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COMMISSION

August 6, 2019

Gwen R. Pinson, Executive Director  
Public Service Commission  
211 Sower Blvd.  
P.O. Box 615  
Frankfort, KY 40602-0615

**RE: *East Kentucky Network, LLC***  
***Case No. 2019-00264 – Filing Deficiency***

Dear Ms. Pinson:

Please find enclosed one (1) original and five (5) copies of the revised geotechnical investigation report that includes boring logs and a finding as to the proximity of the proposed site to flood hazard areas to replace the original Exhibit 4.

If you have any further questions, feel free to contact me at 606-477-2355, ext. 1009 or via email [kbranham@ekn.com](mailto:kbranham@ekn.com).

Sincerely,

*Krystal Branham*

Krystal Branham  
Regulatory Compliance Attorney

Enclosures



230 Swartz Drive • Hazard • Kentucky • 41701  
Phone (606) 551-1050

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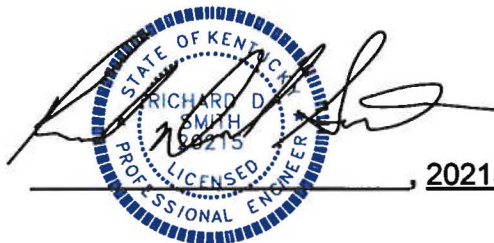
PUBLIC SERVICE  
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**EAST KENTUCKY ENGINEERING, LLC.**

**APPALACHIAN WIRELESS  
Geotechnical Investigation on the  
Hiner Tower Site  
Perry County, Kentucky  
EKYENG Project No. 165-000-0080 Rev. No. 1**

PREPARED FOR:  
Appalachian Wireless.  
101 Technology Trail  
Ivel, Kentucky 41642

PREPARED BY:  
Richard Dirk Smith PE, PLS  
President  
**East Kentucky Engineering**  
230 Swartz Drive  
Hazard, Kentucky 41701



, 20215, August 5<sup>th</sup>, 2019



# **EAST KENTUCKY ENGINEERING, LLC.**

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## **EXECUTIVE SUMMARY**

### **1.0 INTRODUCTION**

### **2.0 PROJECT DESCRIPTION**

### **3.0 SITE DESCRIPTION**

3.1 GENERAL INFORMATION

3.2 SURFACE MINING

3.3 UNDERGROUND MINING

3.4 FLOOD HAZARD

### **4.0 FIELD EXPLORATION**

4.1 SITE INFORMATION

4.2 TRENCHING

4.3 GROUNDWATER

4.4 SEISMIC SITE CLASSIFICATION

### **5.0 DISCUSSION AND RECOMMENDATIONS**

5.1 GENERAL

5.2 FOUNDATIONS

5.3 SHALLOW FOUNDATIONS

5.4 BURIED UTILITIES

### **6.0 WARRANTY**

6.1 SUBSURFACE EXPLORATION

6.2 LABORATORY AND FIELD TESTS

6.3 ANALYSIS AND RECOMMENDATIONS

6.4 CONSTRUCTION MONITORING

6.5 GENERAL

## **SPECIFICATIONS**

**I – GENERAL**

**II – ENGINEERED FILL BENEATH STRUCTURES**

**III – GUIDELINES FOR EXCAVATIONS AND TRENCHING**

**IV – GENERAL CONCRETE SPECIFICATIONS**

**APPENDIX A – SEISMIC DATA**

**APPENDIX B – PHOTOGRAPHS**

**APPENDIX C – MAPS**



## EXECUTIVE SUMMARY

A geotechnical investigation has been performed on the Hiner Tower Site, located in Perry County, Kentucky. This site is not readily accessible. A location map is shown in Figure 1 of this report. Trenching was conducted with the assistance of Wendell Gay Construction. The following geotechnical considerations were identified:

- Trenching utilized for this study encountered soils and sandstone.
- A preliminary site plan was provided by the client for the location of the proposed tower.
- The estimated base elevation of tower mat foundation is 1,541 to 1547 ft.
- This site is on a forested ridgeline.
- **The allowable bearing capacities of the underlying rock is estimated at 4 TSF.**
- The 2015 International Building Code seismic site classification for this site is "B."
- If during the foundation design it becomes necessary to change the base of the footer, alternate design recommendations can be provided.
- The Hazard No. 7 Seam has been historically mined beneath the tower site at an approximate elevation of 1200' feet. It is estimated that this mining occurred in the 1940s. No evidence of subsidence was found during the site investigation.
- Close monitoring of the construction operations discussed herein will be critical in achieving the design subgrade support. We, therefore, recommend that EKYENG is retained to monitor this portion of the work.

This executive summary is included to provide a general overview of the project and should not be relied upon except for the purpose it was prepared. Please rely on the complete report for the information on the findings, recommendations, and all other concerns.





# EAST KENTUCKY ENGINEERING, LLC.

## 1. INTRODUCTION

East Kentucky Engineering (EKYENG) was retained by Mr. Marty Thacker of Appalachian Wireless to prepare a geotechnical engineering report for the proposed tower site located on the Hiner Property, in Perry County, Kentucky. A site location map is shown in Figure No. 1.

Trenching was conducted with assistance from Wendall Gay Construction. The purpose of these services is to provide information and geotechnical engineering recommendations about subsurface conditions, earthwork, seismic considerations, groundwater conditions, and foundation design.

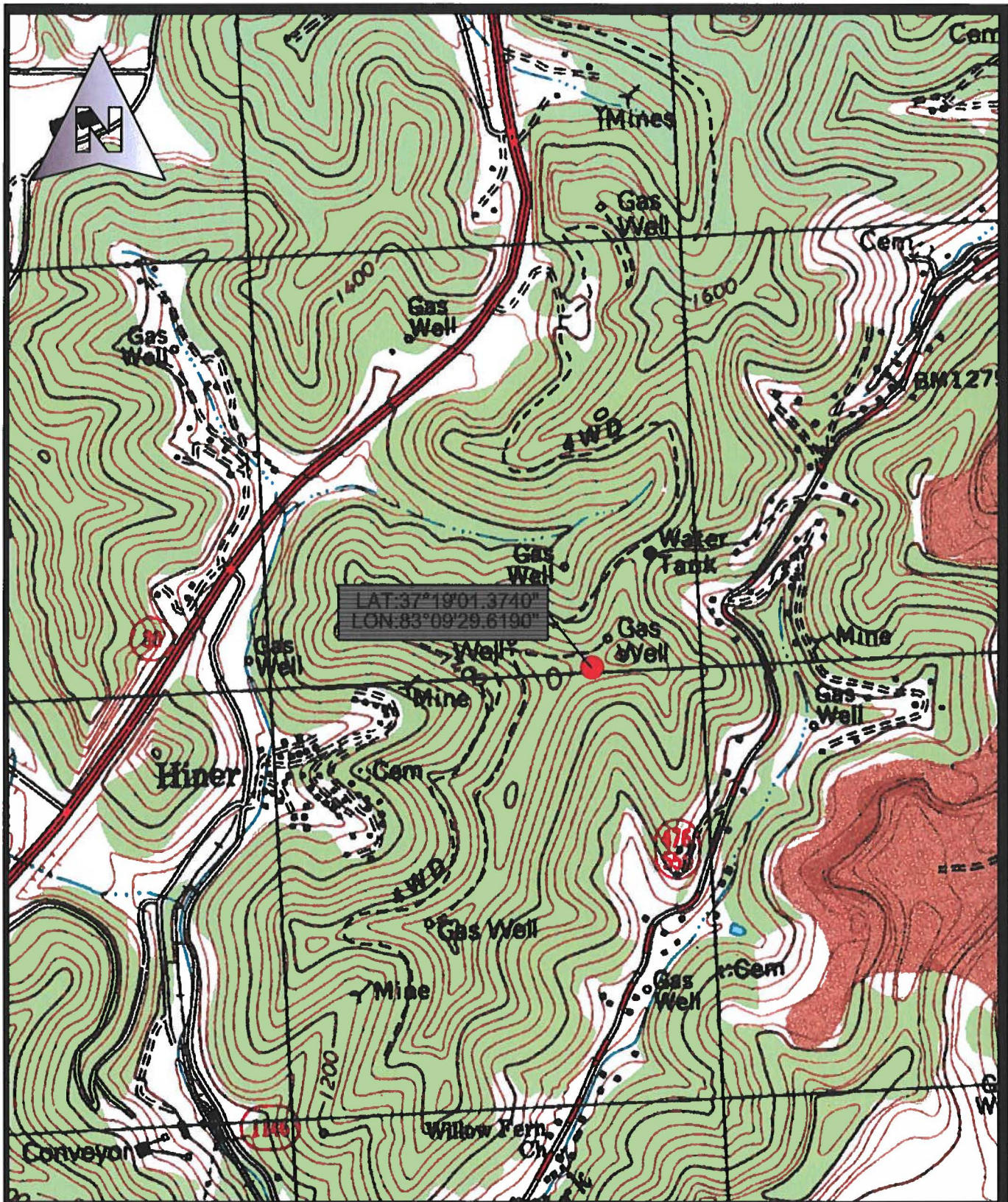
## 2.0 PROJECT DESCRIPTION

The proposed communication facility will consist of a self-supporting tower of undetermined height and ancillary support areas. The footing area is estimated to be approximately 27 ft x 27 ft with an estimated base of the tower footer elevation at 1541.0 ft to 1547.0 ft. Based upon information provided; we estimate the structural loads will be similar to the following conditions;

CONDITION	LOAD
Total Shear	40 Kips
Axial Load	50 Kips

We anticipate that overturning will govern the structural design. If the loading is significantly different than these expected values, EKYENG should be notified to re-evaluate the recommendations provided in this report.





Drawn: RDS	Date: 4/4/2019
Job: 165-080	Scale: 1"=1000'

**APPALACHIAN WIRELESS**  
**EXCERPT FROM USGS QUAD**  
**LOCATION MAP**  
**HINER**  
**FIGURE NO 1**

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 230 Swartz Drive  
 Hazard, KY 41701  
 (606) 551-1050





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### 3.0 SITE DESCRIPTION

#### 3.1 GENERAL INFORMATION

The site location is on a ridgeline. EKYENG reviewed available historical mine maps from the Kentucky Division of Mine Safety, Kentucky Mine Mapping Information System ("KMMIS"). Aerial satellite imagery and lidar mapping also were reviewed to determine the extents of mining near the proposed tower site.

#### 3.2 SURFACE MINING

No surface mining was found during our site investigation and research that would impact this proposed tower.

#### 3.3 UNDERGROUND MINING

Our research found underground mining below the proposed site. It is estimated that mining was conducted in the 1940s by Harvey Coal company in the Hazard No. 7 at an approximate elevation of 1200 ft, 245 feet below the proposed tower base. During our site investigation, no evidence of subsidence was visible. If subsidence has occurred, there should be evidence present at the site. Based upon the depth to the mining and the site investigation the potential for subsidence or impacts from mining at this site is unlikely.

#### 3.4 FLOOD HAZARD

A flood determination was conducted by EKYENG. For this determination, the FEMA Flood Map Service was reviewed for this location. The flood map for the selected area is number **21193C0185D**. The flood zone for this area is Zone X and is an area of minimal flood Hazard. A FIRMette map is included in Appendix C of this report.





LAT: 37°19'01.3740"  
 LON: 83°09'29.6190"

Drawn: RDS	Date: 4/4/2019
Job: 165-080	Scale: 1"=1000'

**APPALACHIAN WIRELESS**  
 EXCERPT FROM GEOLOGIC QUAD  
 LOCATION MAP  
 HINER  
 FIGURE NO 2

**East Kentucky Engineering, LLC.**  
 230 Swartz Drive  
 Hazard, KY 41701  
 (606) 551-1050





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### 4.0 FIELD EXPLORATION

#### 4.1 SITE INFORMATION

A proposed tower pin location was placed on the Hiner property and provided to EKYENG. The proposed tower location was established and tied to the existing boundary. An estimated footer location was determined, and trenching was conducted through the slope at the proposed tower site.

#### 4.2 TRENCHING

This investigation was conducted with trenching with an excavator. The combinations of trenching and visual inspections were used to evaluate the site lithology and type of materials immediately below the proposed tower site. The following soils and rock properties were found.

TABLE NO. 2

Depth (Ft.)	Base Elevation (Ft.)	Strata
0.0	1551	Surface
0.0 – 1.5	1549.5	Topsoil / Clays
1.5 – 16.0	1535.0	Sandstone

*A Cross-Section & Geologic / Boring log of this information is in Appendix C of this report*

#### 4.3 GROUNDWATER

Groundwater in Eastern Kentucky is characterized by water flowing through a system of internal fractures that lead to an alluvial aquifer near the bottom of valley floors. Large, defined aquifers other than the alluvium are not common, especially in higher elevations such as where this tower site is proposed. Therefore, groundwater should not be a concern in this area. During the site investigation, no groundwater resources were observed.





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### 4.4 SEISMIC SITE CLASSIFICATION

Based on the encountered soil conditions at the project site, the site classification was determined to be "Site Class B" per the 2015 Kentucky Building Code. In addition, an  $S_{DS}$  coefficient of 0.139 g was calculated, and an  $S_{D1}$  coefficient of 0.06 g was also calculated for design based on the aforementioned building code.

## 5.0 DISCUSSION AND RECOMMENDATIONS

### 5.1 GENERAL

The structure will be a self-supporting freestanding tri-pole tower. Due to wind loading, lattice tower foundations can experience both vertical loads and horizontal loads. The vertical loads act in both an upward and downward direction as the tower attempts to overturn and can act in any directions.

### 5.2 FOUNDATIONS

This report demonstrates the different expected bearing capacities based upon the type of material encountered from the trenching and visible observations at the site. The approximate elevation of the surface of the site is 1551.6 ft with an expected base of the footer between 1541.0 ft and 1547.0 ft in elevation. A two-foot granular base has been added to assist in ensuring that the tower can be placed at a higher elevation if needed to accommodate limited excavations. This granular base can be placed up to 2 feet thick. This base will be a well-graded stone and compacted to 95% of a standard proctor. A 6-inch schedule 40 PVC pipe should be placed outside the footer area if the granular fill is utilized.

### 5.3 SHALLOW FOUNDATIONS

Based upon the laboratory and field testing, visual inspection of the materials, and practical experience we have estimated that the **allowable bearing capacity of the sandstone to be a minimum of 4 tsf**, between the elevations of



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1541.0 ft and 1547.0 ft. The upper limit is determined by the topography of the site to ensure that the entire footer is above the sandstone strata.

It is furthermore recommended that the slabs-on-grade be supported on 4 to 6-inch layer of relatively clean granular material such as sand and gravel or crushed stone is used if placed directly on the sandstone surface. This is to help distribute concentrated loads and equalize moisture conditions beneath the slab. Proper drainage must be incorporated into this granular layer to preclude future wet areas in the finished slab-on-grade. However, all topsoil and/or other deleterious materials encountered during site preparation must be removed and replaced with 4000 psi concrete below the foundation base. Provided that a minimum of 4 inches of granular material is placed below the new slab-on-grade, a modulus of subgrade reaction ( $k_{30}$ ) of 100 lbs./cu. in. can be used for the design of the slabs.

Support structure for this tower can be placed as needed. It is recommended that test pits are examined to ensure that any of these structures are on the competent materials. If pockets of soft, loose, or otherwise unsuitable material are encountered in the footing excavations and it is inconvenient to lower the footings, the proposed footing elevations may be re-established by backfilling after the undesirable material has been removed. The undercut excavation beneath each footing should extend to suitable bearing soils and the dimensions of the excavation base should be determined by imaginary planes extending outward and down on a 1 (vertical) to 1 (horizontal) slope from the base perimeter of the footing. The entire excavation should then be refilled with a well-compacted engineered fill, or lean concrete (Please note that the width of the lean concrete zone should be equal or wider than the width of the overlying footing element). Special care should be exercised to remove any sloughed, loose or soft materials near the base of the excavation slopes. In addition, special care should be taken to "tie-in" the compacted fill with the excavation slopes, with benches as necessary, to ensure that no pockets of loose or soft



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materials will be left in place along the excavation slopes below the foundation bearing level. All Federal, State, and Local regulations should be strictly adhered to relative to excavation side-slope geometry.

### **5.4 BURIED UTILITIES**

Excavations for buried utility pipelines should follow the guidelines set forth in this report. Depending on the pipeline material, a minimum thickness of at least 0.5 feet of select fine-grained granular bedding material should be used beneath all below-grade pipes, with a minimum cover thickness of at least 3 feet to afford an "arching" effect and reduce stresses on the pipe. The cover thickness may be reduced if the external loading condition on the pipe is relatively light or if the pipe is designed to withstand the external loading condition. It is not recommended that "pea-gravel" or other "open-work" aggregates be used for trench backfill since these materials are nearly impossible to compact and tend to pond water within their interstices.

## **6.0 WARRANTY**

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. No other warranty, express or implied, is made.

While the services of EKYENG are a valuable and integral part of the design and construction teams, we do not warrant, guarantee, or insure the quality or completeness of services provided by other members of those teams, the quality, completeness, or satisfactory performance of construction plans and specifications which we have not prepared, nor the ultimate performance of building site materials.





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### **6.1 SUBSURFACE EXPLORATION**

Subsurface exploration is normally accomplished by test borings, although test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report and is presented on the Boring Location Plan or on the boring log. The location and elevation of the boring should be considered accurate only to the degree inherent with the method used.

The boring log includes sampling information, description of the materials recovered, approximate depth of boundaries between soil and rock strata and groundwater data. The boring log represents conditions specifically at the location and time the boring was made. The boundaries between different soil strata are indicated at specific depths; however, these depths are in fact approximate and are somewhat dependent upon the frequency of sampling (The transition between soil strata is often gradual). Free groundwater level readings are made at the times and under conditions stated on the boring logs (Groundwater levels change with time and season). The borehole does not always remain open sufficiently long enough for the measured water level to coincide with the groundwater table.

### **6.2 LABORATORY AND FIELD TESTS**

Laboratory and field tests are performed by specific ASTM standards unless otherwise indicated. All determinations included in each ASTM standard are not always required and performed. Each test report indicates the measurements and determinations made.

### **6.3 ANALYSIS AND RECOMMENDATIONS**

The geotechnical report is prepared primarily to aid in the engineering design of site work and structural foundations. Although the information in the report is



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expected to be sufficient for these purposes, it is not intended to determine the cost of construction or to stand alone as a construction specification.

Our engineering report recommendations are based primarily on data from test borings made at the locations shown in a boring location drawing included. Soil variations may exist between borings, and these variations may not become evident until construction. If significant variations are then noted, the geotechnical engineer should be contacted so that field conditions can be examined and recommendations revised if necessary.

The geotechnical engineering report states our understanding as to the location, dimensions and structural features proposed for the site. Any significant changes in the nature, design, or location of the site improvements **MUST** be communicated to the geotechnical engineer such that the geotechnical analysis, conclusions, and recommendations can be appropriately adjusted. The geotechnical engineer should be given the opportunity to review all drawings that have been prepared based on their recommendations.

### **6.4 CONSTRUCTION MONITORING**

Construction monitoring is a vital element of complete geotechnical services. The field engineer/inspector is the owner's "representative" observing the work of the contractor, performing tests as required in the specifications, and reporting data developed from such tests and observations. The field engineer or inspector does not direct the contractor's construction means, methods, operations or personnel. The field inspector/engineer does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. The field inspector/engineer is responsible for his own safety but has no responsibility for the safety of other personnel at the site. The field inspector/engineer is an important member of a team whose responsibility is to watch and test the work being done and report to the owner whether that work is being carried out in general conformance with the plans and specifications.





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### **6.5 GENERAL**

The scope of our services did not include an environmental assessment for the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater or air, on, within or beyond the site studied. Any statements in the report or on the boring logs regarding odors, staining of soils or other unusual items or conditions observed are strictly for the information of our client.

To evaluate the site for possible environmental liabilities, we recommend an environmental assessment, consisting of a detailed site reconnaissance, a record review, and report of findings. Additional subsurface drilling and samplings, including groundwater sampling, may be required.

This report has been prepared for the exclusive use of Appalachian Wireless, for specific application to the proposed cellular tower located on the Hiner Property located in Perry County, Kentucky. Specific design and construction recommendations have been provided in the various sections of the report. The report shall, therefore, be used in its entirety. This report is not a bidding document and shall not be used for that purpose. Anyone reviewing this report must interpret and draw their conclusions regarding specific construction techniques and methods that were chosen. EKYENG is not responsible for the independent conclusions, opinions or recommendations made by others based on the field exploratory and laboratory test data presented in this report.



## **SPECIFICATIONS**

### **I – GENERAL**

#### **1.0 STANDARDS AND DEFINITIONS**

**1.1 STANDARDS** - All standards refer to latest edition unless otherwise noted.

**1.1.1** ASTM D-698-70 (Method C) "Standard Test Methods for Moisture. Density Relations of Soils and Soil Aggregate Mixtures Using 5.5-lb (2.5 kg.) Rammer and 12-inch (305-mm) Drop".

**1.1.2** ASTM D-2922 "Standard Test Method for Density of Soil and Soil Aggregate in Place by Nuclear methods (Shallow Depth)".

**1.1.3** ASTM D-1556 "Standard Test Method for Density of Soil in place by the Sand-Cone Method".

#### **1.2 DEFINITIONS**

**1.2.1** Owner - In these specifications the word "Owner" shall mean Appalachian Wireless.

**1.2.2** Engineer - In these specifications the word "Engineer" shall mean the Owner designated engineer.

**1.2.3** Design Engineer - In these specifications the words "Design Engineer" shall mean the Owner designated design engineer.

**1.2.4** Contractor - In these specifications the word "Contractor" shall mean the firm or corporation undertaking the execution of any work under the terms of these specifications.



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- 1.2.5** Approved - In these specifications the word "approved" shall refer to the approval of the Engineer or his designated representative.
- 1.2.6** As Directed - In these specifications the words "as directed" shall refer to the directions to the Contractor from the Owner or his designated representative.



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### **2.0 GENERAL CONDITIONS**

- 2.1** The Contractor shall furnish all labor, material and equipment and perform all work and services except those set out and furnished by the Owner, necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction, grading as shown on the plans and as described therein.

This work shall consist of all mobilization clearing and grading, grubbing, stripping, removal of existing material unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications.

This work is to be accomplished under the observation of the Owner or his designated representative.

- 2.2** Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including, without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work.

If conditions other than those indicated are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed so that the owner can investigate the condition.



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- 2.3** The construction shall be performed under the direction of an experienced engineer who is familiar with the design plan.





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### **II - ENGINEERED FILL BENEATH STRUCTURES CLEARING AND GRADING SPECIFICATIONS**

#### **1.0 GENERAL CONDITIONS**

The Contractor shall furnish all labor, materials, and equipment, and perform all work and services necessary to complete in a satisfactory manner the site preparation, excavation, filling, compaction and grading as shown on the plans and as described therein.

This work shall consist of all clearing and grading, removal of existing structures unless otherwise stated, preparation of the land to be filled, filling of the land, spreading and compaction of the fill, and all subsidiary work necessary to complete the grading of the cut and fill areas to conform with the lines, grades, slopes, and specifications.

This work is to be accomplished under the constant and continuous supervision of the Owner or his designated representative.

In these specifications, the terms "approved" and "as directed" shall refer to directions to the Contractor from the Owner or his designated representative.

#### **2.0 SUBSURFACE CONDITIONS**

Prior to bidding the work, the Contractor shall examine, investigate and inspect the construction site as to the nature and location of the work, and the general and local conditions at the construction site, including without limitation, the character of surface or subsurface conditions and obstacles to be encountered on and around the construction site; and shall make such additional investigation as he may deem necessary for the planning and proper execution of the work. Borings and/or soil investigations shall have been made. Results of these borings and studies will be made available by the Owner to the Contractor upon his request, but the Owner is not responsible for any interpretations or conclusions with respect thereto made by the Contractor based on such



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information, and the Owner further has no responsibility for the accuracy of the borings and the soil investigations.

If conditions other than those indicated are discovered by the Contractor, the Owner should be notified immediately. The material which the Contractor believes to be a changed condition should not be disturbed so that the Owner can investigate the condition.

### **3.0 SITE PREPARATION**

Within the specified areas, all trees, brush, stumps, logs, tree roots, and structures scheduled for demolition shall be removed and disposed of.

All cut, and fill areas shall be properly stripped. Topsoil will be removed to its full depth and stockpiled for use in finish grading. Any rubbish, organic and other objectionable soils, and other deleterious material shall be disposed of off the site, or as directed by the Owner or his designated representative if on site disposal is provided. In no case shall such objectionable material be allowed in or under the fill unless specifically authorized in writing.

Prior to the addition of fill, the original ground shall be compacted to job specifications as outlined below. Special notice shall be given to the proposed fill area now. If wet spots, spongy conditions, or groundwater seepage is found, corrective measures must be taken before the placement of fill.

### **4.0 FORMATION OF FILL AREAS**

Fills shall be formed of satisfactory materials placed in successive horizontal layers of not more than eight (8) inches in loose depth for the full width of the cross-section. The depth of lift may be increased if the Contractor can demonstrate the ability to compact a larger lift. If compaction is accomplished using hand-tamping equipment, lifts will be limited to 4-inch loose lifts. Engineered fill placed below the structure bearing elevation shall be compacted to at least 95% of the maximum dry unit weight with a moisture content within 2% of the optimum moisture content as determined by the modified Proctor test. The top size of the material placed shall not exceed 4 inches.



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All material entering the fill shall be free of organic matter such as leaves, grass, roots, and other objectionable material.

The operations on earth work shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing weather, or other unsatisfactory conditions. The Contractor shall keep the work areas graded to provide the drainage always.

The fill material shall be of the proper moisture content before compaction efforts are started. Wetting or drying of the material and manipulation to secure a uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work thus affected shall be delayed until the material has dried to the required moisture content. The moisture content of the fill material should be no more than two (2) percentage points higher or lower than optimum unless otherwise authorized. Sprinkling shall be done with equipment that will satisfactorily distribute the water over the disced area. Any areas inaccessible to a roller shall be consolidated and compacted by mechanical tampers. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of filled areas, starting layers shall be placed in the deepest portion of the fill, and as placement progresses, additional layers shall be constructed in horizontal planes. Original slopes shall be continuously, vertically benched to provide horizontal fill planes. The size of the benches shall be formed so that the base of the bench is horizontal, and the back of the bench is vertical. As many benches as are necessary to bring the site to final grade shall be constructed. Filling operations shall begin on the lowest bench, with the fill being placed in horizontal eight (8) inch thick loose lifts unless otherwise authorized. The filling shall progress in this manner until the entire first bench has been filled, before any fill is placed on the succeeding benches. Proper drainage shall be maintained always during benching and filling of the benches, to ensure that all water is drained away from the fill area.





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Frozen material shall not be placed in the fill nor shall the fill be placed upon frozen material.

The Contractor shall be responsible for the stability of all fills made under the contract, and shall replace any portion, which in the opinion of the Owner or his designated representative, has become displaced due to carelessness or negligence on the part of the Contractor. Fill damaged by inclement weather shall be repaired at the Contractor's expense.

### **5.0 SLOPE RATIO AND STORM WATER RUN-OFF**

Slopes shall not be greater than 2 (horizontal) to 1 (vertical) in both cut and fill, or as illustrated on the construction drawings. Excavations shall be constructed in accordance with all Federal, State and local codes relative to slope geometry.

### **6.0 GRADING**

The Contractor shall furnish, operate, and maintain such equipment as is necessary to construct uniform layers, and control smoothness of grade for maximum compaction and drainage.

### **7.0 COMPACTING**

The compaction equipment shall be approved equipment of such design, weight, and quantity to obtain the required density in accordance with these specifications.

### **8.0 TESTING AND INSPECTION SERVICES**

Testing and inspection services will be provided by the Owner.



**III GUIDELINES FOR EXCAVATIONS AND TRENCHES**

The following represents some general guidelines relative to the design and construction of excavations and trenches. It must be emphasized that these guidelines are not intended to represent a "safety plan," but rather are presented herein to provide general guidance regarding the design characteristics and safety measures for excavations and trenches.

1. Check with the following utilities prior to breaking ground:
  - Sewer
  - Telephone
  - Fuel
  - Electric
  - Water
  - Gas
  - Cable

When utility companies or owners do not respond to your request within 48 hours, the contractor may only then proceed provided the contractor does so with caution by using detection equipment or other acceptable means to locate utility installations.

Once the excavation is open, the contractor should protect and support the exposed underground utilities or remove installations to safeguard workers and prevent damage to exposed utilities.

2. Access and egress ramps must be designed by a "competent person" and structural ramps used for equipment must be designed by a "competent person" with qualified knowledge in structural design. In addition:
  - Ramps must be secured to prevent displacement;
  - Ramps used in lieu of steps must have cleats to prevent slipping; and





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- Trenching excavations four feet or greater in depth must have a stairway, ladder, ramps or other safe means to egress with lateral travel no more than 25 feet.
3. Workers must be provided with reflector garments, such as warning orange or red vests, when exposed to vehicular traffic.
  4. Contractors must not allow workers to work under or near equipment when there is danger of falling debris, spillage or equipment-related injuries.
  5. Mobile equipment, operating adjacent to an open excavation or approaching the edge of an excavation, must have one of the following when the operator's view is obstructed:
    - Warning System
    - Mechanical Signals
    - Barricades
    - Stop Logs
    - Hand Signals
  6. The contractor must check the atmosphere for hazardous gases and oxygen deficiencies when excavating four feet or greater around landfills, or when hazardous substances are stored nearby, and when the contractor expects there could be any exposure to the workers.
  7. When hazardous atmospheric conditions exist, or when conditions could change, the contractor must make emergency rescue equipment readily available including breathing apparatus, safety harnesses with life lines and a basket stretcher.
  8. When workers enter bell-bottom pier holes or other deep and confined excavations, the worker must wear (always while performing work in the confined space) a separate life line attached to a harness. The line must



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be attended by someone above while work is being performed. The worker must check for hazardous atmospheric conditions prior to entry.

- 9.** The contractor must ensure that water does not accumulate in open excavations and must inspect the excavation prior to allowing workers to re-enter after heavy rains.
- 10.** Adjacent structures (buildings, walls, etc.) must be supported or secured to prevent worker exposure to unsafe conditions and damage to existing structures.
- 11.** A registered professional engineer must approve operations when a contractor underpins existing structures to ensure worker safety and prevent damage to existing structures.
- 12.** Workers must not be exposed to loose soil and rock or materials in and around excavations. Materials, such as removed soil and rock, must not be stored closer than two feet from the edge of the excavation.
- 13.** Daily inspections of the excavation, the adjacent areas and protective systems must be made by a "competent person" for evidence of possible cave-ins, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions. The "competent person" must stop work immediately and remove workers from the excavation when conditions change and pose a threat to their safety workers must not be exposed to fall hazards associated with excavations.
- 14.** Protective walkways or bridges with standard guardrails must be provided. All wells, pits, shafts, etc. must be barricaded or covered. After completion of work, all wells, pits, shafts, etc. must be backfilled.



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### IV - GENERAL CONCRETE SPECIFICATIONS

#### 1.0 GENERAL

It is the intent of this specification to secure, for every part of the work, concrete of homogenous structure which, when hardened, will have the required strength and resistance to weathering. To this end, the limiting values of concrete and the requirements hereinafter specified must be met. Standard tests of the cement, aggregates, concrete and reinforcement will be made by the Owner as it sees fit. The Contractor shall furnish the material for all required samples plus such labor as required to obtain samples. The Contractor shall provide to authorized representatives of the Owner, convenient access to all parts of the work of all concreting operations for the purpose of sampling and inspection.

#### 2.0 SCOPE

Contractor shall furnish all materials, labor, services, transportation, tools, equipment, and related items required to complete work indicated on the drawings and/or specified.

Unless otherwise noted or as modified by more stringent requirements specified herein, all plain and reinforced concrete work shall be performed in full compliance with applicable requirements of the Building Code Requirements for Reinforced Concrete ACI 318.

Contractor shall obtain Owner's approval of all subgrades, footing bottoms, forms, and reinforcement just prior to placing concrete.

Contractor shall coordinate the work specified in this section with that specified in other sections so that all anchors, pipes and other embedded items are properly installed before concrete is placed.

Contractor shall clean all exposed concrete surfaces and obtain approval of Owner for method of cleaning.





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### 3.0 MATERIALS

All materials shall be of the respective quality specified herein, delivered, stored, and handled as to prevent inclusion of foreign matter and damage by dampness or breakage. Packaged material shall be stored in original container until ready for use. Materials showing evidence of dampness or other damage may be rejected.

A. Fine and Coarse Aggregates: Coarse and fine aggregates shall conform to ASTM Specification C33. The maximum size of aggregate shall not be larger than one-fifth (1/5) of the narrowest dimensions between forms, or larger than three fourths (3/4) of the minimum clear spacing between reinforcement.

1. Fine Aggregate: Sand shall be composed essentially of clean, hard, strong, durable grains free of structurally weak grains, organic matter, loam, clay, silt, salt, mica or other fine materials that may affect bonding of the cement paste.

2. Coarse Aggregate: Cement concrete shall consist of crushed rock or screened gravel and shall be composed essentially of clean, hard, strong and impermeable particles, resistant to wear and frost and free from deleterious amounts of organic matter, loam, clay, salts, mica, and soft, thin, elongated, laminated or disintegrated stone, and shall be inert to water and cement.

B. Portland Cement: Portland cement shall conform to ASTM Specification C150. Type I or Type II Portland Cement shall be used provided that they are not intermixed during any one batch. Type II Portland Cement shall not be used unless indicated on the plans.

C. Water: Water for mixing and curing shall be clean, fresh, and free from deleterious materials.



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- D. Metal Reinforcement: Rebar shall be Grade 60 and with deformations conforming to ASTH Specification A305. Welded wire mesh shall conform to W4 x W4 size and be of Grade 60 steel.
- E. Admixtures: Except as herein noted, admixtures shall not be used.
1. Under adverse weather conditions only retarding or accelerating agents containing no chloride may be used.
  2. Air-Entraining Agent shall be used for all concrete will give an entrained air range of not less than 4 percent but no greater than 8 percent in the finished product. Under no circumstances shall the air-entraining be interground with cement.
  3. Approval in writing shall be required from Owner prior to the use of any admixture.

### 4.0 FORM

Forms shall be constructed with proper shoring and cross-bracing, safeguarding the total structure and specifically lateral stability and sufficiently strong to stand vibrations of concrete and to carry, without appreciable deflection or displacement, all dead and live loads to which they may be subjected.

### 5.0 INSERTS, ETC.

Anchors, bolts, dowels, conduit, water stops, vent pipes and other similar built-in or concreted-in items shall be properly located, accurately positioned and secured. The Contractor shall cooperate in placing of such items with other contractors who require a fastening device for their work, and he shall maintain them in proper location during the progress of his work.



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### 6.0 REINFORCEMENT

Reinforcement at the time concrete is placed shall be free from rust, scale or other coatings that will destroy or reduce the bond.

Reinforcement shall be accurately placed and securely tied at intersections and shall be securely held in position during the placing of concrete by pacers, chairs, or other approved supports.

The reinforcement of foundations, footings and other principal structural members in which the concrete is deposited against the ground shall not have less than three (3) inches of concrete between it and the ground contact surface. If concrete surfaces after removal of the forms are to be exposed to the weather or to be in contact with the ground or rock, reinforcement shall be protected with not less than two (2) inches of concrete.

### 7.0 CONCRETE

Concrete for the various parts of the work shall be of 4000 pounds per square inch compressive strength with a minimum 28-day cure. Contractor is responsible to provide a mix of not less than 6 bags of cement per yard of concrete and not more than 7 gallons of water per bag of cement, producing a minimum slump of 2-1/2 inches and a maximum slump of 4-1/2 inches. Concrete that exceeds the above range of maximum or minimum slump requirements may be rejected by the Owner. All concrete shall be air-entrained. Contractors are required to furnish the name or names of the company(s) that will be providing the mix. The Owner reserves the right to disapprove any concrete supplier that has been known to supply an undesirable material to the Owner on previous occasions.

### 8.0 DEPOSITING CONCRETE

4.1. Preparation for Placing Concrete: Before depositing concrete, the Contractor shall:

1. Remove from space to be occupied by concrete all debris, including snow, ice, and water unless otherwise permitted by Owner.





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2. Provide diversion, satisfactory to Owner, of any flow of water to an excavation to avoid washing the freshly deposited concrete.
  3. Coat the forms prior to placing of reinforcing steel as required in formwork.
  4. Secure firmly in correct position, all reinforcement and other items to be encased and remove therefrom all coating including ice and frost.
- B. Transportation of Concrete from Batch Plant: The concrete shall be delivered to the site of the work and discharge shall be completed within 90 minutes after addition of the cement and water to the aggregates. Each batch of concrete delivered at the job site shall be accompanied by a time slip issued at the batching plant, bearing the time of charging of the mixer drum with the cement and aggregates.
- C. Transporting of Concrete from Mixer to Place of Final Deposit: Transportation shall be done as rapidly as practical by means which shall prevent the separation or loss of the ingredients. If chutes are used, they shall be at a slope not flatter than one vertical to two horizontal. Buggies or carts shall be equipped with pneumatic rubber tires or surfaces of runways shall be sufficiently smooth or both so as not to cause separation or segregation of concrete ingredients. Concrete shall not be allowed to drop freely more than 4 feet. Where greater drops are required, canvas "elephant trunks" or galvanized iron chutes equipped with suitable hopper heads shall be employed and a sufficient number placed to ensure that the concrete may be effectively compacted into



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horizontal layers not exceeding 12 inches in thickness with minimum lateral movements.

- D. Depositing of Concrete: Depositing of concrete shall:
1. Proceed continuously after once starting until reaching the end of a section of construction joint location shown on the drawings, or as approved by the Owner. The operations shall be conducted so that no concrete is deposited on concrete sufficiently hardened to cause formation of seams, and planes of weakness.
  2. Be as near as practical to its final position in the forms.
  3. Proceed to maintain constantly a top surface which is approximately level.
  4. Be placed before initial set has occurred, and in no event after it has contained its water content for more than 90 minutes.
  5. Be thoroughly worked and compacted by means of suitable tools to provide impermeability, durability and strength and shall be thoroughly worked around reinforcements and embedded items and into corners of forms and to be free from voids, pockets or honeycombing. Care shall be taken to provide impermeability.
- E. Vibration Equipment: Vibration equipment shall be of the appropriate type and shall, always, be adequate in number of units and power of each unit to properly consolidate all concrete.



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- F. Monolithic Pours: Proper delivery of concrete shall be the Contractor's responsibility to make a mono-lithic pour without delays and changes of cold joints.

### 9.0 CURING

All concrete work shall be protected from injurious action by the sun, rain, flowing water, frost and other injury and shall be covered with plastic after application of curing compound for three (3) days on pours located above ground.

Contractor shall not remove any formwork for a minimum period of 24 hours after a concrete pour without the written approval of the Owner.

### 10.0 CONCRETE FINISHES

Finishes of all exposed concrete shall be free of defects which impair its durability or adversely affect its appearance. All such surfaces when stripped, shall be uniform in appearance and any surfaces displaying any deviations from adjacent uniform surfaces shall be rejected and subject to removal.

Finished work shall be level and plumb, true to lines, and dimensions. Finished plane surfaces shall be smooth, and as nearly perfect as practical; however, deviations from a true plane shall not exceed 1/8 inch when measured from a 6-foot straight edge placed against the surface to any point on the surface and under the straight edge.

All exposed surfaces shall have defects corrected, protrusions removed, and holes filled.





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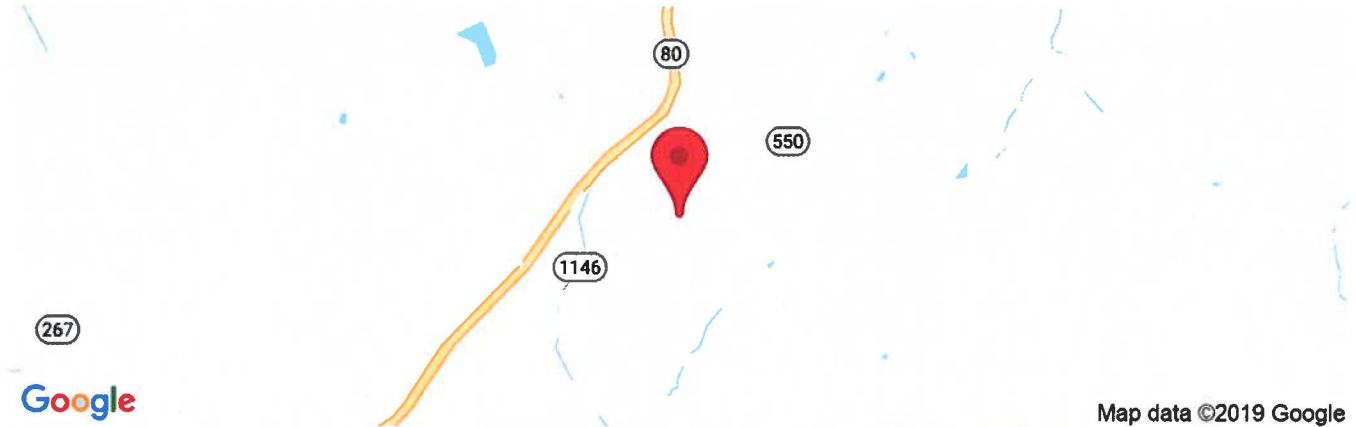
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**APPENDIX A SEISMIC DATA**



# Hiner Tower Site

Latitude, Longitude: 37.317561, -83.159252

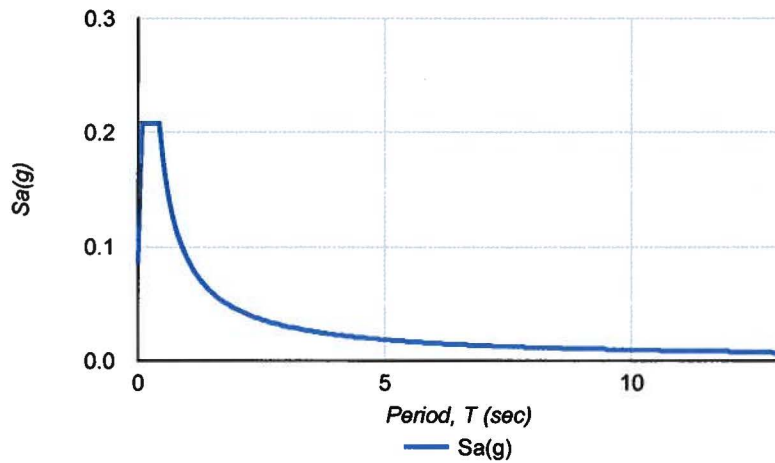


<b>Date</b>	4/9/2019, 11:28:13 AM
<b>Design Code Reference Document</b>	ASCE7-10
<b>Risk Category</b>	IV
<b>Site Class</b>	B - Rock

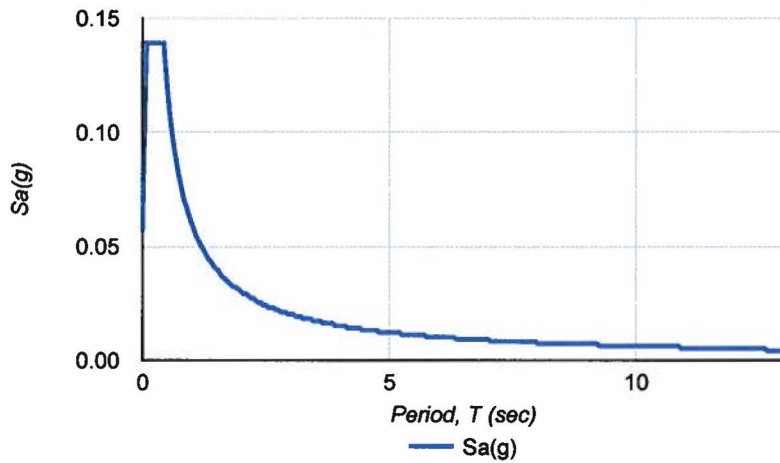
Type	Value	Description
$S_S$	0.208	$MCE_R$ ground motion. (for 0.2 second period)
$S_1$	0.09	$MCE_R$ ground motion. (for 1.0s period)
$S_{MS}$	0.208	Site-modified spectral acceleration value
$S_{M1}$	0.09	Site-modified spectral acceleration value
$S_{DS}$	0.139	Numeric seismic design value at 0.2 second SA
$S_{D1}$	0.06	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	A	Seismic design category
$F_a$	1	Site amplification factor at 0.2 second
$F_v$	1	Site amplification factor at 1.0 second
PGA	0.101	$MCE_G$ peak ground acceleration
$F_{PGA}$	1	Site amplification factor at PGA
$PGA_M$	0.101	Site modified peak ground acceleration
$T_L$	12	Long-period transition period in seconds
$SsRT$	0.208	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	0.226	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
$SsD$	1.5	Factored deterministic acceleration value. (0.2 second)
$S1RT$	0.09	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	0.099	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	0.6	Factored deterministic acceleration value. (1.0 second)
PGA <sub>d</sub>	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
$C_{RS}$	0.921	Mapped value of the risk coefficient at short periods
$C_{R1}$	0.907	Mapped value of the risk coefficient at a period of 1 s

**MCER Response Spectrum**



**Design Response Spectrum**



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**APPENDIX B PHOTOGRAPHS**



Trench



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Sandstone Bottom of Trench



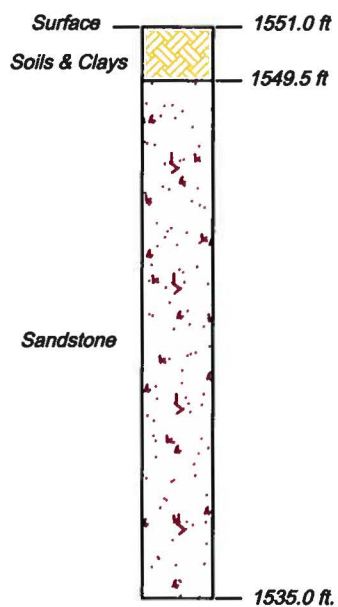
**EAST KENTUCKY ENGINEERING, LLC.**

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**APPENDIX C    MAPS**



**GEOLOGIC LOG  
(Boring Log)**



	Date: 8/5/19
Job: 165-80	Scale: 1"= 5'
Drawing: RDS	
Tool Palette: EKYENG	

**APPALACHIAN  
WIRELESS  
HINER SITE  
GEOLOGIC / BORING LOG  
PERRY COUNTY, KENTUCKY**



**East Kentucky Engineering, LLC**

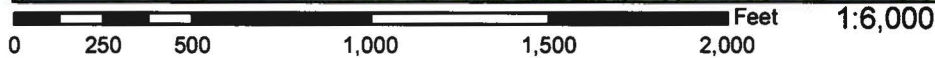
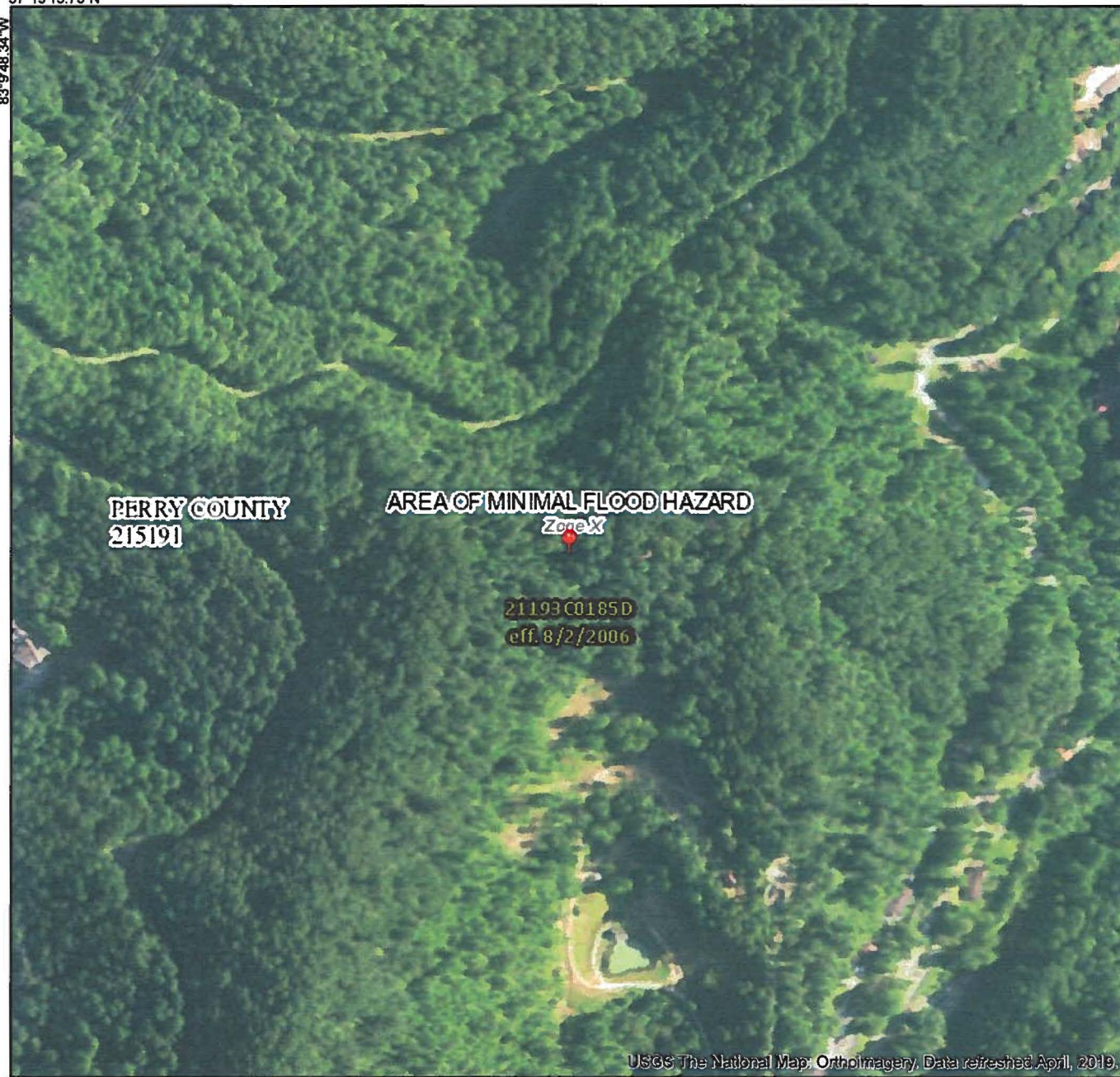
230 Swartz Drive  
Hazard, KY 41701  
(606) 551-1050

# National Flood Hazard Layer FIRMette



37°19'15.75"N

83°9'48.34"W



## Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, V, A99
	With BFE or Depth Zone AE, AO, AH, VE, AR
	Regulatory Floodway

	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
	Future Conditions 1% Annual Chance Flood Hazard Zone X
	Area with Reduced Flood Risk due to Levee. See Notes, Zone X
	Area with Flood Risk due to Levee Zone D

	Area of Minimal Flood Hazard Zone X
	Effective LOMRs
	Area of Undetermined Flood Hazard Zone D

	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall

	Cross Sections with 1% Annual Chance Water Surface Elevation
	Coastal Transect
	Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature

	Digital Data Available
	No Digital Data Available
	Unmapped

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

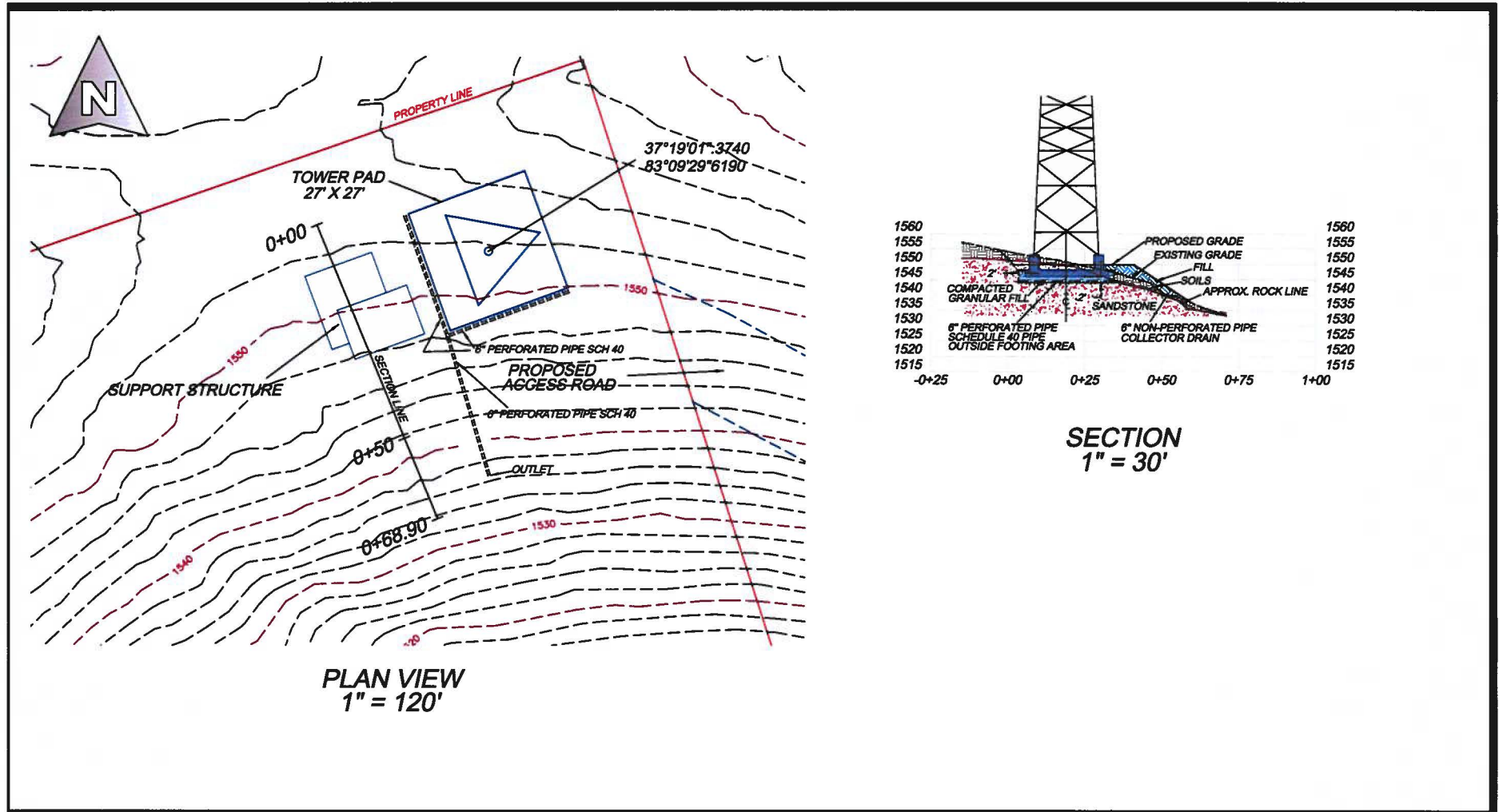
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/5/2019 at 3:22:19 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

83°9'10.69"W





East Kentucky Engineering, LLC

230 Swartz  
Hazard, KY 41701  
(606) 551-1050  
Email: ekyyeng@ekyyeng.net



0' 30' 60'



Drawn by: RDS Date: 03/25/19  
Job #: 165-0080 Scale: 1" = 30'  
File Location:

APPALACHIAN  
WIRELESS  
HINER SITE  
PERRY COUNTY, KENTUCKY