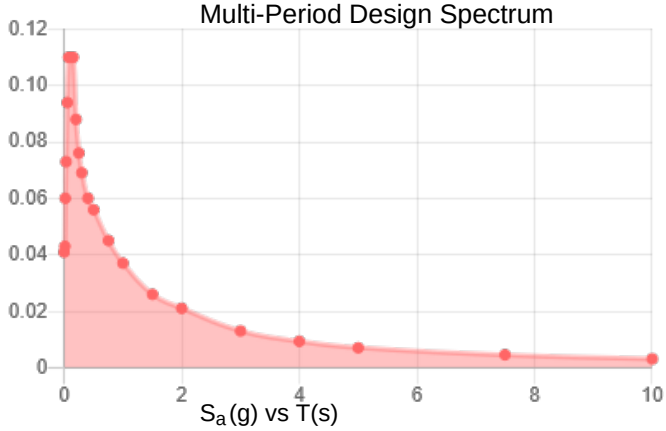
PGA_M :	0.054	T_L :	12
S_{MS} :	0.12	S_S :	0.11
S_{M1} :	0.055	S_1 :	0.043
S_{DS} :	0.079	V_{S30} :	530
S_{D1} :	0.037		

Seismic Design Category: A

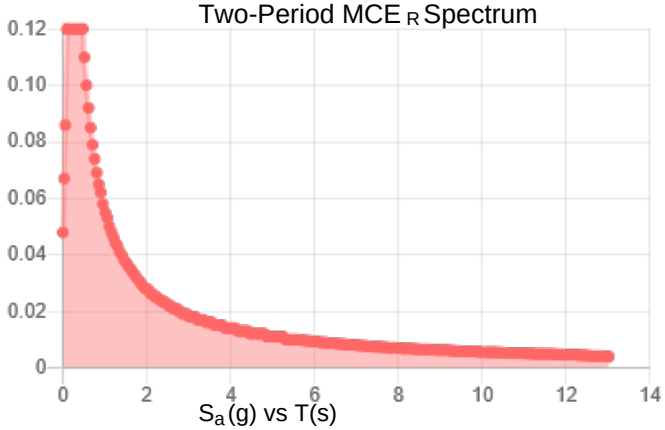
Multi-Period MCE_R Spectrum



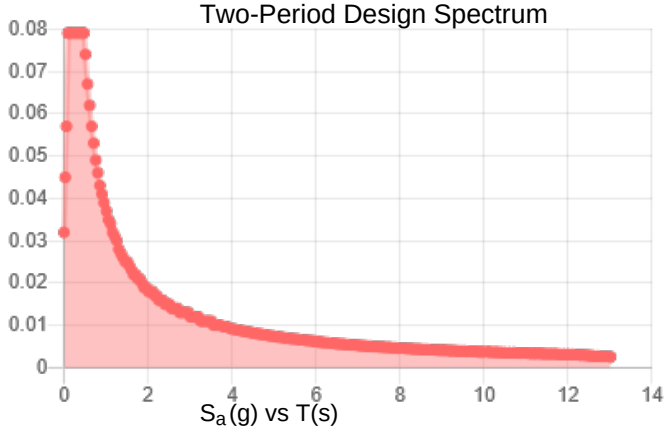
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Thu Sep 11 2025**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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

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TRIAD ENGINEERING, INC.

Report of Geotechnical Exploration

Triad Project No. 01-23-0291

September 25, 2025

Hopewell Tower Site
Bedford County, Pennsylvania

Prepared For:
Alleghenies Broadband, Inc.
3900 Industrial Park Drive
Altoona, PA 16602

Prepared By:
Triad Engineering, Inc.
1097 Chaplin Hill Road
Morgantown, WV 26501

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Report of Geotechnical Exploration
Hopewell Tower Site
Bedford County, Pennsylvania

SITE AND PROJECT DESCRIPTION

The project site is located approximately four miles southwest of Hopewell in Bedford County, Pennsylvania. The project area consists of a gently sloping hillside beyond the edge of a wooded area between two soybean fields. The approximate location is shown on Figure A-1 in Appendix A.

According to the *Tower Site Exhibit* prepared by Mission Critical Partners, the proposed development will consist of a 180-foot self-supporting telecommunications tower for Alleghenies Broadband, Inc. The project will also include construction of an adjacent 8-foot by 10-foot utility shed, enclosed within a 100-foot by 100-foot security fence. The proposed tower center is located at coordinates 40.114899, -78.340145. Estimates of loads to be supported by the tower foundations have not been provided.

GEOLOGY

Bedrock Geology

According to the *Geologic Map of Pennsylvania* (Pennsylvania Geological Survey, 1980) and the *Pennsylvania Geologic Data Exploration* system maintained by the Department of Conservation and Natural Resources (PA DCNR), the project site lies near the mapped contact between the Devonian-aged Onondaga and Old Port Formations (undivided) and the underlying Keyser and Tonoloway Formations (undivided), which range from Devonian to Silurian in age.

The Onondaga Formation is subdivided into two members. The upper Selinsgrove Limestone is a dark-gray, argillaceous limestone that contains abundant fossils and is absent west of the 78° longitude. The lower Needmore Shale is calcareous, with claystone in its lower portion, and exhibits bedding that ranges from thin, flaggy layers to thicker beds. In east-central Pennsylvania, the Tioga Ash Beds mark the top of the Onondaga Formation. The formation reaches a maximum thickness of approximately 150 feet. The overlying Old Port Formation is comprised of sandstone, chert, shale, and limestone. From top to bottom, it includes the Ridgeley Member, a porous sandstone ranging from fine- to very coarse-grained; the Shriver Member, a dark chert that weathers to light gray or yellow-brown; the Mandata and Corriganville Members, composed of silty to sandy shale, siltstone, and chert; and the New Creek Member, consisting of calcareous shale interbedded with limestone. In Fulton County, the Licking Creek Member, composed of limestone and chert, replaces the Shriver and Mandata Members. Overall, the Old Port Formation is roughly 100 feet thick.

The Onondaga and Old Port Formations are underlain by the Keyser and Tonoloway Formations. The Keyser Formation is primarily a dark-gray, fossil-rich limestone that can be crystalline or nodular, with shaly limestone near its upper portion. Its bedding ranges from thin, flaggy layers to thick beds, and some beds are massive, with a total thickness of about 270 to 290 feet. The underlying Tonoloway Formation consists of medium-gray laminated limestone

with interbedded layers of medium-dark-gray to light-olive-gray shale and siltstone. Bedding varies from flaggy to thick, and the formation is approximately 400 feet thick at its type section.

Development in Karst Areas

The project site located in an area underlain by carbonate sedimentary bedrock which results in karst terrain. Karst terrain is often characterized by caves, internal drainage, lack of surface streams, and topographic features such as sinkholes. These features are the result of the dissolution of soluble bedrock, such as limestone or dolomite, by groundwater. As groundwater enters fractures and bedding planes in soluble carbonate bedrock, it slowly dissolves the rock and enlarges the fractures. This results in the formation of solutioning channels or underground streams or ravines. Sinkholes are created by the subsidence of unconsolidated materials into underlying voids such as solution channels or caves. Usually, subsidence occurs slowly and steadily over geologic time. Many sinkholes, however, are caused by a sudden collapse of a solution cave when the roof of the cave becomes too thin to support the overburden materials. Sinkholes recently created by such a collapse can usually be identified by the presence of freshly broken rock outcrops around the rim or throat of the sinkhole.

Although indications of karst features were not observed at surface of the site, a possible 1-foot sediment-filled karst void was encountered in boring B-1 during our subsurface investigation. It is important to note that there are certain risks that an owner must accept when developing in areas underlain by carbonate rocks. These risks are primarily associated with unpredictable subsidence. In these instances, water is the primary cause of the problem. Alterations in the ground surface, particularly in cut areas, during construction can impact the natural drainage within the site, and it is common to have small solution features develop in these areas because of construction. Also, normal blasting required to remove hard rock can create micro-fractures within the bedrock that will allow greater surface water infiltration into areas that may normally not receive water and, in turn, disturb old solution features and/or possibly create new solution features.

Coal Resources

We researched mine maps available through the *Pennsylvania Mine Map Atlas*, the *Pennsylvania Historic Surface Mine Permit Locator*, and the *Pennsylvania Active Underground Bituminous Coal Mining* database, all maintained by the Pennsylvania Department of Environmental Protection (PA DEP), to ascertain what minable coal beds are present below the site and to determine if past surface or underground mining operations have been conducted. In performing this evaluation, we could not identify any documented surface or underground mining directly at or beneath the project site.

It should be noted that the abovementioned PA DEP databases may be incomplete due to the limited number of years requiring permitting and mapping. As such, the lack of identified mines at the subject site does not constitute a guarantee of a mine-free area.

SUBSURFACE EXPLORATION

As requested, Triad drilled one test borings at the proposed tower center from September 5 to 8, 2025. The boring location was staked by others prior to Triad arriving at the site, and the

surface elevation for the boring was obtained from the provided *Tower Site Exhibit* prepared by Mission Critical Partners. Figure A-2 in Appendix A depicts the approximate locations of the test borings drilled for the project.

A geologist from Triad was present full time during the drilling to direct the drilling crew, log all recovered soil samples, and observe groundwater and rock conditions. Triad transported the recovered soil samples to our laboratory for further testing. Detailed descriptions of materials encountered in the test borings are documented on the boring logs in Appendix B. Figures B-1 and B-2 in Appendix B describe the classification system and terminology utilized.

SUBSURFACE CONDITIONS

The materials encountered in the borings are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types, and the actual transitions between boring locations may be gradual.

Topsoil: A layer of topsoil was observed at the surface of the boring. The topsoil had an approximate thickness of 0.6 feet.

Residuum: Underlying the topsoil, residual soils were encountered. The residual soils consisted of limestone gravel with lesser amounts of sand and silt. Standard Penetration Test (SPT) N-values obtained within the residuum indicated a medium dense relative density. The residuum extended to a depth of approximately 3 feet.

Weathered Bedrock: Sampler refusal in weathered limestone was observed at a depth of 3 feet. SPT-N values obtained within the weathered limestone were in excess of 50 blows per foot, which indicates a very dense relative density. Auger refusal on more competent bedrock was noted at a depth of 5 feet.

Bedrock: Once auger refusal was attained, the boring was further advanced to a termination depth of 25 feet utilizing rock coring techniques. Bedrock cored in the boring consisted of argillaceous limestone with chert nodules and shale laminae. A possible sediment-filled karst void was observed between 19 and 20 feet, as indicated by a soft tool drop. Rock core recovery values ranged from 36 to 90 percent, and Rock Quality Designation (RQD) values ranged from 0 to 18 percent per core run. Unconfined compressive strength tests were performed on two rock core samples recovered from the boring. The results ranged from 1,228 to 2,635 psi, corresponding to soft to medium hard rock.

Groundwater: Groundwater levels were measured both during and after drilling operations. Groundwater levels are documented on the boring logs in Appendix B. The boring was dry prior to coring operations. It should be noted that water levels indicated after rock coring operations are not considered representative of true groundwater levels due to the introduction of water into the borehole during rock coring.

It is emphasized that fluctuations in true groundwater levels can occur due to seasonal, climatic and environmental variations which may not have been evident at the time of the field exploration. Consequently, groundwater levels can vary significantly from those recorded at the time measurements were taken.

LABORATORY TESTING

Triad performed laboratory tests on selected rock samples to aid in classification and provide a basis for estimating their engineering properties. The laboratory tests were performed in general accordance with ASTM standard test methods. Appendix C contains the detailed results. These results are summarized in the following table:

TYPE OF TEST	TEST RESULTS
Unconfined Compressive Strength of Rock	1,228 and 2,634 psi

DISCUSSION

The project site is underlain by approximately 3 feet of medium dense coarse-grained residual soils. The residual soils are underlain by a layer of weathered limestone. Refusal in more competent bedrock was attained at a depth of about 5 feet. Bedrock cored in the boring consisted primarily of soft to medium hard argillaceous limestone.

Based on these conditions, we suggest two options for consideration to support the proposed tower. Option 1 includes a pier and pad foundation bearing on residual soils. To further decrease the potential for karst damage, the foundation should be placed at or near the top of rock limiting natural soils between the footing and the top of rock. Excavation into bedrock for the pad (below approximately 5 feet) will require rock excavation. However, based on the unconfined results, weathering and brokenness of the bedrock should still be attainable for short distances. Option 2 includes caissons that will transfer loads down to the more competent bedrock at the site and can be used to resist uplift forces. The caisson will also involve rock excavation techniques and may encountered karst solutioning. If solutioning is encountered, the caisson may need to be extended deeper.

The following sections of this report include recommendations for the design and construction of the geotechnical elements of the project. Provided that these recommendations are followed, it is our opinion that the site is generally suitable for the proposed construction.

DESIGN RECOMMENDATIONS

The geotechnical engineering evaluation of the site and subsurface conditions at the property, as well as the recommendations for site preparation and foundation support, are based on our site observations, the field data obtained and our understanding of the project information as presented in this report.

Option 1: Pad and Pier

Based on the subsurface conditions encountered in boring B-1, it is our opinion that the foundation for support of the tower can be a pad and pier type foundation comprised of an isolated foundation and pier extending to the base of the tower. We anticipate that this foundation type may require an excavation on the order of 4 feet below existing grade to meet

suitable bearing and be below frost depth. We have assumed a 6-foot square pad for purposes of our analysis. The recommendations provided are acceptable for foundations 6 foot square and larger. For a foundation bearing at 4 feet (weathered limestone) below existing grade, we recommend for foundation design on weathered bedrock. If higher design values are required, we recommend over-excavating foundations to top of bedrock. Recommendations for weathered bedrock and top of bedrock are provided below:

STRATA	BOTTOM OF FOUNDATION	ALLOWABLE BEARING CAPACITY (psf)	K (pci)
Weathered Limestone	3	5000	130
Top of Bedrock	5	12,000	170

Uplift Considerations

We anticipate that the tower planned for the site will be subjected to uplift forces. The uplift capacity for pad and pier foundations is obtained from the weight of the concrete foundation and the weight of equipment and/or backfill above the foundation. We recommend that unit weights of 145 pcf for concrete and 125 pcf for compacted backfill be used to compute uplift resistance. The weight of the equipment placed above the foundation should be obtained from the equipment manufacturer. A factor of safety of 1.5 should be applied to uplift determinations for foundations.

Lateral Load Considerations

We anticipate that the tower planned for the site will be subjected to lateral loads. Lateral load resistance of foundations can be obtained using friction along the base of the foundation and passive resistance of the materials immediately adjacent to the foundation. In designing the foundation to resist lateral loads, we recommend the use of a frictional resistance value (coefficient of friction) of 0.50 and active and passive lateral earth pressure coefficients of 0.33 and 3.0, respectively. When computing the lateral resistance due to earth pressure, the resistance due to active earth pressure must be subtracted from the passive earth pressure. A factor of safety of 1.5 should be used to determine the allowable lateral load resistance.

Option 2: Drilled Shafts (Caissons)

We recommend that drilled shafts (caissons) should be extended through the soil overburden and weathered bedrock to bear a minimum of one caisson diameter in the harder bedrock encountered at a depth of approximately 5 feet. For caissons bearing in soft to medium hard argillaceous limestone, we recommend that a maximum factored end bearing capacity of 20 ksf be utilized for design. Additionally, we recommend using a factored side resistance value of 5 ksf for the bedrock.

It is emphasized that conditions can vary from those depicted by the borings. Consequently, caisson bearing depths may require adjustment during construction. As such, we recommend that a representative from our office be present during caisson construction to verify that appropriate bearing conditions are present.

Lateral Analysis of Deep Foundations

The ultimate lateral load capacity was not evaluated for the anticipated caissons. A full analysis of the lateral capacity should be evaluated by the structural engineer during the design phase of the tower foundations. In order to aid in this evaluation, the following parameters are provided. The given parameters are from the LPILE computer program.

DEPTH (feet)	MATERIAL TYPE	MATERIAL MODELED AS	EFFECTIVE UNIT WEIGHT γ (pcf)	FRICTION ANGLE ϕ (°)	UNDRAINED COHESION (psf)	K STATIC/ CYCLIC (pci)	ξ_{50}	k_{rm}	INITIAL MODULUS OF ROCK MASS (psi)	UCS (psi)	RQD (%)
0-3	Gravel, some sand, some silt	Sand (Reese)	105	33	N/A	800	N/A	N/A	N/A	N/A	N/A
3-5	Weathered limestone	Weak rock (Reese)	140	N/A	N/A	N/A	N/A	0.00009	10,000	200	0
5-25	Argillaceous limestone	Strong rock	145	N/A	N/A	N/A	0.001	0.0003	40,000	2500	0

Settlement Considerations

For the pad and pier foundation, settlements due to structural loading were estimated based on the results of the test borings, the recommended allowable bearing pressure of 3,000 psf, laboratory test results and our past experience with similar conditions. Based on this information, we estimate that foundation settlement for the proposed tower could be on the order of 1/2 inch if not bearing on bedrock. For foundations bearing on bedrock, settlement will be negligible. Differential settlement which could occur between individual similarly loaded column foundations is estimated to be on the order of approximately ½ inch. If structural loads require foundations larger than the minimum widths for individual column footings recommended in this report, we should be contacted to re-evaluate our settlement estimates using the actual structural loads and proposed foundation dimensions.

Seismic Site Classification

The subsurface profile was evaluated and classified according to ASCE/SEI 7-22. This code establishes the criteria for project site evaluation and determination of several seismic design parameters. ASCE/SEI 7-22, Chapter 20 outlines the procedure for determination of the site classification based on the average shear wave velocity for materials to a depth of 100 feet. Table 20.2-1 includes ranges of estimated shear wave velocities for each class (type) of material, and those classes are determined as the result of soil type and in-situ consistencies and/or relative densities reflected by SPT testing in the borings. Based on the results of the test borings and our assumptions, the site has an average shear wave velocity of 1,951 feet per

second (fps). Using this information along with knowledge of the site geologic setting, the seismic site class and additional seismic information is as follows:

PARAMETER DESCRIPTION	SEISMIC RESULT
Seismic Site Class	C
Soil Profile	Very Dense Soil and Soft Rock
MCE_R (5% damped, short periods), S_{MS}	0.12
MCE_R (5% damped, 1.0 second period), S_{M1}	0.055
Design (5% damped, short periods), S_{DS}	0.08
Design (5% damped, 1.0 second period), S_{D1}	0.037

Based on results from the test borings, published regional geologic information and the probable maximum strength of earthquake, it is our opinion that liquefaction potential for the on-site soils during seismic activity is relatively low. Seismic parameters to be considered for structural design of the project are provided in Appendix D of this report.

CONSTRUCTION RECOMMENDATIONS

Site Preparation

Initial preparation of the site for construction should include installation of sediment and erosion control measures and any upslope diversion ditching or berms that are required. Existing utilities that conflict with proposed foundations and/or new utility alignments should be relocated as necessary.

Site Excavations

It is anticipated that most of the on-site soil and weathered bedrock can be effectively removed with conventional earth-moving equipment such as backhoes and dozers. Except for the deep foundations, it is assumed that excavations required for the project will likely not extend to depths sufficient to encounter harder bedrock. However, harder bedrock that is encountered may require rock removal techniques such as hoe-ram chipping or hydraulic splitting for effective removal.

The means necessary to excavate rock are a function of the consistency/hardness of the material, the type/size of excavation equipment utilized and the effort the contractor is willing to apply. If the plans call for excavation of rock for bidding purposes, potential contractors should be instructed to perform their own investigations as to measures necessary to excavate bedrock encountered.

Excavated materials should not be stockpiled and construction equipment should not be positioned beside open excavations, since the added load may cause a sudden collapse of the

excavation side walls. The design and construction of all excavations should comply with applicable local, state, and federal safety regulations, including the current requirements of the Occupational Safety and Health Administration (OSHA). In no case should slope height, slope inclination, or excavation depth exceed those specified by OSHA or any other regulatory agencies or local authorities having jurisdiction at the construction site.

Controlled Fill

Suitable Fill Material

Fill required to attain design grades should be placed as controlled, compacted fill. Satisfactory fill includes approved on-site excavated materials, off-site borrow material such as residual soils, soil/rock mixtures, and soft weathered rock, or a well-graded commercial stone such as crusher run aggregate. The fill should be free of trash, wood, coal, topsoil, organics, pyritic material with greater than 0.1 percent by weight of pyritic sulfur, frozen material, and pieces of rock greater than 4 inches in any dimension for lift thicknesses of 9 inches or 1½ inches in any dimension for lift thicknesses of 4 inches. Materials classified as MH, CH, OH, OL and Pt based on the Unified Soil Classification System (USCS) are not considered suitable for use as new fill. All fill should be tested and approved prior to placement and compaction.

Fill Placement and Compaction

Before initiating fill placement, the topsoil or other surficial material should be removed. The subgrade surface should be proof-rolled with appropriate rubber-tired construction equipment and/or visually evaluated to locate any soft spots or areas of excessive "pumping." Any such areas should be over-excavated to a firm subgrade and replaced with new, controlled fill material. The engineer should be contacted if excessive over-excavation is required.

During placement, moisten or aerate each layer of fill, as necessary, to obtain the required compaction. Fill should not be placed on surfaces that are muddy, frozen or have not been approved by prior testing and/or proof-rolling. Free water should be prevented from appearing on the surface during or after compaction operations. Fill placed on sloping areas should be properly benched or “notched” into the slope face such that a smooth transition between the new fill and existing slope face is not present.

Soil material which is removed because it is too wet to permit proper compaction may be spread and allowed to dry. Drying can be facilitated by discing, harrowing, or by pulverizing until the moisture content is reduced to an acceptable level. When the soil is too dry, water may be uniformly applied to the subgrade surface or to the layer to be compacted.

Fill material compacted by heavy compaction equipment should be placed in loose layers not exceeding 9 inches in thickness. Fill compacted with lightweight equipment, such as hand-operated tampers or walk-behind rollers, should be placed in loose layers not exceeding 4 inches in thickness. The compaction equipment utilized should be suitable for the type of material being compacted. Vibratory rollers are best suited to coarse-grained soils, while pad foot (often called sheepsfoot) rollers are appropriate for fine-grained materials. Fill placed adjacent to foundation walls should be compacted using lightweight equipment.

New fill placed within the structure footprint and extending at least five (5) feet beyond its perimeter, or to that extent possible, should be compacted to at least 98 percent of the laboratory maximum dry density as determined by the Standard Proctor method (ASTM D 698). Fill placed outside of these areas should be compacted to at least 95 percent of the maximum dry density as determined by the same standard. The placement moisture content of fill material should be within ±3 percentage points of the optimum moisture content as determined by ASTM D 698, except the structural areas where the moisture content should be within ±2 percent of the optimum moisture content. Granular materials, such as clean sand or aggregate, should be compacted to at least 85% of its relative density, as determined by ASTM D 4253 and D 4254 test methods.

Foundation Construction

Foundation excavations should be cleaned of all loose or otherwise disturbed materials present in the base of the excavations. The excavations should be observed and tested by a qualified geotechnical engineer, or his/her representative, prior to concrete placement to verify that materials capable of providing the recommended bearing capacity are present. Materials exposed in the foundation excavations may be susceptible to softening and/or degradation if exposed to precipitation or surface water runoff. In addition, some foundation excavations could be relatively deep. Consequently, foundation concrete should be placed in the excavations as soon as possible once the excavations have been observed and approved, and only that amount of foundation excavation which can be backfilled with concrete should be opened on any given day. Once foundation walls have been constructed up to final exterior grades, we recommend that the foundation excavations be backfilled with compacted soil fill to prevent ponding of water adjacent to foundations.

Caisson Construction

Caissons should be constructed as straight shafts, plumb to within one (1) percent of their drilled lengths. Caissons should penetrate through the soils and very weathered underlying bedrock materials encountered in each test boring, in order that they will attain a suitable bearing material capable of supporting the recommended maximum allowable bearing pressure as previously identified. It is likely that rock augers and core barrels will be required to achieve the recommended bearing elevations. Temporary casing may be needed during the drilling operations to support the in-situ soils and to produce a seal along the soil-rock contact to reduce infiltration of groundwater into the excavation.

After the caissons have been drilled, the caisson bottom should be prepared to receive concrete. This will require cleaning the hole with drilling equipment. To facilitate smooth placement of concrete, we recommend that the concrete slump range be between 5 and 7 inches for the drilled caissons, provided that a suitable mix design is developed to provide the necessary strength at the appropriate water-to-cement ratio.

The caisson bottom must be clean of debris and have less than 2 inches of standing water prior to placement of concrete. If groundwater in the caisson becomes problematic, the concrete may need to be placed with a tremie tube, placing the concrete near the bottom, and forcing the

water out of the caisson hole. The caisson bottom should not be left open longer than 24 hours to help prevent deterioration of the bearing conditions. During withdraw of temporary casings care should be taken to maintain the concrete a minimum of 5 feet above the bottom of the casing. We do not recommend down hole inspections of the bearing material at this site. However, we do recommend that a representative from Triad be on site during the caisson construction to verify the bearing conditions in the bottom of each caisson.

Groundwater and Surface Runoff Control

The contractor should be prepared to implement temporary and/or permanent dewatering measures since groundwater conditions can change. We anticipate that sources of subsurface water which may develop during construction can probably be managed and removed by a gravity drainage system, sump pits and pumps or other minor dewatering procedures.

Surface water runoff should be prevented from flowing through the construction area. If necessary, diversion ditches or berms should be installed upslope of the construction area. Ditches should be protected from excessive erosion using riprap, erosion control matting, or vegetation.

Quality Assurance and Control

We recommend that the geotechnical engineer-of-record, Triad, be retained to monitor the construction activities to verify that the field conditions are consistent with the findings of our exploration. If significant variations are encountered, or if the design is altered, we should be notified.

The geotechnical engineer should provide personnel full-time and/or intermittently to:

- Observe and document installation of the drainage features and verify initial subgrade conditions prior to fill placement.
- Observe and test material compaction during fill construction. Field density tests should be performed in accordance with ASTM D 6938 (nuclear method). At least three (3) field density tests should be performed for each lift or at a frequency determined by the geotechnical engineer to be sufficient for the size of the fill area to verify the required soil compaction.
- Observe drilling and placement of concrete for caissons to confirm compliance with our recommendations.
- Examine all subgrade bearing levels to confirm compliance with our recommendations and verify that adequate support is available.
- Test fresh structural concrete placed for the project.

LIMITATIONS

This report has been prepared for the exclusive use of Alleghenies Broadband, Inc. for specific application to the design of the proposed telecommunications tower in Hopewell, Bedford

County, Pennsylvania. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own investigation of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or reuse of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety. Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the boring at the site. It is emphasized that subsurface conditions may vary dramatically between borings, and Triad makes no representations as to subsurface conditions other than those encountered at the specific boring location. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, if any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed, and the conclusions are modified or verified in writing by Triad.

It is recommended that we be provided the opportunity to review the final grading plan, overall foundation design, and specifications so that earthwork and foundation recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

We appreciate the opportunity to submit this report and look forward to working with you on the construction of this project. Please contact the undersigned with any questions or concerns you have regarding this report.

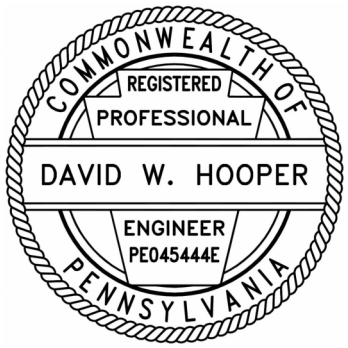
TRIAD ENGINEERING, INC.

Maria af Rolén

Maria af Rolén, P.G.
Senior Geologist

David W. Hooper

David W. Hooper, P.E.
Principal Engineer



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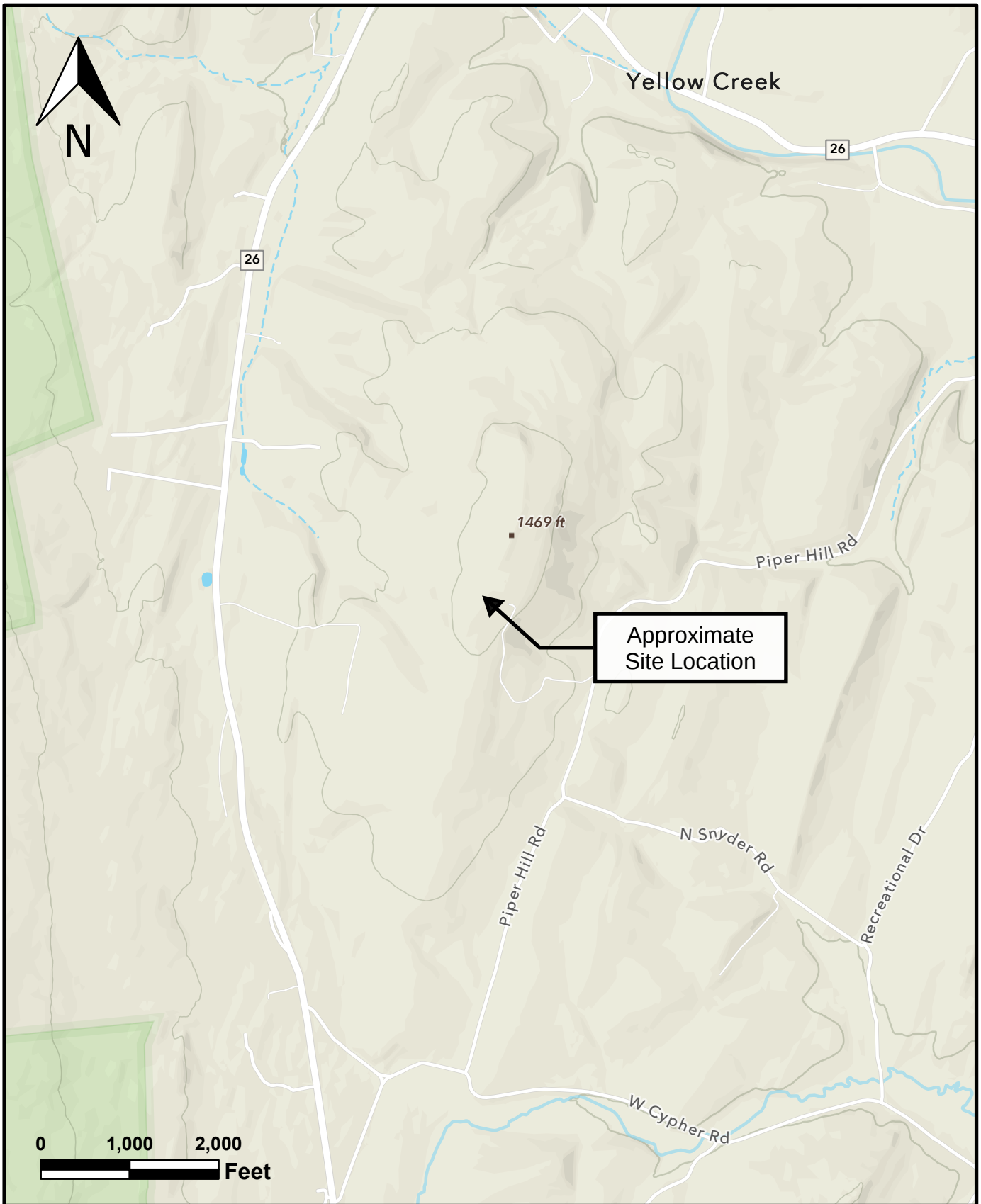
APPENDIX A

FIGURES



PREPARED BY:	CHECKED BY:
MAR	DWH
PROJECT NUMBER: 01-23-0291	
FIGURE A-1	

GENERAL SITE VICINITY

Hopewell Tower Site
Bedford County, Pennsylvania
Outdoor Map (ESRI)

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PREPARED BY:	CHECKED BY:
MAR	DWH

PROJECT NUMBER: 01-23-0291

FIGURE A-2

BORING LOCATION PLAN

Hopewell Tower Site
Bedford County, Pennsylvania
Google Earth Satellite Imagery (2016)

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APPENDIX B

FIELD EXPLORATION

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FIELD EXPLORATION

A representative of Triad was present to direct the drill crew, log recovered samples and observe groundwater conditions. The borings were drilled utilizing a Geoprobe 7822DT rotary auger drill rig. Samples of in-situ soil and weathered bedrock were obtained using a split-barrel sampler while performing Standard Penetration Tests (ASTM D 1586). The results of these tests (N-values) are commonly interpreted to provide an index to strength, consistency or relative density of the sampled materials and their ability to support foundations.

Once auger or sampler refusal on harder rock was encountered, select borings were further advanced using rock coring techniques. Continuous rock core samples were obtained from auger/sampler refusal depth to the boring termination depth. The harder rock materials were penetrated and sampled using a conventional, double-tubed core barrel and diamond coring bit, producing a rock core sample a nominal two (2) inches in diameter. The rock coring was performed to assess the type, quality and continuity of the bedrock at the drilled locations. The Rock Quality Designation (RQD) noted on the logs provides an indication of the relative quality and soundness of a specific bedrock stratum by measuring the lengths of intact rock core (unbroken core samples) that are larger than twice the core sample diameter for a specific rock stratum and/or core run and dividing the sum of the cumulative lengths by the thickness of the stratum and/or core run.

Groundwater levels were checked both during and after drilling operations and are recorded on the individual logs. Water levels indicated after rock coring operations are not considered representative of true groundwater levels, due to the introduction of water into the borehole during rock coring. It is emphasized that groundwater levels typically vary and are dependent upon climatic conditions and other environmental factors.

It is also emphasized that the lines shown on the logs are estimates of the changes in material. Actual changes may be gradual and may vary from those indicated on the logs, and the subsurface conditions between the borings may differ from those depicted on the logs. The boreholes were backfilled upon completion of the drilling with auger cuttings. Samples were transported to our office for temporary storage and additional analysis. The samples will be discarded after a period of 60 days unless other arrangements are made.

Figures B-1 and B-2 on the following pages describe the classification system and terminology used on the boring logs.

KEY TO IDENTIFICATION OF SOIL AND WEATHERED BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Primary Component
3	Fractions
4	Moisture
5	Descriptors
6	Plasticity
7	Consistency/ Relative Density
8	Deposition Type

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Primary Component	
Component	Grain Size (USCS)
Boulders	≥ 12 inches
Cobbles	3 to 12 inches
Gravel	#4 to 3 inches
Sand	#200 to #4
Silt/Clay	≤ #200

3. Fractions	
And	≥ 35%
Some	20 to 35%
Little	10 to 20%
Trace	< 10%

4. Moisture	
Dry	Dry to touch
Damp	Slightly moist
Moist	No visible free water
Wet	Visible free water

5. Descriptors	
Fissile	Splits easily along closely spaced parallel planes (breaks into plates)
Hackly	Jagged or irregular fracture planes
Slickensided	Polished and striated surfaces that result from friction along a fault plane
Laminated	Alternating thin layers of varying material or colors less than ¼" thick
Lensed	Inclusion of small pockets of different soils
Saprolitic	Completely weathered rock that retains the appearance of the original rock structure but has only a trace of the original bond strength
Micaceous	Containing mica minerals
Varved	Laminated sediment consisting of alternating layers of fine sand and silt or clay deposited in still water

6. Plasticity of Fine-Grained Soils

Fine-Grained Component	Plasticity	Estimated Plasticity Index (PI)	Smallest Thread Diameter	Thread Characteristics	Dilatancy
Primarily Silt	Non-Plastic	0 - 2%	Ball cracks	Dries rapidly; a 1/8-inch thread cannot be rolled at any water content	Moist ball sheds water when shaken giving a glossy appearance
Primarily Clay	Low Plasticity	3 - 10%	$^1/_8$ to $^1/_4$ inch	Feels powdery when drying out during rolling; thread can barely be rolled	Moist ball retains water or sheds water slowly when shaken
	Medium Plasticity	> 10 - 20%	$^1/_{16}$ inch	Thread cannot be rerolled after reaching plastic limit	
	High Plasticity	> 20%	$^1/_{32}$ inch	Thread can be rerolled after reaching plastic limit	Moist ball retains water when shaken

7a. Relative Density of Granular Coarse-Grained Soils

Descriptor	N-Value
Very Loose	≤ 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

7b. Consistency of Fine-Grained Soils

Descriptor	Pocket Penetrometer (tons/ft^2)	N-Value
Very Soft	≤ 0.25	≤ 2
Soft	≥ 0.25 - 0.5	3 - 4
Medium Stiff	> 0.5 - 1.0	5 - 8
Stiff	> 1.0 - 2.0	9 - 15
Very Stiff	> 2.0 - 4.0	16 - 30
Hard	> 4	≥ 31

8. Type of Deposit	
Alluvium	Sediment deposited by moving water
Colluvium	Sediment deposited by gravity
Fill	Manmade deposit
Fluviomarine	Stratified materials formed by the combined action of river and sea processes
Glacial Outwash	Sediment deposited by glacial meltwater; commonly sand and gravel
Glacial Till	Unsorted sediment deposited by glacier
Glacial Drift	Collective term for all sediment transported and deposited by a glacier or glacial meltwater
Residuum	Insoluble material remaining from weathered rock
Weathered Bedrock	Bedrock that has been weathered

FIGURE B-1

KEY TO IDENTIFICATION OF HARD BEDROCK SAMPLES

Descriptor Sequence	
1	Color
2	Rock Type
3	Interbedding
4	Descriptors
5	Weathering
6	Fracturing
7	Fracture Angle
8	Hardness

1. Color	
Gray	Tan
Brown	Black
Orange	Red
Green	Yellow
Purple	Blue
Modifiers	
Light	Lighter side of color range
Dark	Darker side of color range
Mottled	Irregularly marked with spots of different colors
Banded	Alternating shades or colors

2. Rock Type	
Common Regional Rocks	
Sandstone	Siltstone
Mudstone	Shale
Coal	Claystone
Limestone	Dolostone

3. Interbedding/Fractions	
And	≥ 50%
Some	15 to 40%
Few	0 to 15%

4. Descriptors	
Arenaceous	Sedimentary rock containing sand sized particles
Argillaceous	Pertaining to a sedimentary rock which contains an appreciable amount of clay
Calcareous	Containing calcium carbonate; when applied to a rock name, it implies that as much as 50% of the rock is calcium carbonate
Carbonaceous	A rock rich in carbon
Cross Bedded	Original depositional layering is inclined
Ferruginous	A rock having a red or rusty color due to the presence of ferric oxide
Fissile	Splits easily along closely spaced parallel planes
Fossiliferous	Containing fossils
Hackly	Jagged or irregular fracture planes
Micaceous	Containing mica minerals
Nodule	A small rounded mass of a mineral or mineral aggregate different in composition from the enclosing rock
Pyritic	Containing the mineral pyrite
Slickenside	Polished and striated surface that results from friction along a fault plane
Vein	An epigenetic mineral filling of a fault or other fracture
Vuggy	Containing voids usually lined with crystals of a different mineral composition from the enclosing rock

5. Degree of Weathering	
Descriptor	**Criteria**
Fresh	No visible sign of weathering, discoloration, or oxidation
Slightly Weathered	Slight weathering, discoloration, or oxidation **impacting <20% of rock mass**
Weathered	Significant weathering, discoloration, or oxidation **impacting 20 to 60% of rock mass**
Highly Weathered	Major weathering, discoloration, or oxidation **impacting >60% of rock mass**

6. Degree of Fracturing	
Descriptor	**Spacing**
Very Broken	≤ 2 inches
Broken	2 to 8 inches
Blocky	8 inches to 2 feet
Slightly Fractured	2 to 6 feet

7. Angle of Fracture Planes	
Fracture Planes	**Degrees**
Flat	< 5°
Shallow	5 to 15°
Moderate	15 to 30°
Steep	30 to 45°
Very Steep	45 to 60°
Sheer	60 to 90°
Vertical	90°

8. Rock Hardness	
Descriptor	**Test Criteria for Hand Specimen**
Very Soft	Indented with thumb or scratched by fingernail
Soft	Gouged deeply or carved with a knife blade
Medium Hard	Readily scratched by knife blade, scratch leaves heavy trace of dust
Hard	Scratched by knife blade with difficulty, scratch produces little powder and is faintly visible
Very Hard	Not scratched by a knife blade

FIGURE B-2

TEST BORING LOG

Project Number: **01-23-0291** Project Name: **Hopewell Tower Site** Boring No.: **B-1**

Logger: MAR Boring Location: See Boring Location Plan

Date Started: 9/5/25 Drill/Method: Geoprobe 7822DT

Date Completed: 9/8/25 Driller: RU (TERRA) Ground Elev.: 1460.9

Shelby Tube | Standard Split Spoon | Water Level Upon Completion 11.0 ft.

Core Sample | Auger Probe

Depth (feet)	Sample No.	Sample Type	Blow Counts	Recovery (%)	RQD (RUN)	Strata Depth (ft)	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
	S-1		2-8-11	67%		0.6	**TOPSOIL**				1460.3
							Reddish brown limestone **GRAVEL**, some sand, little silt, dry to damp, medium dense, **residuum**				
	S-2		50/0.5	100%		3.0	Tan **LIMESTONE**, dry, very dense, **weathered bedrock**				1457.9
5.0						5.0	Auger refusal at 5.0 feet				1455.9
	R-1			90%	0%		Tan and gray, little red **LIMESTONE**, some shale laminae, few black chert nodules, few crystal vugs, argillaceous, weathered, very broken to broken, moderate fracture planes, soft to medium hard				
	R-2			36%	8%						
10.0											
	R-3			62%	18%			11%			
15.0							- From 15.7 to 16.1 feet: UCS=1,228 psi				
							- Soft, gray clay from 17.8 to 18.1 feet				
	R-4			44%	8%		- Soft tool drop from 19.0 to 20.0 feet (possible sediment-filled karst void)				
20.0											
	R-5			83%	17%		- Few calcite veins from 22.7 to 23.4 feet - From 22.8 to 23.3 feet: UCS=2,634 psi				
25.0						25.0	Boring terminated at 25.0 feet				1435.9

Remarks: Ground surface elevation obtained from "Tower Site Exhibit" prepared by Mission Critical Partners. Boring dry prior to rock coring.

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ROCK CORE PHOTOGRAPHS

Boring B-1: Box 1 of 2

Boring B-1: Box 2 of 2

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APPENDIX C

LABORATORY TESTING

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Laboratory Testing

The samples obtained from the test borings were visually classified in the field by geotechnical engineering personnel from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soils tests were conducted in accordance with applicable ASTM Standards as listed below:

1. Rock core compression tests were performed in accordance with ASTM D 7012.

A summary and details of the laboratory test results are included on the following pages of this appendix.

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LABORATORY DATA SUMMARY

BORING NO.	SAMPLE DEPTH (ft)	SAMPLE TYPE	NATURAL MOISTURE (%)	ATTERBERG LIMITS			GRADATION			USCS SOIL CLASS.	UNCONFINED COMPRESSIVE STRENGTH (psi)
				LL	PL	PI	% GRAVEL	% SAND	% FINES		
B-1	15.7 - 16.1	RC									1228
B-1	22.8 - 23.3	RC									2634

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Notes:
1) Soil tests performed in accordance with recognized ASTM testing standards.
2) SS = Split Spoon UD = Undisturbed
RC = Rock Core
3) NV = Non Viscous NP = Non Plastic

PROJECT NUMBER: 01-23-0291
PROJECT NAME: Hopewell Tower Site
LOCATION: Bedford County, Pennsylvania

FIGURE C-1

TRIAD ENGINEERING, INC.
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Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Hopewell

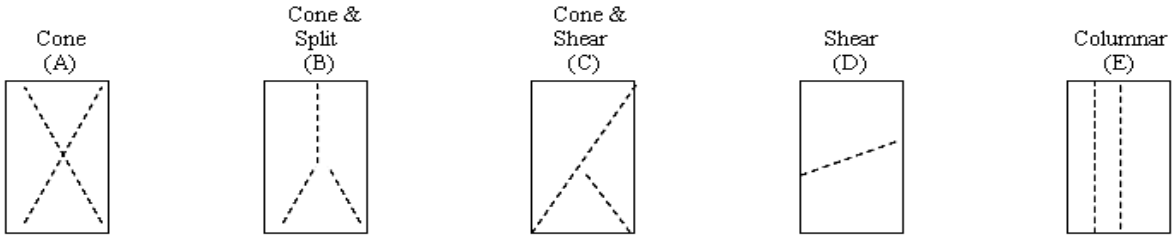
Project # : 01-23-0291 Date : 9/12/2025

Core # : B-1/R-3 Depth: 15.7' - 16.1'

Sample Description: Light brown Limestone

Measurements (inches)		
	Capped Length	Diameter
#1	3.420	1.981
#2	3.432	1.980
#3	3.412	1.977
Avg.	3.421	1.979

Length to Diameter Ratio :	**1.73**		Correction Factor:	**0.979**
Area:	**3.0770**	in^2	Flatness of Sample:	FLAT
Load:	**3860**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**1254**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**90**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**1228**	lbs/in^2	Type of Break:	E
Corrected Strength :	**88**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-2

TRIAD ENGINEERING, INC.
1097 Chaplin Hill Road
Morgantown, WV 26501
Phone No. (304) 296-2562
www.triadeng.com

Rock Core Compressive Strength Worksheet
ASTM D7012

Project Name: Hopewell

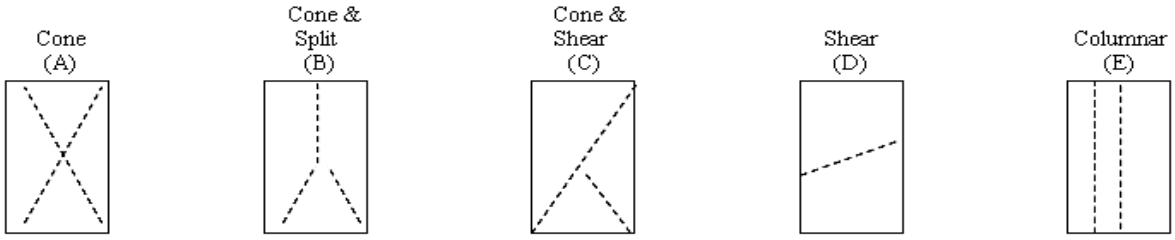
Project # : 01-23-0291 Date : 9/12/2025

Core # : B-1/R-5 Depth: 22.8' - 23.3'

Sample Description: Light brown limestone

Measurements (inches)		
	Capped Length	Diameter
#1	3.884	1.977
#2	3.881	1.980
#3	3.866	1.979
Avg.	3.877	1.979

Length to Diameter Ratio :	**1.96**		Correction Factor:	**1**
Area:	**3.0749**	in^2	Flatness of Sample:	FLAT
Load:	**8100**	lbs	Surface Straightness:	STRAIGHT
Compressive Strength:	**2634**	lbs/in^2	Moisture Condition:	DRY
Compressive Strength:	**190**	$tons/ft^2$	Deformation Rate:	s
Corrected Strength :	**2634**	lbs/in^2	Type of Break:	E
Corrected Strength :	**190**	$tons/ft^2$		



Remarks:

Tested by: LMC Checked by: JKM

Figure C-3

TRIAD ENGINEERING, INC.

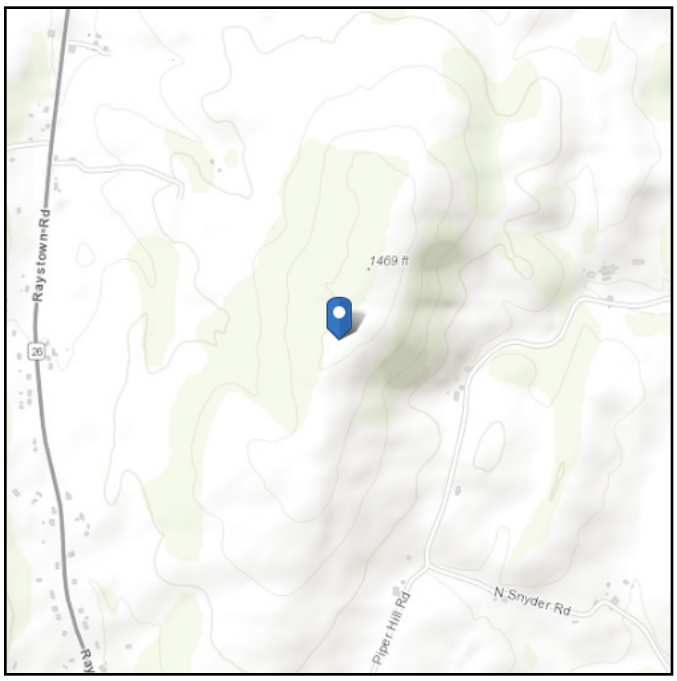
APPENDIX D

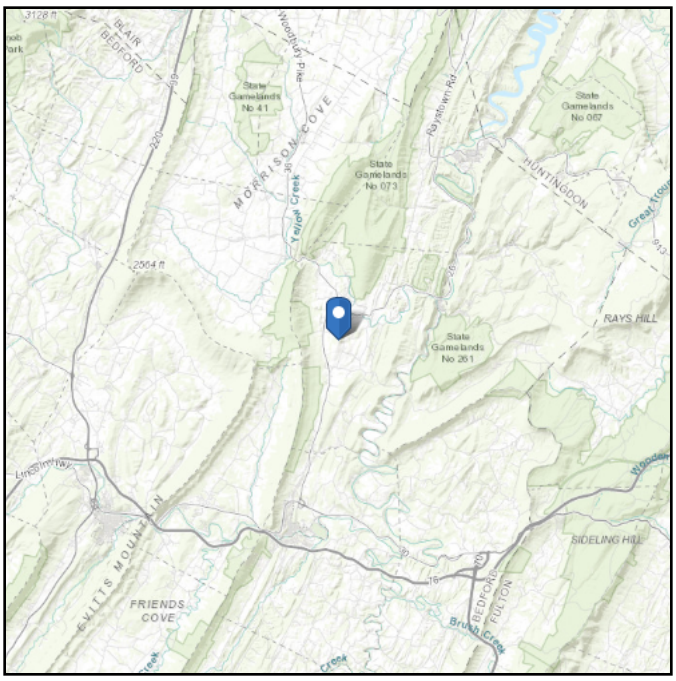
SEISMIC INFORMATION

ASCE Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-22	**Latitude:**	40.114899
Risk Category:	II	**Longitude:**	-78.340145
Soil Class:	C - Very Dense Soil and Soft Rock	**Elevation:**	1461.2387576585888 m (NAVD 88)





Seismic

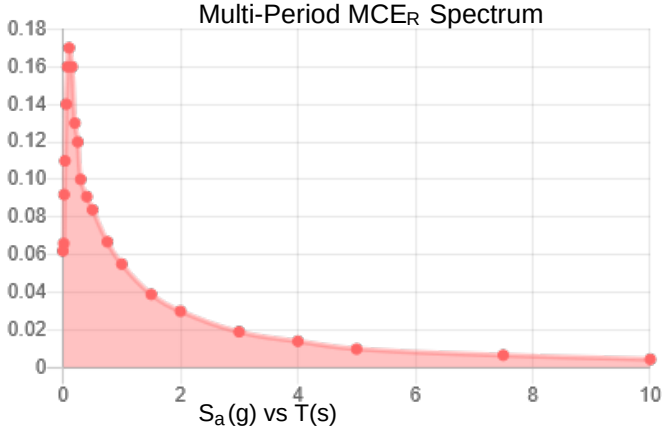
Site Soil Class: C - Very Dense Soil and Soft Rock

Results:

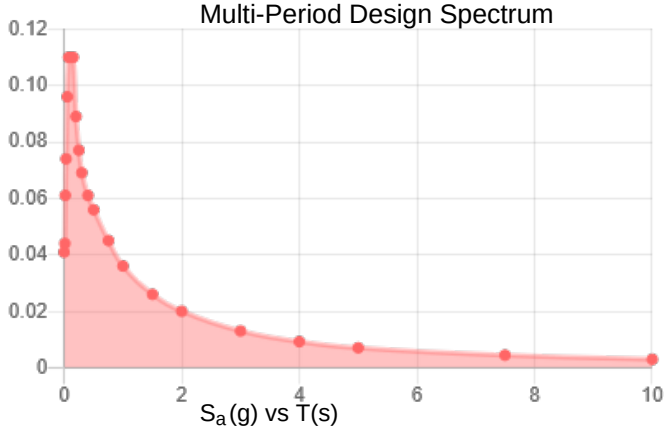
PGA_M :	0.055	T_L :	12
S_{MS} :	0.12	S_S :	0.12
S_{M1} :	0.055	S_1 :	0.042
S_{DS} :	0.08	V_{S30} :	530
S_{D1} :	0.037		

Seismic Design Category: A

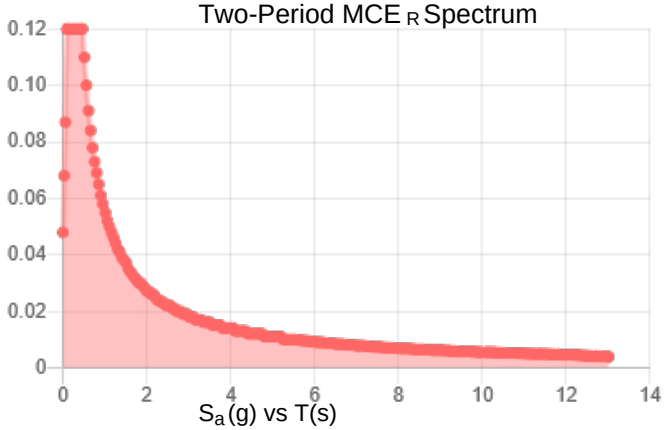
Multi-Period MCE_R Spectrum



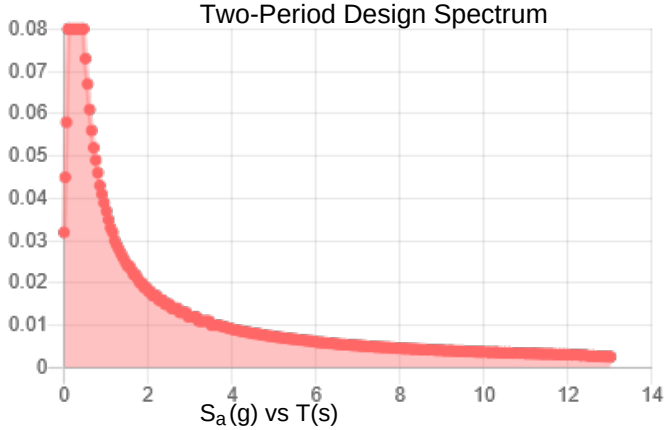
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Thu Sep 11 2025**

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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APPENDIX C: COMPLIANCE MATRIX

RFP Section	Description	Respondent's Statement of Compliance Select one Choice 1)Comply 2)Comply with Clarification 3)Exception	Respondent's Clarifications and Comments
1	**General Guidelines**		
1.1.	Introduction		
1.2.	Response Information		
1.3.	Who May Respond		
1.4.	Conditions of Response		
1.5.	Bonds		
1.6.	Right to Reject		
1.7.	Notice of Decision		
1.8.	Non-Discrimination Provisions		
1.9.	Prevailing Laws for Public Works		
1.10.	Weekly Communications		
2	**Project Overview**		
2.1.	Project Intent		
2.2.	Project Summary		
3	**Technical Specifications**		
3.1.	Site Development		
3.1.1.	Site		
3.1.2.	Water and Drainage		
3.1.3.	Site Preparation		
3.1.4.	Access Roads		

RFP Section	Description	Respondent's Statement of Compliance Select one Choice 1)Comply 2)Comply with Clarification 3)Exception	Respondent's Clarifications and Comments
3.1.5.	Security Fencing		
3.1.6.	Security Fence Gates		
3.1.7.	Gate Operation		
3.1.8.	Security Fence Signage Requirements		
3.1.9.	Site Finishing		
3.1.10.	Disposal		
3.1.10.	Restoration		
3.1.12.	Area Perimeter and Signage Requirements		
3.2.	Foundations and Concrete		
3.2.1.	Foundation Design		
3.2.2.	Tower Foundation		
3.2.3.	Shelter Foundation		
3.2.4.	Foundation Construction		
3.2.5.	Concrete Test		
3.3.	Communications Towers		
3.3.1.	Intent		
3.3.2.	Tower Structures		
3.3.3.	Construction		
3.3.4.	Foundation		
3.3.5.	Tower Design and Loading		
3.3.6.	Design Calculations and Drawings		

RFP Section	Description	Respondent's Statement of Compliance Select one Choice 1)Comply 2)Comply with Clarification 3)Exception	Respondent's Clarifications and Comments
3.3.7.	Wind and Ice Load Design		
3.3.8.	Antenna Load		
3.3.9.	Labeling and Identification		
3.3.10.	Tower Grounding		
3.3.11.	Ice Bridge		
3.3.12.	Tower Lightning Protection System		
3.3.13.	Tower Finishing		
3.3.14.	Tower Climbing and Installation Safety Practices		
3.3.15.	Field Quality Control		
3.4.	Shelter (Optional)		
3.4.1.	Intent		
3.4.2.	Climate Control		
3.4.3.	Floor		
3.4.4.	Door		
3.4.5.	Roof and Doorframe		
3.4.6.	Locks, Finish, and Openings		
3.4.7.	Cable Trays		
3.4.8.	Safety Equipment		
3.4.9.	Site Preparation		
3.4.10.	Antenna Cable Entry Ports		
3.4.11.	Manual Transfer Switch		

RFP Section	Description	Respondent's Statement of Compliance Select one Choice 1)Comply 2)Comply with Clarification 3)Exception	Respondent's Clarifications and Comments
3.5.	Power Distribution and Utilities		
3.5.1.	Utilities		
3.5.2.	Generation Installation (Optional)		
3.5.3.	Diesel Fuel System		
3.5.4.	Liquid Propane Fuel System		
3.6.	Grounding		
3.6.1.	General		
3.6.2.	Additional Concerns		
3.6.3.	Grounding Components		
3.6.4.	Ground Rod Installation		
3.6.5.	Exterior Ground Ring System		
3.6.6.	Radial Grounding Conductors (when required)		
3.6.7.	Exterior Equipment Grounding		
3.6.8.	Fence Grounding		
3.6.9.	Tower Grounding		
3.6.10.	Ice Bridge		
3.6.11.	Exterior Ground Bus Bar Installation		
3.6.12.	Tower Ground Bus Bar Installation		
3.6.13.	Utility Service Entrance Grounding		
3.6.14.	Electrical Service Grounding		
3.6.15.	Telco Service Grounding (as applicable)		

RFP Section	Description	Respondent's Statement of Compliance Select one Choice 1)Comply 2)Comply with Clarification 3)Exception	Respondent's Clarifications and Comments
3.6.16.	Internal Bus for Shelter Grounding		
3.6.17.	Interior Perimeter Bonding Bus		
3.6.18.	Primary Bonding Bar		
3.6.19.	Secondary Bonding Bar		
3.6.20.	Ground Bus Conductors		
3.6.21.	Interior Shelter Ancillary Equipment Grounding		
3.6.22.	Doors and Frames		
3.6.23.	Electrical Panels and Cabinets		
3.6.24.	Cable Ladder Tray Grounding		
3.6.25.	Electrical Surge Protection		
3.7.	Final Testing and Acceptance		
Appendix A:	**Tower Site Drawings**		
Appendix B:	**Geotechnical Surveys**		
Appendix C:	**Compliance Matrix**		
Appendix D:	**Proposal Pricing**		

APPENDIX D: PROPOSAL PRICING

INSPECTIONS $ _____

SITE WORK TOTAL $ _____

- Clearing $_____
- Fencing $_____
- Road work $ _____
- Electrical $ _____
- Building Foundation $ _____
- Labor $_____
- Generator (Optional) $ _____
- Generator Foundation (Optional) $ _____

CONSTRUCTION TOTAL $ _____

Tower Structure $ _____

Tower Erection $ _____

Labor $ _____

Shelter (Optional) $ _____

TOTAL (without Optional pricing) $ _____

TOTAL (with all Options) $ _____

APPENDIX E

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project Name:	ABI Broadband Tower Project
General Description:	Construction of 5 new Broadband Towers
Project Locality	Bedford County
Awarding Agency:	Alleghenies Broadband Inc
Contract Award Date:	3/25/2026
Serial Number:	26-01522
Project Classification:	Building/Heavy/Highway
Determination Date:	2/17/2026
Assigned Field Office:	Altoona
Field Office Phone Number:	(814)940-6224
Toll Free Phone Number:	
Project County:	Bedford County

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-01522 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	8/1/2024		$41.55	$29.51	$71.06
Boilermakers	1/1/2021		$49.32	$34.90	$84.22
Bricklayer	6/1/2025		$38.65	$23.52	$62.17
Bricklayer	12/1/2025		$39.15	$24.02	$63.17
Carpenters - Piledriver/Welder	1/1/2025		$43.38	$22.72	$66.10
Carpenters - Piledriver/Welder	1/1/2026		$44.63	$23.47	$68.10
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2024		$33.72	$19.20	$52.92
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2025		$34.76	$20.91	$55.67
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2026		$34.76	$23.41	$58.17
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2027		$34.76	$25.66	$60.42
Cement Masons	1/1/2025		$31.97	$21.47	$53.44
Cement Masons	1/1/2026		$32.97	$22.47	$55.44
Drywall Finisher	1/1/2025		$34.01	$24.63	$58.64
Drywall Finisher	6/1/2025		$35.16	$25.98	$61.14
Electricians & Telecommunications Installation Technician	12/27/2024		$50.86	$32.69	$83.55
Electricians & Telecommunications Installation Technician	12/26/2025		$53.11	$33.72	$86.83
Elevator Constructor	1/1/2025		$61.07	$40.05	$101.12
Elevator Constructor	1/1/2026		$63.71	$40.89	$104.60
Glazier	9/1/2024		$26.00	$26.95	$52.95
Glazier	9/1/2025		$28.00	$27.67	$55.67
Iron Workers	5/1/2024		$31.00	$24.40	$55.40
Iron Workers	5/1/2025		$31.65	$24.75	$56.40
Laborers (Class 01 - See notes)	1/1/2025		$28.31	$17.82	$46.13
Laborers (Class 01 - See notes)	1/1/2026		$29.31	$18.82	$48.13
Laborers (Class 01 - See notes)	1/1/2027		$30.31	$19.82	$50.13
Laborers (Class 02 - See notes)	1/1/2025		$30.66	$17.82	$48.48
Laborers (Class 02 - See notes)	1/1/2026		$31.66	$18.82	$50.48
Laborers (Class 02 - See notes)	1/1/2027		$32.66	$19.82	$52.48
Laborers (Class 03 - See notes)	1/1/2025		$31.56	$17.82	$49.38
Laborers (Class 03 - See notes)	1/1/2026		$32.56	$18.82	$51.38
Laborers (Class 03 - See notes)	1/1/2027		$33.56	$19.82	$53.38
Laborers (Class 04 - See notes)	1/1/2025		$27.31	$17.82	$45.13
Laborers (Class 04 - See notes)	1/1/2026		$28.31	$18.82	$47.13
Laborers (Class 04 - See notes)	1/1/2027		$29.31	$19.82	$49.13
Landscape Laborer (Skilled)	1/1/2025		$25.79	$18.78	$44.57
Landscape Laborer (Skilled)	1/1/2026		$26.79	$19.03	$45.82
Landscape Laborer (Tractor Operator)	1/1/2025		$26.09	$18.78	$44.87
Landscape Laborer (Tractor Operator)	1/1/2026		$27.09	$19.03	$46.12
Landscape Laborer	1/1/2025		$25.37	$18.78	$44.15
Landscape Laborer	1/1/2026		$26.37	$19.03	$45.40

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-01522 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Millwright	6/1/2020		$41.68	$20.32	$62.00
Operators (Class 01 - see notes)	7/1/2024		$36.87	$21.42	$58.29
Operators (Class 01 - see notes)	7/1/2025		$37.97	$21.82	$59.79
Operators (Class 01 - see notes)	7/1/2026		$39.12	$22.17	$61.29
Operators (Class 02 -see notes)	7/1/2024		$32.87	$21.42	$54.29
Operators (Class 02 -see notes)	7/1/2025		$33.35	$21.82	$55.17
Operators (Class 02 -see notes)	7/1/2026		$34.50	$22.17	$56.67
Operators (Class 03 - See notes)	7/1/2024		$29.70	$21.42	$51.12
Operators (Class 03 - See notes)	7/1/2025		$30.80	$21.82	$52.62
Operators (Class 03 - See notes)	7/1/2026		$31.95	$22.17	$54.12
Operators (Class 04 - Chief of Party (Surveying and Layout))	7/1/2025		$30.40	$21.82	$52.22
Operators (Class 04 - Chief of Party (Surveying and Layout))	7/1/2026		$31.55	$22.17	$53.72
Operators (Class 04 - Instrument Person (Surveying & Layout))	7/1/2025		$29.40	$21.82	$51.22
Operators (Class 04 - Instrument Person (Surveying & Layout))	7/1/2026		$30.55	$22.17	$52.72
Operators (Class 04 - Rodman/Chainman (Surveying and Layout))	7/1/2025		$28.95	$21.82	$50.77
Operators (Class 04 - Rodman/Chainman (Surveying and Layout))	7/1/2026		$30.10	$22.17	$52.27
Painters Class 6 (see notes)	6/1/2024		$32.14	$24.93	$57.07
Painters Class 6 (see notes)	6/1/2025		$34.16	$25.81	$59.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		$62.82	$22.72	$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		$64.70	$23.47	$88.17
Piledrivers	1/1/2025		$41.88	$22.72	$64.60
Piledrivers	1/1/2026		$43.13	$23.47	$66.60
Plasterers	6/1/2024		$33.14	$21.04	$54.18
Plumbers and Steamfitters	6/1/2025		$41.47	$27.71	$69.18
Plumbers and Steamfitters	6/1/2026		$42.92	$28.45	$71.37
Pointers, Caulkers, Cleaners	6/1/2025		$40.66	$21.99	$62.65
Pointers, Caulkers, Cleaners	12/1/2025		$41.50	$22.50	$64.00
Roofers	6/1/2025		$39.91	$20.76	$60.67
Roofers	12/1/2025		$41.21	$21.46	$62.67
Sheet Metal Workers	6/1/2024		$43.09	$43.14	$86.23
Sheet Metal Workers	6/1/2025		$45.02	$44.71	$89.73
Sign Makers and Hangars	7/15/2024		$32.32	$25.82	$58.14
Sign Makers and Hangars	7/15/2025		$33.48	$26.41	$59.89
Sprinklerfitters	4/1/2024		$46.45	$28.62	$75.07
Sprinklerfitters	4/1/2025		$49.75	$29.21	$78.96
Stone Masons	12/1/2022		$38.56	$23.61	$62.17
Terrazzo Finisher	6/1/2025		$41.73	$19.03	$60.76
Terrazzo Finisher	12/1/2025		$42.75	$19.51	$62.26
Terrazzo Mechanics	6/1/2025		$41.13	$21.28	$62.41
Terrazzo Mechanics	12/1/2025		$42.15	$21.76	$63.91

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-01522 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Tile Finisher	6/1/2025		$33.24	$18.36	$51.60
Tile Finisher	12/1/2025		$33.99	$18.71	$52.70
Tile Setter	6/1/2025		$40.15	$22.80	$62.95
Tile Setter	12/1/2025		$40.80	$23.25	$64.05
Truckdriver class 1(see notes)	1/1/2025		$36.29	$23.13	$59.42
Truckdriver class 1(see notes)	1/1/2026		$37.79	$23.63	$61.42
Truckdriver class 2 (see notes)	1/1/2025		$36.75	$23.43	$60.18
Truckdriver class 2 (see notes)	1/1/2026		$38.25	$23.93	$62.18
Window Film / Tint Installer	10/1/2019		$25.00	$2.63	$27.63

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-01522 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenter	1/1/2025		$41.10	$22.09	$63.19
Carpenter	1/1/2026		$42.35	$22.84	$65.19
Carpenter Welder	1/1/2025		$42.60	$22.09	$64.69
Carpenter Welder	1/1/2026		$43.85	$22.84	$66.69
Carpenters - Piledriver/Welder	1/1/2025		$43.38	$22.72	$66.10
Carpenters - Piledriver/Welder	1/1/2026		$44.63	$23.47	$68.10
Carpenters	1/1/2019		$33.77	$18.42	$52.19
Cement Finishers	1/1/2025		$35.94	$27.50	$63.44
Cement Masons	1/1/2020		$32.84	$21.10	$53.94
Electric Lineman	5/29/2023		$52.56	$29.99	$82.55
Electric Lineman	6/3/2024		$53.97	$31.05	$85.02
Electric Lineman	6/2/2025		$57.10	$31.63	$88.73
Iron Workers	5/1/2024		$31.00	$24.40	$55.40
Iron Workers	5/1/2025		$31.65	$24.75	$56.40
Laborers (Class 01 - See notes)	1/1/2024		$32.10	$25.50	$57.60
Laborers (Class 01 - See notes)	1/1/2025		$33.60	$26.00	$59.60
Laborers (Class 01 - See notes)	1/1/2026		$34.60	$27.00	$61.60
Laborers (Class 02 - See notes)	1/1/2024		$32.26	$25.50	$57.76
Laborers (Class 02 - See notes)	1/1/2025		$33.76	$26.00	$59.76
Laborers (Class 02 - See notes)	1/1/2026		$34.76	$27.00	$61.76
Laborers (Class 03 - See notes)	1/1/2024		$32.75	$25.50	$58.25
Laborers (Class 03 - See notes)	1/1/2025		$34.25	$26.00	$60.25
Laborers (Class 03 - See notes)	1/1/2026		$35.25	$27.00	$62.25
Laborers (Class 04 - See notes)	1/1/2024		$33.20	$25.50	$58.70
Laborers (Class 04 - See notes)	1/1/2025		$34.70	$26.00	$60.70
Laborers (Class 04 - See notes)	1/1/2026		$35.70	$27.00	$62.70
Laborers (Class 05 - See notes)	1/1/2024		$33.61	$25.50	$59.11
Laborers (Class 05 - See notes)	1/1/2025		$35.11	$26.00	$61.11
Laborers (Class 05 - See notes)	1/1/2026		$36.11	$27.00	$63.11
Laborers (Class 06 - See notes)	1/1/2024		$30.45	$25.50	$55.95
Laborers (Class 06 - See notes)	1/1/2025		$31.95	$26.00	$57.95
Laborers (Class 06 - See notes)	1/1/2026		$32.95	$27.00	$59.95
Laborers (Class 07 - See notes)	1/1/2024		$33.10	$25.50	$58.60
Laborers (Class 07 - See notes)	1/1/2025		$34.60	$26.00	$60.60
Laborers (Class 07 - See notes)	1/1/2026		$35.60	$27.00	$62.60
Laborers (Class 08 - See notes)	1/1/2024		$34.60	$25.50	$60.10
Laborers (Class 08 - See notes)	1/1/2025		$36.10	$26.00	$62.10
Laborers (Class 08 - See notes)	1/1/2026		$37.10	$27.00	$64.10
Millwright	6/1/2024		$47.59	$23.72	$71.31
Millwright	6/1/2025		$49.72	$23.72	$73.44
Operators (Class 01 - see notes)	1/1/2024		$38.30	$24.03	$62.33
Operators (Class 01 - see notes)	1/1/2025		$40.10	$24.23	$64.33
Operators (Class 01 - see notes)	1/1/2026		$41.67	$24.66	$66.33
Operators (Class 02 -see notes)	1/1/2024		$38.02	$24.03	$62.05

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-01522 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Class 02 -see notes)	1/1/2025		$39.82	$24.23	$64.05
Operators (Class 02 -see notes)	1/1/2026		$41.39	$24.66	$66.05
Operators (Class 03 - See notes)	1/1/2024		$34.38	$24.03	$58.41
Operators (Class 03 - See notes)	1/1/2025		$36.18	$24.23	$60.41
Operators (Class 03 - See notes)	1/1/2026		$37.75	$24.66	$62.41
Operators (Class 04 - See notes)	1/1/2024		$33.89	$24.03	$57.92
Operators (Class 04 - See notes)	1/1/2025		$35.69	$24.23	$59.92
Operators (Class 04 - See notes)	1/1/2026		$37.26	$24.66	$61.92
Operators (Class 05 - See notes)	1/1/2024		$33.68	$24.03	$57.71
Operators (Class 05 - See notes)	1/1/2025		$35.48	$24.23	$59.71
Operators (Class 05 - See notes)	1/1/2026		$37.05	$24.66	$61.71
Operators Class 1-A	1/1/2024		$41.30	$24.03	$65.33
Operators Class 1-A	1/1/2025		$43.10	$24.23	$67.33
Operators Class 1-A	1/1/2026		$44.67	$24.66	$69.33
Operators Class 1-B	1/1/2024		$40.30	$24.03	$64.33
Operators Class 1-B	1/1/2025		$42.10	$24.23	$66.33
Operators Class 1-B	1/1/2026		$43.67	$24.66	$68.33
Painters Class 1 (see notes)	6/1/2022		$34.45	$22.82	$57.27
Painters Class 2 (see notes)	6/1/2024		$38.09	$24.93	$63.02
Painters Class 2 (see notes)	6/1/2025		$40.36	$25.81	$66.17
Painters Class 3 (see notes)	6/1/2024		$40.66	$24.93	$65.59
Painters Class 3 (see notes)	6/1/2025		$43.68	$25.81	$69.49
Painters Class 5 (see notes)	6/1/2019		$22.91	$20.06	$42.97
Pile Driver Divers (Building, Heavy, Highway)	1/1/2025		$62.82	$22.72	$85.54
Pile Driver Divers (Building, Heavy, Highway)	1/1/2026		$64.70	$23.47	$88.17
Piledrivers	1/1/2025		$41.88	$22.72	$64.60
Piledrivers	1/1/2026		$43.13	$23.47	$66.60
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2022		$48.43	$40.28	$88.71
Truckdriver class 1(see notes)	1/1/2025		$36.29	$23.13	$59.42
Truckdriver class 1(see notes)	1/1/2026		$37.79	$23.63	$61.42
Truckdriver class 2 (see notes)	1/1/2025		$36.75	$23.43	$60.18
Truckdriver class 2 (see notes)	1/1/2026		$38.25	$23.93	$62.18