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PUBLIC SERVICE
COMMISSION

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the matter of:

THE APPLICATION OF EAST KENTUCKY NETWORK,)
LLC FOR THE ISSUANCE OF A CERTIFICATE OF)
PUBLIC CONVENIENCE AND NECESSITY TO) CASE NO. 2018-00155
CONSTRUCT A TOWER IN HARLAN COUNTY,)
KENTUCKY)

East Kentucky Network, LLC d/b/a Appalachian Wireless, was granted authorization to provide cellular service in the KY-11 Cellular Market Area (CMA453) by the Federal Communications Commission (FCC). The FCC license is included as Exhibit 1. East Kentucky Network, LLC merger documents were filed with the Commission on February 2, 2001 in Case No. 2001-022. East Kentucky Network, LLC is a Kentucky limited liability company that was organized on June 16, 1998. East Kentucky Network, LLC is in good standing with the state of Kentucky.

In an effort to improve service in Harlan County, pursuant to KRS 278.020 Subsection 1 and 807 KAR 5:001, East Kentucky Network, LLC is seeking the Commission’s approval to construct a 180-foot self-supporting tower on a tract of land located at 266 Vanover Hill Road, Harlan County, Kentucky (36°49’03.5055”N 83°29’47.2293”W). A map and detailed directions to the site can be found in Exhibit 7.

Exhibit 2 is a list of all Property owners or residents according to the Property Valuation Administrator’s record who own property within 500 feet of the proposed Tower and all property owners that own property contiguous to the property upon which construction is proposed in accordance with the Property Valuation Administrator’s record.

Pursuant to 807 KAR 5:063 Section 1(1)(l), Section 1(m) and Section 2, all affected property owners according to the Property Valuation Administrator's records who own property within 500 feet of the proposed Tower or who own property contiguous to the property upon which construction is proposed were notified by certified mail return receipt requested of East Kentucky Network, LLC's proposed construction and informed of their right to intervene. They were given the docket number under which this application is filed. Enclosed in Exhibit 2 is a copy of that notification.

Harlan County has no formal local planning unit. In absence of this unit, the Harlan County Judge Executive's office was notified by certified mail, return receipt requested of East Kentucky Network, LLC's proposal and informed of their right to intervene. The Harlan County Judge Executive's Office was also given the docket number under which this application is filed. Enclosed in Exhibit 3 is a copy of that notification.

Notice of the location of the proposed construction was published in the Harlan Daily Enterprise, July 27, 2018 edition. Enclosed is a copy of that notice in Exhibit 3. The Harlan Daily Enterprise is the newspaper with the largest circulation in Harlan County.

A geologist was employed to determine soil and rock types and to ascertain the distance to solid bedrock. The geotechnical report is enclosed as Exhibit 4.

A copy of the tower design information is enclosed as Exhibit 5. The proposed tower has been designed by engineers at Rohn Products, LLC and will be constructed under their supervision. Their qualifications are evidenced in Exhibit 5 by the seal and signature of the registered professional engineer responsible for this project.

The tower will be erected by S & S Tower Services of St. Albans, West Virginia. S & S Tower Services has vast experience in the erection of communications towers.

The FAA approval and the Kentucky Airport Zoning Commission confirmation of no permit required are included as Exhibit 6.

No Federal Communications Commission approval is required prior to construction of this facility. Once service is established from this tower we must immediately notify the Federal Communications Commission of its operation. Prior approval is needed only if the proposed facility increases the size of the cellular geographic service area. This cell site will not expand the cellular geographic service area.

East Kentucky Network, LLC will finance the subject Construction with earned surplus in its General Fund.

Estimated Cost of Construction	\$ 350,000.00
Annual Operation Expense of Tower	\$ 12,500.00

Two notice signs meeting the requirements prescribed by 807 KAR 5:063, Section 1(2), measuring at least two (2) feet in height and four (4) feet in width and containing all required language in letters of required height, have been posted, one at a visible location on the proposed site and one on the nearest public road. The two signs were posted on July 25, 2018, and will remain posted for at least two weeks after filing of this application as specified.

Enclosed in Exhibit 8 is a copy of East Kentucky Network, LLC's Memorandum of Lease for the site location along with a lot description.

The proposed construction site is on a mountaintop some feet from the nearest structure. Prior to construction, the site was wooded.

Due to the steep hillside surrounding the proposed site, the property in close proximity is unsuitable for any type of development. East Kentucky Network, LLC's operation will not affect the use of nearby land nor its value. No more suitable site exists in the area. A copy of the search area map is enclosed in Exhibit 7. No other tower capable of supporting East Kentucky Network,

LLC's load exists in the general area; therefore there is no opportunity for co-location of our facilities with anyone else.

Enclosed, and filed as Exhibit 9 is a survey of the proposed tower site signed by a Kentucky registered professional engineer.

Exhibit 10 is a map in one (1) inch equals 200 feet scale identifying every structure and every owner of real estate within 500 feet of the proposed tower and all property owners who own contiguous property to the property upon which construction is proposed

Exhibit 11 contains a vertical sketch of the tower supplied by James W. Caudill, Kentucky registered professional engineer.

Enclosed as Exhibit 12 is a list of utilities, corporations, or persons with whom the tower is likely to compete.

[THE REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK.]

WHEREFORE, Applicant, having met the requirements of KRS 278.020(1), 278.650, 278.665, and all applicable rules and regulations of the PSC, respectfully requests that the PSC accept the foregoing Application for filing and grant a Certificate of Public Convenience and Necessity to construct and operate the proposed tower.

The foregoing document was prepared by Krystal Branham, Regulatory Compliance Attorney for East Kentucky Network, LLC d/b/a Appalachian Wireless. All related questions or correspondence concerning this filing should be mailed to East Kentucky Network, LLC d/b/a Appalachian Wireless, Attn: Regulatory Compliance Department, 101 Technology Trail, Ivel, KY 41642.

SUBMITTED BY: Lynn Haney DATE: 7/25/18
Lynn Haney, Regulatory Compliance Director

APPROVED BY: W.A. Gillum DATE: 7/25/18
W.A. Gillum, General Manager

ATTORNEY: Krystal Branham DATE: 7/25/18
Hon. Krystal Branham, Attorney

CONTACT INFORMATION:

W.A. Gillum, General Manager
Phone: (606) 477-2355, Ext. 111
Email: wagillum@ekn.com

Lynn Haney, Regulatory Compliance Director
Phone: (606) 477-2355, Ext. 1007
Email: lhaney@ekn.com

Krystal Branham, Attorney
Phone: (606) 477-2355, Ext. 1009
Email: kbranham@ekn.com

Mailing Address:

**East Kentucky Network, LLC
d/b/a Appalachian Wireless
Attn: Regulatory Compliance Department
101 Technology Trail
Ivel, KY 41642**

1	FCC License
2	Copies of Cell Site Notices to Land Owners
3	Notification of County Judge Executive and Newspaper Advertisement
4	Universal Soil Bearing Analysis
5	Tower Design
6	FAA and KAZC Approvals
7	Driving Directions from County Court House and Map to Suitable Scale
8	Memorandum of Lease for Proposed Site with Legal Description
9	Survey of Site Signed/Sealed by Professional Engineer Registered in State of Kentucky
10	Site Survey Map with Property Owners Identified in Accordance with PVA of County
11	Vertical Profile Sketch of Proposed Tower
12	List of Competitors

Uls License

700 MHz Lower Band (Blocks C, D) License - WPWV284 - East Kentucky Network, LLC d/b/a Appalachian Wireless

Call Sign	WPWV284	Radio Service	WZ - 700 MHz Lower Band (Blocks C, D)
Status	Active	Auth Type	Regular

Rural Service Provider Bidding Credit

Is the Applicant seeking a Rural Service Provider (RSP) bidding credit?

Reserved Spectrum

Reserved Spectrum

Market

Market	CMA453 - Kentucky 11 - Clay	Channel Block	C
Submarket	0	Associated Frequencies (MHz)	000710.00000000-000716.00000000 000740.00000000-000746.00000000

Dates

Grant	01/24/2003	Expiration	06/13/2019
Effective	11/02/2013	Cancellation	

Buildout Deadlines

1st	06/13/2019	2nd	
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Notification Dates

1st		2nd	
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Licensee

FRN	0001786607	Type	Limited Liability Company
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Licensee

East Kentucky Network, LLC d/b/a Appalachian Wireless 101 Technology Trail Ivel, KY 41642 ATTN W.A. Gillum, General Manager/CEO	P:(606)477-2355
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Contact

Lukas, Nace, Gutierrez & Sachs, LLP Pamela L Gist Esq 8300 Greensboro Drive McLean, VA 22102	P:(703)584-8665 F:(703)584-8695 E:pgist@fcclaw.com
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Ownership and Qualifications

Radio Service Type Fixed, Mobile, Radio Location
Regulatory Status Common Carrier, Interconnected Yes
Non-Common Carrier

Alien Ownership

The Applicant answered "No" to each of the Alien Ownership questions.

Basic Qualifications

The Applicant answered "No" to each of the Basic Qualification questions.

Tribal Land Bidding Credits

This license did not have tribal land bidding credits.

Demographics

Race
Ethnicity Gender

EXHIBIT 2 - LIST OF PROPERTY OWNERS

Statement Pursuant to Section 1 (1) (I) 807 KAR 5:063

Section 1 (1)(I) 1. The following is a list of every property owner who according to property valuation administrator's records, owns property within 500 feet of the proposed tower and each have been: notified by certified mail, return receipt requested, of the proposed construction,

Section 1 (1)(I) 2. Every person listed below who, according to the property valuation administrator's records, owns property within 500 feet of the proposed tower has been: Given the Commission docket number under which the application will be processed: and

Section 1 (1)(I) 3. Every person listed below who, according to property valuation administrator's records owns property within 500 feet of the proposed tower has been: Informed of his right to request intervention.

Section 2. If the construction is proposed for an area outside the incorporated boundaries of a city, the application shall state that public notices required by Section 1(1)(L) have been sent to every person who, according to the property valuation administrator, owns property contiguous to the property upon which the construction is proposed

LIST OF PROPERTY OWNERS

Bristol Belcher
12280 S. Hwy 119
Coldiron, KY 40819

Bobby Belcher
12298 S. Hwy 119
Coldiron, KY 40819

Bristol and Vanessa Belcher
12280 S. Hwy 119
Coldiron, KY 40819

James E. and Flora Turner Asher
P.O. Box 50
Grays Knob, KY 40829

Edward G. and Charlotte L. Hatmaker
P.O. Box 204
Harlan, KY 40831

Veronica and Manfred Anglin, JR.
12906 S US 119
Coldiron, KY 40819

Kathy Vanover
12270 HWY 119
Coldiron, KY 40819

Pearl and Brenda Belcher
12352 S HWY 119
Coldiron, KY 40819

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Bristol Belcher
12280 S. Hwy 119
Coldiron, KY 40819

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

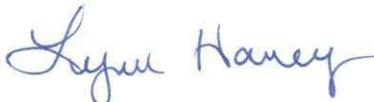
East Kentucky Network, LLC d/b/a Appalachian Wireless has applied to the Public Service Commission of Kentucky for a Certificate of Public Convenience and Necessity to construct and operate a new facility to provide cellular telecommunications service in Harlan County. The facility will include a 180'-foot self-supporting tower with attached antennas extending upwards, and an equipment shelter located on a tract of land at 266 Vanover Hill Road, Coldiron, Harlan County, Kentucky. A map showing the location of the proposed new facility is enclosed. This notice is being sent to you because you may own property within a 500' radius of the proposed tower or own property contiguous to the property upon which construction is proposed.

The Commission invites your comments regarding the proposed construction. You also have the right to intervene in this matter. The Commission must receive your initial communication within 20 days of the date of this letter as shown above.

Your comments and request for intervention should be addressed to: Executive Director's Office, Public Service Commission of Kentucky, P.O. Box 615, Frankfort, KY 40602. Please refer to Case No. 2018-00155 in your correspondence.

If you have any questions for East Kentucky Network, LLC, please direct them to my attention at the following address: East Kentucky Network, LLC, 101 Technology Trail, Ivel, KY 41642 or call me at 606-477-2355, Ext. 1007.

Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Bobby Belcher
12298 S. Hwy 119
Coldiron, KY 40819

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

East Kentucky Network, LLC d/b/a Appalachian Wireless has applied to the Public Service Commission of Kentucky for a Certificate of Public Convenience and Necessity to construct and operate a new facility to provide cellular telecommunications service in Harlan County. The facility will include a 180'-foot self-supporting tower with attached antennas extending upwards, and an equipment shelter located on a tract of land at 266 Vanover Hill Road, Coldiron, Harlan County, Kentucky. A map showing the location of the proposed new facility is enclosed. This notice is being sent to you because you may own property within a 500' radius of the proposed tower or own property contiguous to the property upon which construction is proposed.

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Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Bristol and Vanessa Belcher
12280 S. Hwy 119
Coldiron, KY 40819

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

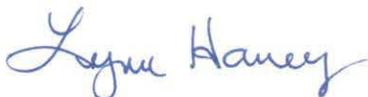
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Lynn Haney, CPA
Regulatory Compliance Director
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PUBLIC NOTICE

July 27, 2018

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P.O. Box 50
Grays Knob, KY 40829

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Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Edward G. and Charlotte L. Hatmaker
P.O. Box 204
Harlan, KY 40831

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

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Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Veronica and Manfred Anglin, JR.
12906 S US 119
Coldiron, KY 40819

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

East Kentucky Network, LLC d/b/a Appalachian Wireless has applied to the Public Service Commission of Kentucky for a Certificate of Public Convenience and Necessity to construct and operate a new facility to provide cellular telecommunications service in Harlan County. The facility will include a 180'-foot self-supporting tower with attached antennas extending upwards, and an equipment shelter located on a tract of land at 266 Vanover Hill Road, Coldiron, Harlan County, Kentucky. A map showing the location of the proposed new facility is enclosed. This notice is being sent to you because you may own property within a 500' radius of the proposed tower or own property contiguous to the property upon which construction is proposed.

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Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Kathy Vanover
12270 HWY 119
Coldiron, KY 40819

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

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Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

VIA: U.S. CERTIFIED MAIL

PUBLIC NOTICE

July 27, 2018

Pearl and Brenda Belcher
12352 S HWY 119
Coldiron, KY 40819

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

East Kentucky Network, LLC d/b/a Appalachian Wireless has applied to the Public Service Commission of Kentucky for a Certificate of Public Convenience and Necessity to construct and operate a new facility to provide cellular telecommunications service in Harlan County. The facility will include a 180'-foot self-supporting tower with attached antennas extending upwards, and an equipment shelter located on a tract of land at 266 Vanover Hill Road, Coldiron, Harlan County, Kentucky. A map showing the location of the proposed new facility is enclosed. This notice is being sent to you because you may own property within a 500' radius of the proposed tower or own property contiguous to the property upon which construction is proposed.

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Sincerely,



Lynn Haney, CPA
Regulatory Compliance Director
Enclosure 1

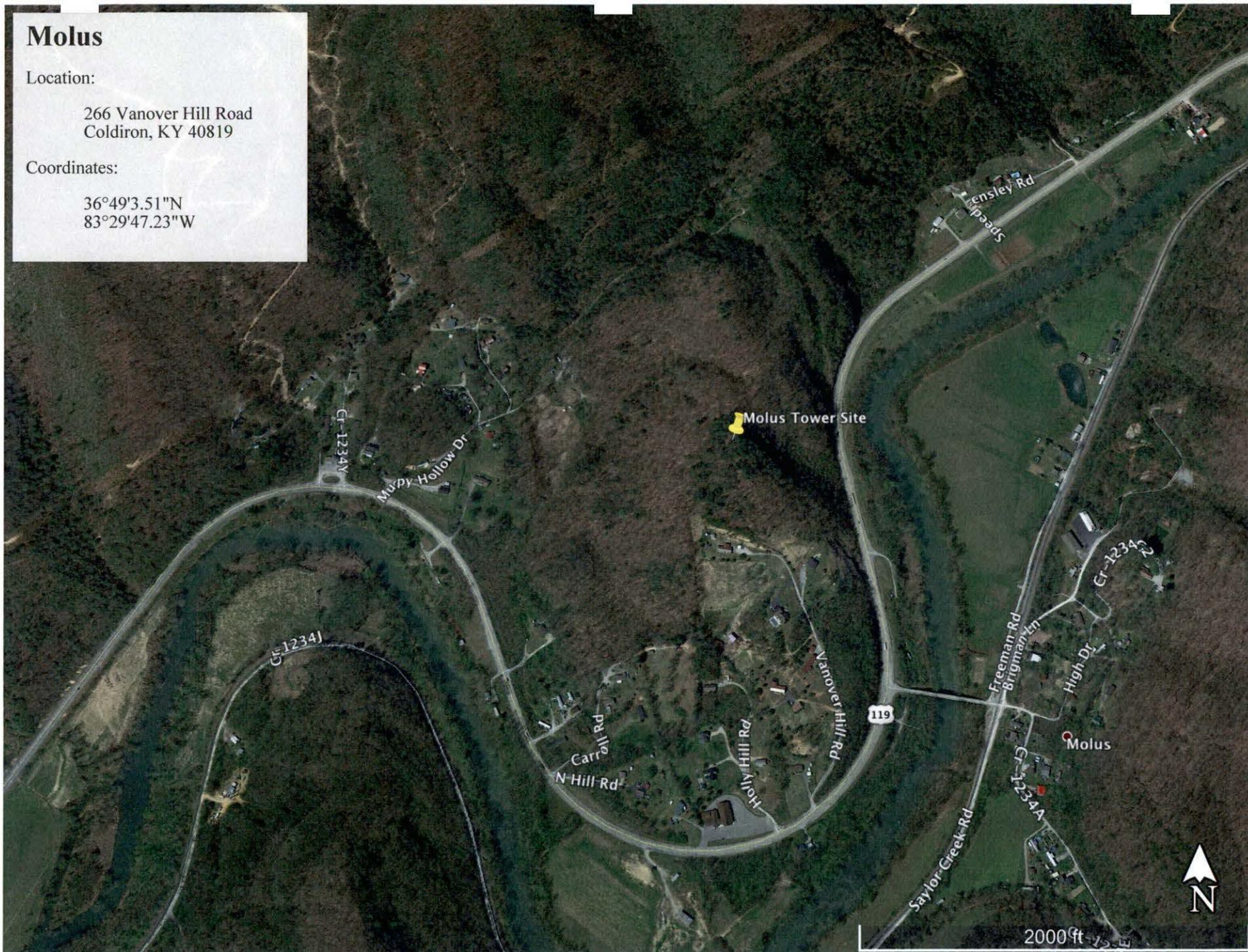
Molus

Location:

266 Vanover Hill Road
Coldiron, KY 40819

Coordinates:

36°49'3.51"N
83°29'47.23"W



dba Appalachian Wireless
101 Technology Trail
Ivel, KY 41642
Phone: 606-477-2355
Fax: 606-791-2225

EAST KENTUCKY
NETWORK



To: The Harlan Daily Enterprise
Attn: Classifieds

From: Raina Helton
Regulatory Compliance Assistant

Email: Melissa.johnson@harlandaily.com

Date: July 24, 2018

Re: PUBLIC NOTICE ADVERTISEMENT

Pages: 1

Please place the following Public Notice Advertisement in The Harlan Daily Enterprise to be ran on July 27, 2018.

PUBLIC NOTICE:

RE: Public Service Commission of Kentucky (CASE NO. 2018-00155)

Public Notice is hereby given that East Kentucky Network, LLC, dba Appalachian Wireless has applied to the Kentucky Public Service Commission to construct a cellular telecommunications tower on a tract of land located at 266 Vanover Hill Road, Coldiron, Harlan County, Kentucky. The proposed tower will be a 180 foot self-supporting tower with attached antennas. If you would like to respond to this notice, please contact the Executive Director, Public Service Commission, 211 Sower Boulevard, PO Box 615, Frankfort, Kentucky 40602. Please refer to Case No. 2018-00155.

If you have any questions about the placement of the above mentioned notice, please call me at 606-477-2375, ext. 1005.

Thank you,

Raina Helton
Regulatory Compliance Assistant

The message above and the information contained in the documents transmitted are confidential and intended only for the person(s) named above. Dissemination, distribution or copying of this communication by anyone other than the person(s) named above is prohibited. If you have received this communication in error, please notify us immediately by telephone and return the original message to us at the address listed above via regular mail. Thank you.

VIA: U.S. CERTIFIED MAIL

July 27, 2018

Dan Mosley, Judge Executive
P.O. Box 956
Harlan, KY 40831

RE: Public Notice-Public Service Commission of Kentucky (Case No. 2018-00155)

East Kentucky Network, LLC d/b/a Appalachian Wireless has applied to the Public Service Commission of Kentucky for a Certificate of Public Convenience and Necessity to construct and operate a new facility to provide cellular telecommunications service in Harlan County. The facility will include a 180-foot self-supporting tower with attached antennas extending upwards, and an equipment shelter located on a tract of land at 266 Vanover Hill Road, Coldiron, Harlan County, Kentucky. A map showing the location of the proposed new facility is enclosed. This notice is being sent to you because you are the County Judge Executive of Harlan County.

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Sincerely,



Lynn Haney
Regulatory Compliance Director
Enclosure

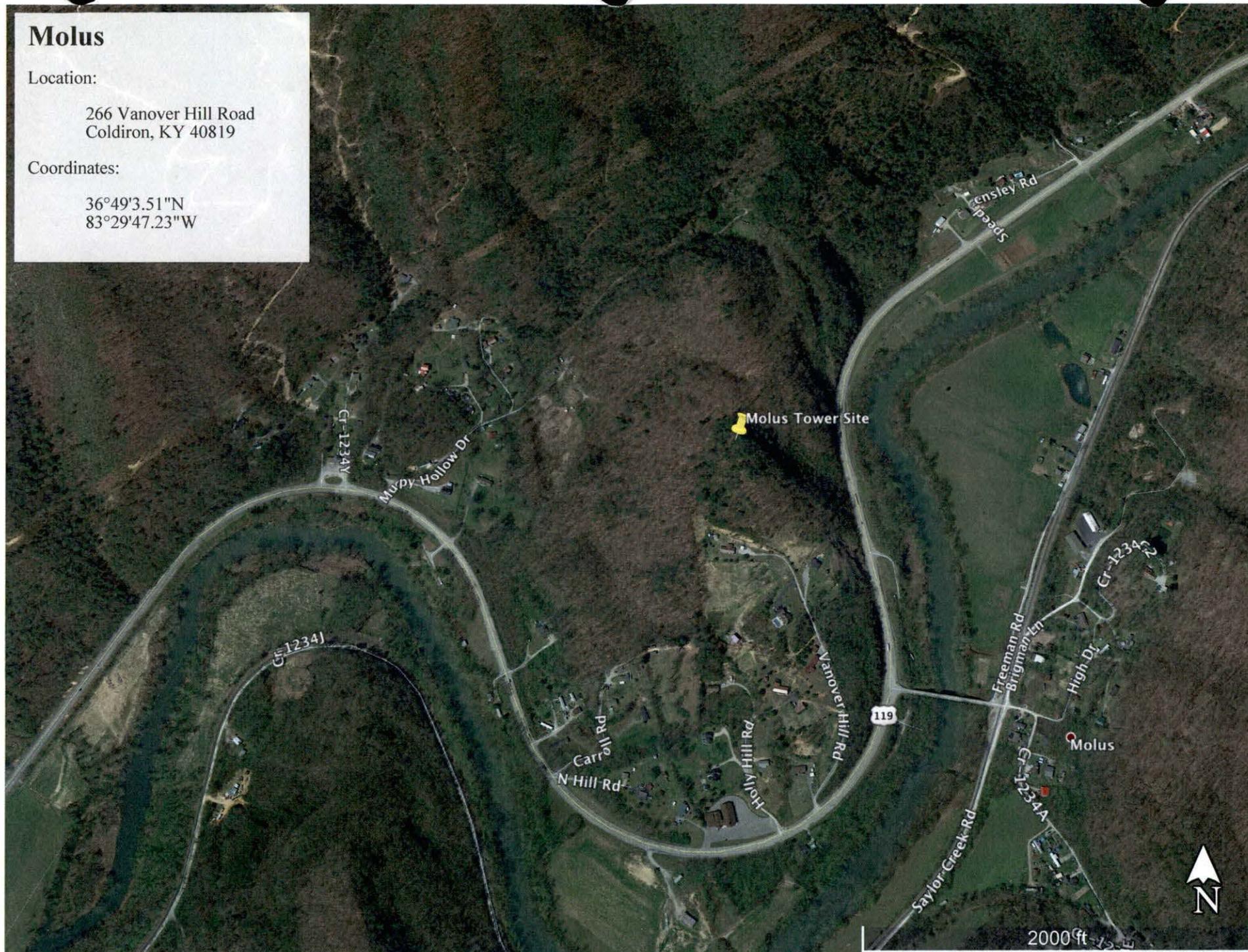
Molus

Location:

266 Vanover Hill Road
Coldiron, KY 40819

Coordinates:

36°49'3.51"N
83°29'47.23"W





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

EAST KENTUCKY ENGINEERING, LLC.

**APPALACHIAN WIRELESS
Geotechnical Investigation on the
Molus Site
Harlan County, Kentucky
EKYENG Project No. 165-000-0063**

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, April 12th, 2018



EAST KENTUCKY ENGINEERING, LLC.

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

4.0 FIELD EXPLORATION

4.1 SITE INFORMATION

4.2 TRENCHING AND TEST HOLE DATA

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 DRILLED PIERS FOUNDATION

5.5 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 – DRILLED PIER INSTALLATION

IV – GENERAL CONCRETE SPECIFICATIONS

APPENDIX A – SEISMIC DATA

APPENDIX B – PHOTOGRAPHS

APPENDIX C – MAPS



EXECUTIVE SUMMARY

A geotechnical investigation has been performed on the Molus tower site, located in Harlan 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 S&S Tower Contracting. The following geotechnical considerations were identified:

- Trenching utilized for this study encountered sandstone.
- The provided base elevation of tower mat foundation is 1414 ft.
- This site is on an undisturbed forest area.
- **The allowable bearing capacities of the underlying rock estimated at 6 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.
- No underground or surface mining was found during our research that would impact this tower site.
- 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.



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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 Molus Property, in Harlan County, Kentucky. A site location map is shown in Figure No. 1.

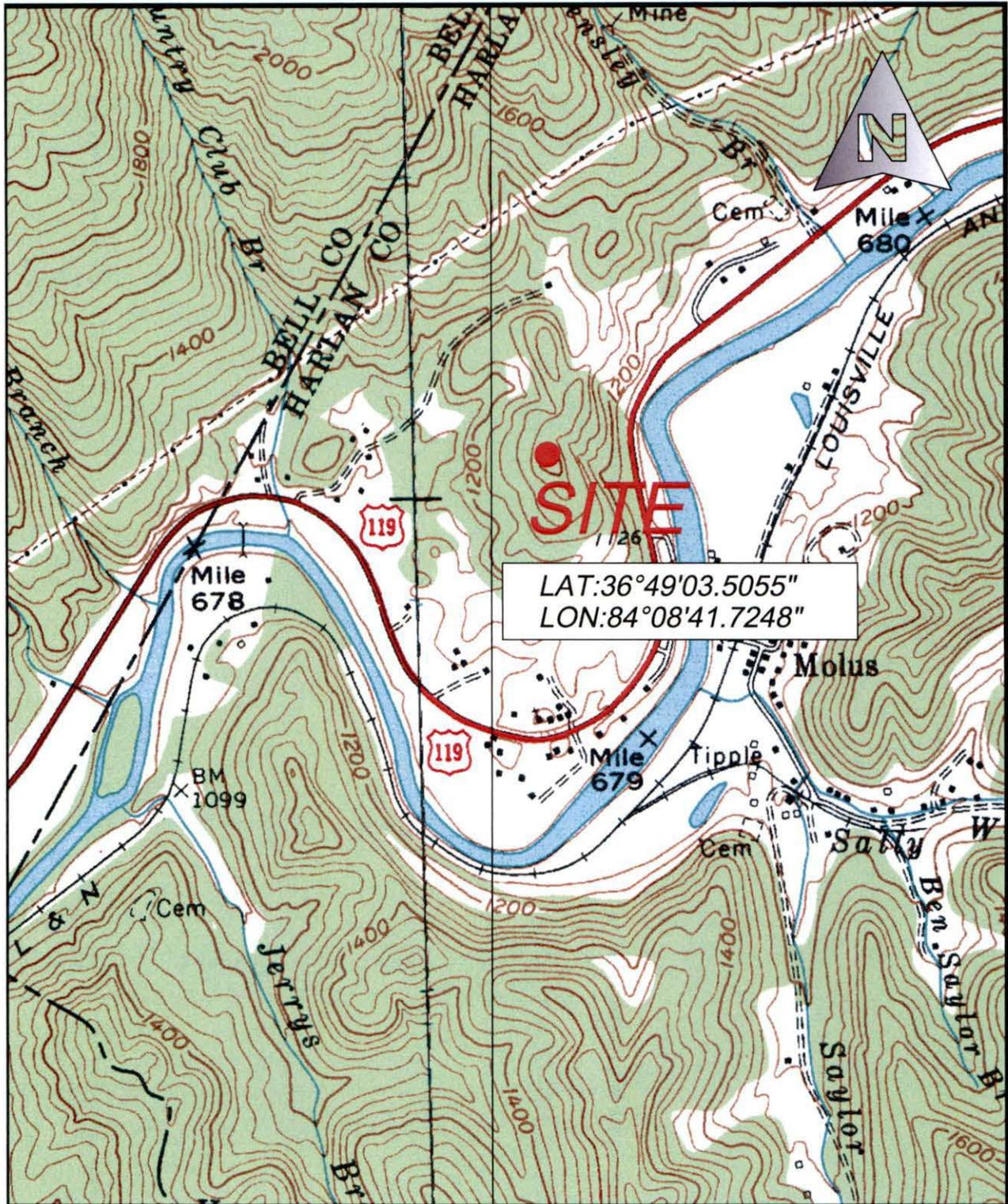
Trenching was conducted with the assistance from S&S Tower Contracting. The purpose of these services is to provide information and geotechnical engineering recommendations about subsurface conditions, earthwork, seismic considerations, groundwater conditions and foundation design.

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 will be approximately 43.5 x 43.5. with an estimated base of the tower footer elevation at 1414 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.



LAT: 36°49'03.5055"
 LON: 84°08'41.7248"

Drawn: RDS Date: 04/22/18
 Job: 165-063 Scale: 1"=1000'

Appalachian Wireless
 USGS Quadrangle
 Location Map
 Molus Tower Site
 Figure No. 1

East Kentucky Engineering, LLC.
 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 forested point. EKYENG reviewed available historical mine maps from the Kentucky Division of Mine Safety, Kentucky Mine Mapping Information System ("KMMIS"). Based on available data, no historical mining has occurred at or near this site.

3.2 SURFACE MINING

This site is on an undisturbed forest area. No other nearby surface mining activities were found on our site investigation and during our research that would impact this site.

3.3 UNDERGROUND MINING

Our research found no underground mining that would impact this site. All underground mining activities found during our research are outside the area of influence for subsidence to be a concern.

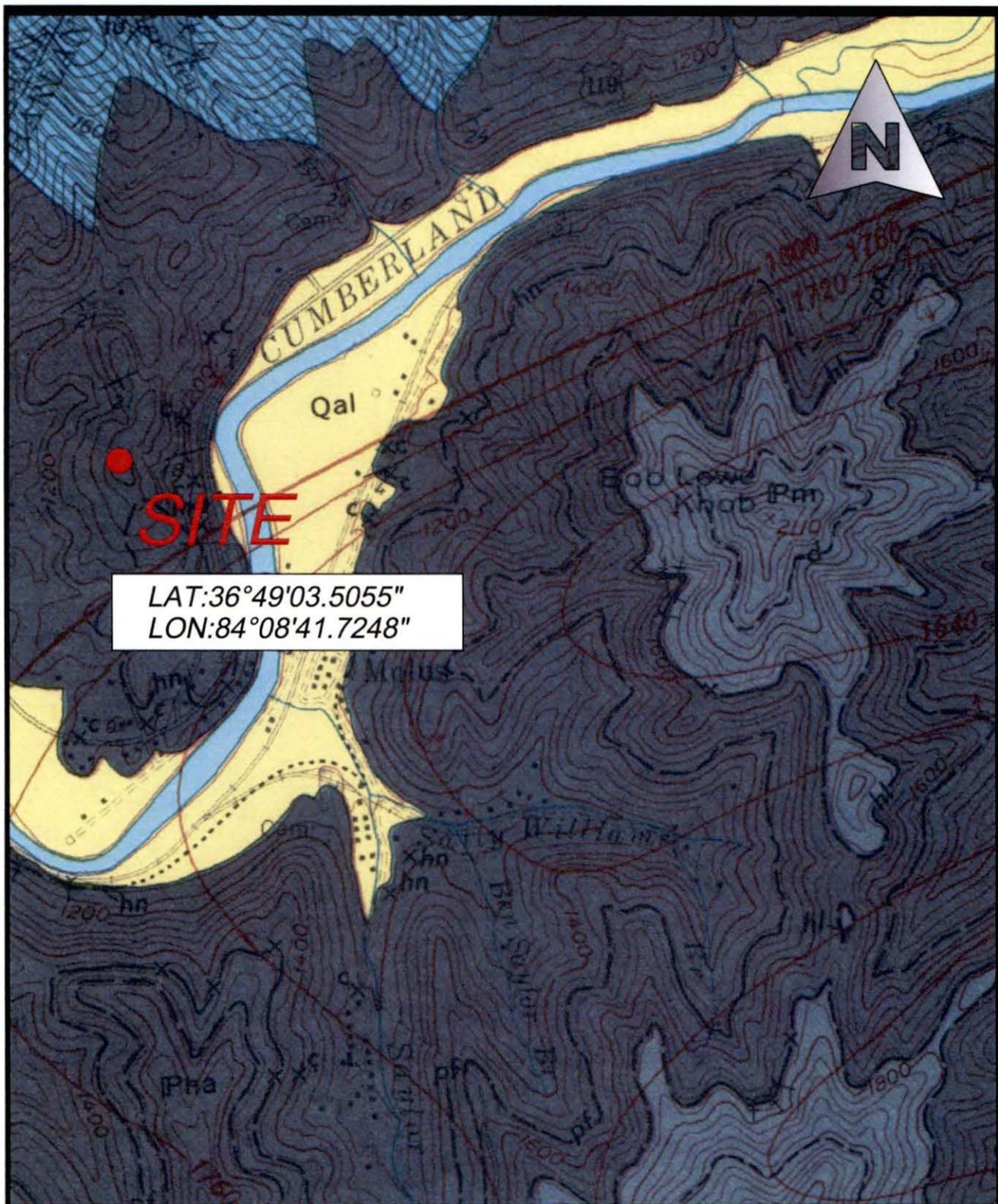
4.0 FIELD EXPLORATION

4.1 SITE INFORMATION

A boundary survey was conducted on the Molus 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 & TEST HOLE DATA

This investigation was conducted with trenching with an excavator. The combinations of trenching and visual inspections were used to evaluate the site



LAT:36°49'03.5055"
 LON:84°08'41.7248"

Drawn: RDS	Date: 04/22/18
Job: 165-063	Scale: 1"=1000'

Appalachian Wireless
 Geologic Quadrangle
 Location Map
 Molus Tower Site
 Figure No. 2

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



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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 - 4.0	1420.0	Top Soils / Clays
4.0 - 40.0	1380.0	Sandstone

A cross section of this information is in Appendix D 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.

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, a S_{DS} coefficient of 0.188 g was calculated, and a S_{D1} coefficient of 0.069 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.



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5.2 FOUNDATIONS

It is our understanding that the foundations for these structures can be designed to bear on low bearing pressure soils. This report demonstrates the different expected bearing capacities based upon the type of material encountered from the trenching test holes and visible observations at the site. The approximate elevation of the surface of the site is 1425 ft. with an expected base of the footer at 1414 ft. in elevation.

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 shale to be less than 6 tsf**, at an estimated elevation of 1414 ft.

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. 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 (k30) of 100 lbs./cu. in. can be used for 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



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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 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 DRILLED PIER FOUNDATION

We have found that drilled piers can be used in lieu of mat foundation in areas that are restricted in space. Based upon the available data and experience we recommend the following design parameters.

TABLE NO. 3

Approx. Depth (ft.)	Allowable Skin Friction (psf.)	Allowable End Bearing Pressure (psf.)	Effective Unit Weight (pcf.)	Cohesion	Internal Angle of Friction (Degrees)
0 - 4.0 Top-soils	Ignore	Ignore	Ignore	-----	Ignore
4.0 - 40 Sandstone	2,200*	16,000*	150*	-----	30*



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According to the information provided, a minimum of the first 5 ft. of rock and soils are expected to be removed during site construction. The values noted with (*) are presented if the proposed pad elevation is changed during the design process. We recommend placing the end bearing area of the drilled pier in the sandstone unit at the interval of 10 ft. to 25 ft. The skin friction and passive resistance have a factor of safety of 2. The allowable end bearing pressure has an approximate safety factor of 3. If the drilled piers are designed using the above design parameters, settlements are not anticipated to exceed ¼ inch.

5.5 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



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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.

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 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



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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.

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 Molus Property located in Harlan 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.



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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.

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.

- 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 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.



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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.

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
 - 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.



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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 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



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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.

- 14.** Workers must not be exposed to fall hazards associated with excavations. Protective walkways or bridges with standard guard rails must be provided.
- 15.** 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 - DRILLED PIER INSTALLATION

1.0 DRILLING PROCEDURE

- 1.1 Drilled piers will be installed with large caisson drill rigs capable of torque and crowd forces sufficient to install drilled piers at the project site given the in-situ soil conditions.
- 1.2 The drill rig kelly bar and auger will be carefully and accurately placed over the centerline of the drilled pier. The Contractor is responsible for providing necessary surveying to verify drilled pier location before, during, and after the drilled pier installation.
- 1.3 The augers are advanced downwards as they are rotated such that drilling of the soil mass is efficiently accomplished. Depending on the subsurface conditions, and the requirements for the given project, a temporary steel casing should be installed at this time to preclude caving of the soil and/or broken rock mass being penetrated.

2.0 CASING INSTALLATION

- 2.1 The casing will be checked for centerline accuracy and plumbness by the Contractor's survey crew. During casing installation, the Contractor's survey crew will verify alignment with instruments. If plumbness and alignment are not within tolerance as determined by the Contractor's survey crew, the casing will be extracted and re-aligned as necessary.
- 2.2 The drill rig will remove soil and bedrock material from within the casing to the drilled pier design tip elevation. A steel casing or "Sonotube" shall be inserted into the borehole to preclude cave-ins and/or instability in the borehole.



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- 2.3** The bearing surface within the drilled pier will be inspected by a registered Professional Engineer before being approved for structural concreting.

3.0 INSTALLATION OF THE REBAR CAGE

- 3.1** An epoxy coated spiral reinforcing steel cage will be installed while in the drilled pier borehole.
- 3.2** To assist in assuring that the reinforcing steel cage does not settle during concrete pumping, a mat of reinforcing steel bars will be installed across the bottom of the reinforcing steel cage perpendicular to the vertical axis of the cage. The exact number of bars will be determined and installed by the Structural Engineer. The number of rebar boots used on the bottom of the cage will also be determined by the Structural Engineer.
- 3.3** The reinforcing steel cage will be lowered into the drilled pier borehole, while drilled pier spacers are placed at intervals as required by the Structural Engineer. The reinforcing steel cage will be checked for alignment by the Contractors survey crew.
- 3.4** The crane will remain attached to the reinforcing steel cage while the concrete pump outlet pipe is lowered to just above the bottom of the drilled pier. The concrete pump pipe sections will be welded together to assure that do not separate during pumping.

4.0 CONCRETING OF THE DRILLED PIER

- 4.1** Concrete pumping may commence once the bearing surface has been approved in accordance with Clause 2.3



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- 4.2** A three-inch trash pump will be used to pump slurry and/or water from within the casing and from above the newly pumped concrete.
- 4.3** The concrete pump outlet pipe will maintain at least ten (10) feet of embedment into the fresh concrete. The concrete level in the casing will be monitored.
- 4.4** The casing will be completely extracted with the crane and/or vibratory hammer. Caisson clamps on the vibratory hammer (if applicable) will be adjusted to the proper dimension to withdrawal the casing.
- 4.5** The concrete will be terminated at the top of drilled pier elevation and screeded flat.
- 4.6** The upper reinforcing steel dowel cage will be lowered into the concrete to the embedment elevation. If necessary, the concrete will be vibrated to assist in placement. Alignment will be verified by the Contractors survey crew and the cage will be sufficiently braced.



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V - 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.

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.



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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.
- D. Metal Reinforcement: Rebar shall be Grade 60 and with deformations conforming to ASTM 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.
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 form work.
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



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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 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.



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- 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.
- 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 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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APPENDIX A SEISMIC DATA

USGS Design Maps Summary Report

User-Specified Input

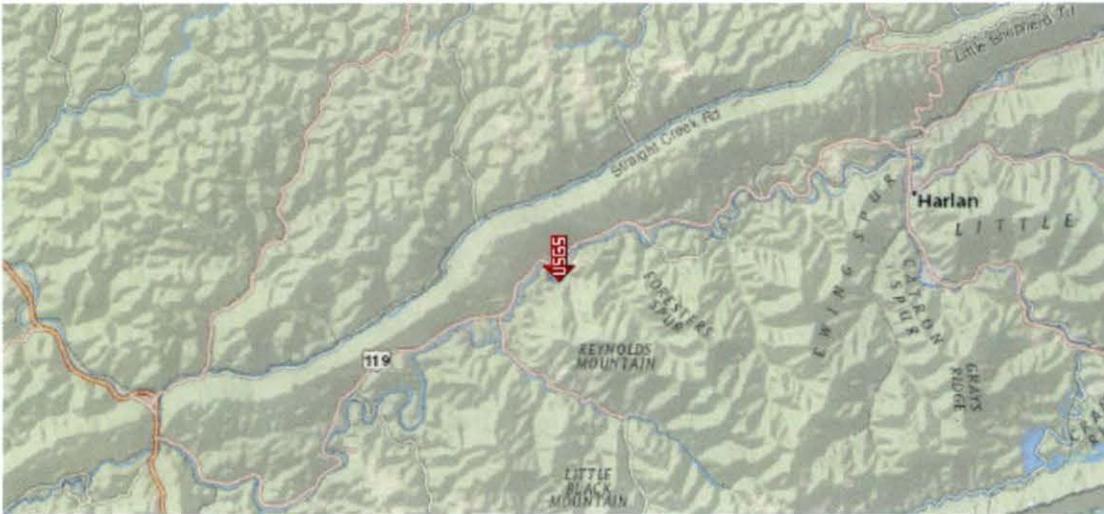
Report Title Molus Tower Site
Wed April 25, 2018 16:48:33 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 36.81764°N, 83.49645°W

Site Soil Classification Site Class B - "Rock"

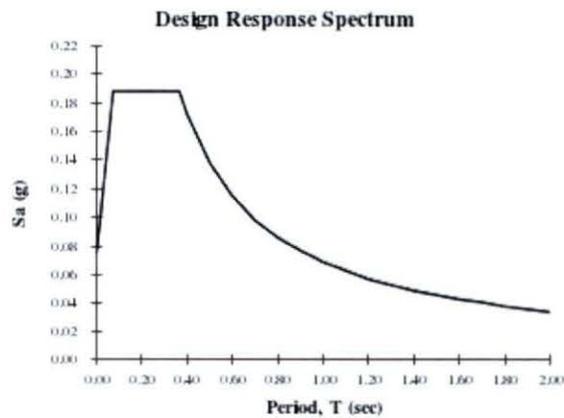
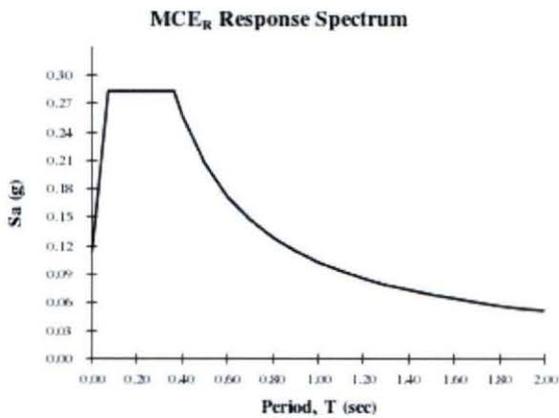
Risk Category IV (e.g. essential facilities)



USGS-Provided Output

$S_S = 0.283 \text{ g}$	$S_{MS} = 0.283 \text{ g}$	$S_{DS} = 0.188 \text{ g}$
$S_1 = 0.103 \text{ g}$	$S_{M1} = 0.103 \text{ g}$	$S_{D1} = 0.069 \text{ g}$

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.



EAST KENTUCKY ENGINEERING, LLC.

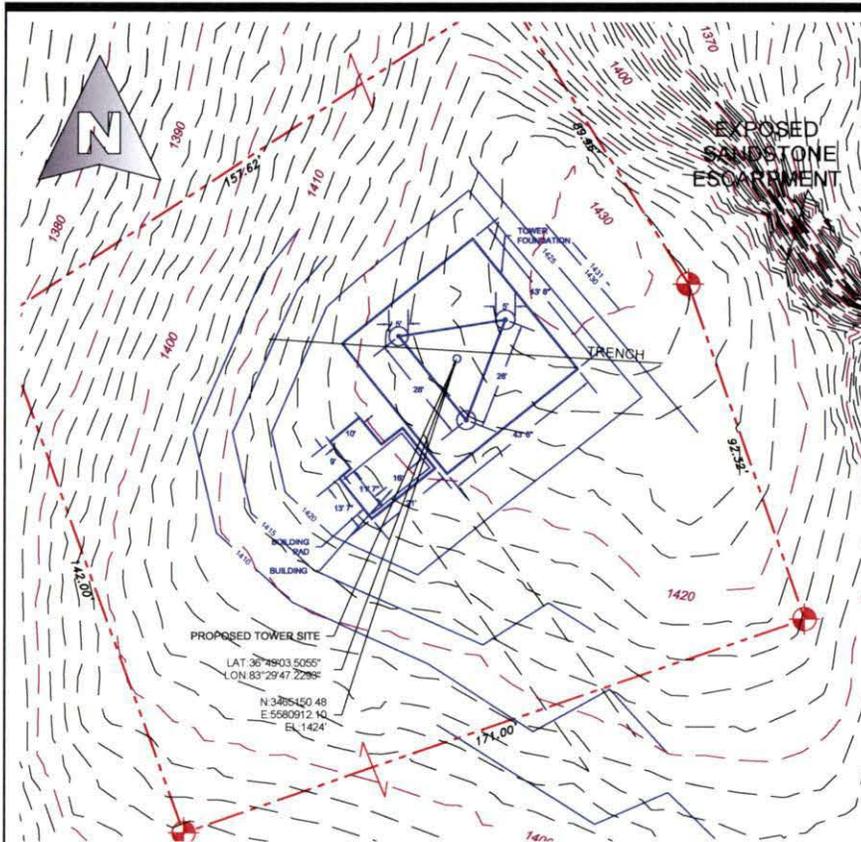
APPENDIX B PHOTOGRAPHS



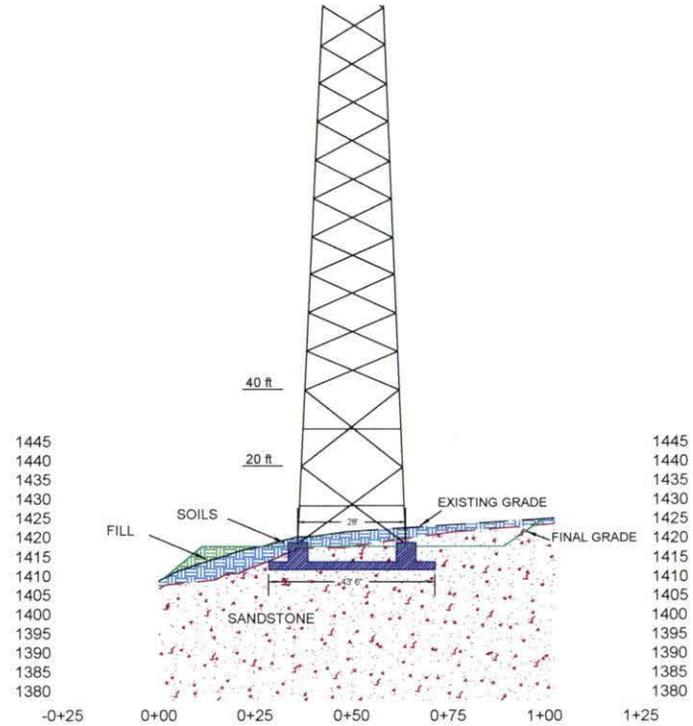


EAST KENTUCKY ENGINEERING, LLC.

APPENDIX C MAPS



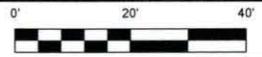
PLAN VIEW
 1" = 20'



SECTION
 1" = 20'

East Kentucky Engineering, LLC

Hazard Location
 230 Swartz
 Hazard, KY 41701
 (806) 551-1050
 Email: rdsekyeng@outlook.com



Drawn by: RDS	Date: 4/10/2018
Job #: 165-0061	Scale: NOTED
File Location:	

**APPALACHIAN
 WIRELESS
 MOLUS TOWER SITE
 HARLAN COUNTY KENTUCKY**



1 Fairholm Avenue
Peoria, IL 61603 USA
Phone 309-566-3000
FAX 309-566-3079

July 20, 2018

Appalachian Wireless
Attn: Marty Thacker
101 Technology Trail
Lvel, KY. 41642

Reference: Molus, Harlan County, KY.
180' RT Tower

File Number: 226626

Enclosed, please find the following for your use:

<u>Copies</u>	<u>Drawing Number</u>	<u>Description</u>
1	226626-01-D1	Design Drawing Sealed for the State of Kentucky
1	226626-01-F1	Foundation
1	226626-01-F2	Foundation

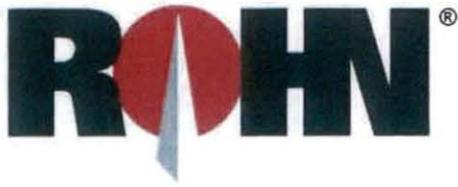
Contact Phone Number: 606 634 9505

Email Only: m.thacker@tgtel.com

Sincerely,

Danny Otten
JD Long

crp



1 Fairholm Avenue
Peoria, IL 61603 USA
Phone: (309)-566-3000
Fax: (309)-566-3079

DATE: JULY 20, 2018

PURCHASER: APPALACHIAN WIRELESS

PROJECT: 180 FT RT SELF SUPPORT TOWER
MOLUS, KENTUCKY

FILE NUMBER: 226626

DRAWINGS: 226626-01-D1 , 226626-01-F1, 226626-01-F2

I CERTIFY THAT THE REFERENCED DRAWINGS WERE PREPARED UNDER MY SUPERVISION IN ACCORDANCE WITH THE DESIGN AND LOADING CRITERIA SPECIFIED BY THE PURCHASER AND THAT I AM A REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF KENTUCKY.

CERTIFIED BY: _____

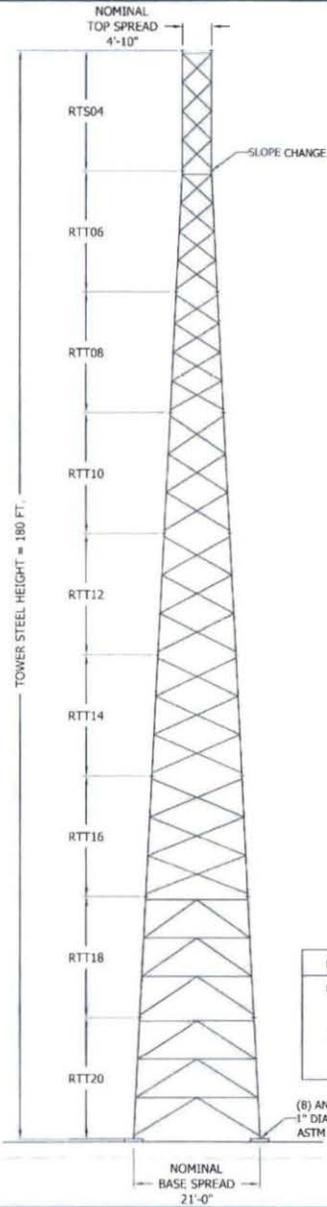
A handwritten signature in blue ink, appearing to be "HWA", written over a horizontal line.

DATE: _____

A handwritten date "7/20/18" in blue ink, written over a horizontal line.



Products for a Growing World of Technology®



TOWER DESIGN LOADING		
DESIGN WIND LOAD PER ANSI/TIA-222-G: ASCE 7-16 WIND SPEED (NO ICE) = 105 MPH BASIC WIND SPEED (ICE) = 30 MPH DESIGN ICE THICKNESS = 0.5 IN. STRUCTURE CLASS = II EXPOSURE CATEGORY = C TOPOGRAPHIC CATEGORY = 1 EARTHQUAKE SPECTRAL RESPONSE ACCELERATION: SS = 0.371		
THIS TOWER IS DESIGNED TO SUPPORT THE FOLLOWING LOADS:		
ELEVATION (FT)	ANTENNA TYPE	LINE SIZE (NOM)
TOP	BEACON & LIGHTNING ROD	(1) 3/4" CONDUIT
175	(12) NN-65A-M & (12) RRUS-12 ON (3) SECTOR FRAMES	(4) 7/8" HYBRID, (6) 1-5/8"
165	(12) NN-65A-M & (12) RRUS-12 ON (3) SECTOR FRAMES	(4) 7/8" HYBRID, (6) 1-5/8"
155	(12) NN-65A-M & (12) RRUS-12 ON (3) SECTOR FRAMES	(6) 1-5/8"
145	(2) 8 FT HP DISHES [AZ. 0 & 180 DEG] [6 GHZ]	(2) EW63
135	(12) NN-65A-M & (12) RRUS-12 ON (3) SECTOR FRAMES	(6) 1-5/8"
125	(12) NN-65A-M & (12) RRUS-12 ON (3) SECTOR FRAMES	(6) 1-5/8"
105	(12) NN-65A-M & (12) RRUS-12 ON (3) SECTOR FRAMES	(6) 1-5/8"

MAXIMUM FACTORED REACTIONS	
COMPRESSION	= 341.2 KIPS
TENSION	= 292.7 KIPS
TOTAL SHEAR	= 52.4 KIPS
O.T.M.	= 5,845.5 FT-KIPS

GENERAL NOTES

- ROHN PRODUCTS, LLC TOWER DESIGNS CONFORM TO ANSI/TIA-222-G UNLESS OTHERWISE SPECIFIED UNDER TOWER DESIGN LOADING.
- THE DESIGN LOADING CRITERIA INDICATED HAS BEEN PROVIDED TO ROHN. THE DESIGN LOADING CRITERIA HAS BEEN ASSUMED TO BE BASED ON SITE-SPECIFIC DATA IN ACCORDANCE WITH ANSI/TIA-222-G AND MUST BE VERIFIED BY OTHERS PRIOR TO INSTALLATION.
- ANTENNAS AND LINES LISTED IN TOWER DESIGN LOADING TABLE ARE PROVIDED BY OTHERS UNLESS OTHERWISE SPECIFIED.
- STEP BOLTS ARE PROVIDED AS A CLIMBING FACILITY FOR THE INSTALLATION OF THE STRUCTURE.
- TOWER MEMBER DESIGN DOES NOT INCLUDE STRESSES DUE TO ERECTION SINCE ERECTION EQUIPMENT AND CONDITIONS ARE UNKNOWN. DESIGN ASSUMES COMPETENT AND QUALIFIED PERSONNEL WILL ERECT THE TOWER.
- WORK SHALL BE IN ACCORDANCE WITH ANSI/TIA-222-G, "STRUCTURAL STANDARDS FOR STEEL ANTENNA TOWERS AND ANTENNA SUPPORTING STRUCTURES".
- THE MINIMUM YIELD STRENGTH OF STRUCTURAL STEEL MEMBERS SHALL BE 50 KSI.
- FIELD CONNECTIONS SHALL BE BOLTED. NO FIELD WELDS SHALL BE ALLOWED.
- STRUCTURAL BOLTS SHALL CONFORM TO GRADE A325 PER ASTM F3125, EXCEPT WHERE NOTED.
- PAL NUTS ARE PROVIDED FOR ALL TOWER BOLTS.
- STRUCTURAL STEEL AND CONNECTION BOLTS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ANSI/TIA-222-G.
- ALL HIGH STRENGTH BOLTS ARE TO BE TIGHTENED TO A "SNIUG TIGHT" CONDITION AS DEFINED IN THE RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING HIGH-STRENGTH BOLTS". NO OTHER MINIMUM BOLT TENSION OR TORQUE VALUES ARE REQUIRED.
- PURCHASER SHALL VERIFY THE INSTALLATION IS IN CONFORMANCE WITH LOCAL, STATE, AND FEDERAL REQUIREMENTS FOR OBSTRUCTION MARKING AND LIGHTING.
- TOLERANCE ON TOWER STEEL HEIGHT IS EQUAL TO PLUS 1% OR MINUS 1/2%.
- DESIGN ASSUMES THAT, AS A MINIMUM, MAINTENANCE AND INSPECTION WILL BE PERFORMED OVER THE LIFE OF THE STRUCTURE IN ACCORDANCE WITH ANSI/TIA-222-G.
- DESIGN ASSUMES LEVEL GRADE AT TOWER SITE.
- DESIGN ASSUMES ALL ANTENNAS ARE MOUNTED SYMMETRICALLY TO MINIMIZE TORQUE, IF APPLICABLE.
- FOUNDATIONS SHALL BE DESIGNED TO SUPPORT THE REACTIONS SHOWN FOR THE CONDITIONS EXISTING AT THE SITE.

SECTION MAIN MEMBER SCHEDULE			
SECTION	LEG	DIAGONAL	HORIZONTALS
RTS04	PIPE 2.875x0.203	L1 3/4x1 3/4x1/8 (4)	L1 1/2x1 1/2x3/16 (1)
RTT06	PIPE 3.500x0.216	L1 3/4x1 3/4x3/16 (4)	L1 1/2x1 1/2x3/16 (1)
RTT08	PIPE 4x0.318	L2 1/2x2 1/2x3/16 (4)	N/A
RTT10	PIPE 4.500x0.337	L2 1/2x2 1/2x3/16 (3)	N/A
RTT12	PIPE 5.563x0.375	L3x3x3/16 (3)	N/A
RTT14	PIPE 6.625x0.340	L3x3x3/16 (3)	N/A
RTT16	PIPE 6.625x0.340	L3x3x1/4 (3)	N/A
RTT18	PIPE 6.625x0.432	L3x3x1/4 (3)	L3x3x3/16 (3)
RTT20	PIPE 6.625x0.432	L3 1/2x3 1/2x1/4 (3)	L3x3x3/16 (3)

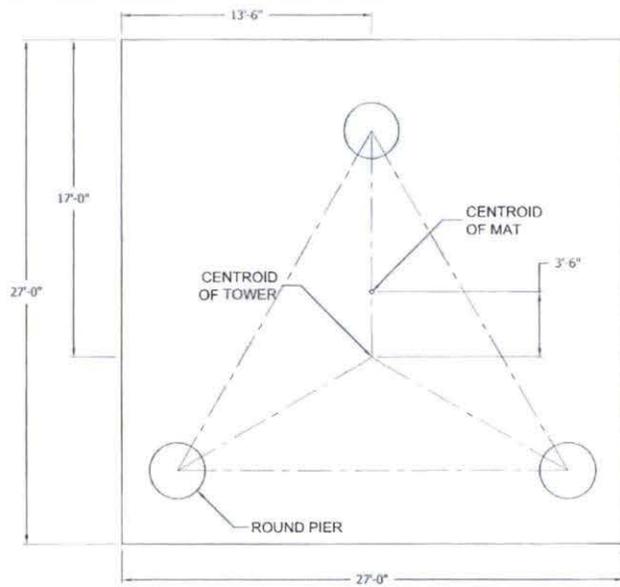
NOTE: SECTION NUMBERS ARE FOR REFERENCE ONLY. FOR NOMINAL FACE WIDTH DIMENSIONS, REFER TO THE STRESS ANALYSIS.
THE NUMBERS SHOWN IN PARENTHESES INDICATE THE NUMBER OF BAYS FROM TOP TO BOTTOM.

FILE NO.		226626		
REVISIONS				
REV	DESCRIPTION	DWN	CHK	APP
 PO BOX 5999 PEORIA, IL 61601-5999 TOLL FREE 800-727-ROHN				
THIS DRAWING IS THE PROPERTY OF ROHN. IT IS NOT TO BE REPRODUCED, COPIED OR TRACED IN WHOLE OR IN PART WITHOUT OUR WRITTEN CONSENT.				
APPALACHIAN WIRELESS DESIGN PROFILE 180 FT RT TOWER MOLUS, KY				
DWN:	AS	CHKD:	AA	DATE:
ENGR:	AS	SHEET #:	1 OF 1	7/20/2018
PRJ. ENGR:	AS	PRJ. MGR.:		
DRAWING NO:	226626-01-D1			REV:
				0

GENERAL NOTES

- FOUNDATION DESIGN HAS BEEN DEVELOPED IN ACCORDANCE WITH GENERALLY ACCEPTED PROFESSIONAL ENGINEERING PRINCIPLES AND PRACTICES WITHIN THE LIMITS OF THE SUBSURFACE DATA PROVIDED. FOUNDATION DESIGN MODIFICATIONS MAY BE REQUIRED IN THE EVENT THE FOLLOWING DESIGN PARAMETERS ARE NOT APPLICABLE FOR THE SUBSURFACE CONDITIONS ENCOUNTERED.
 - ULTIMATE SOIL BEARING PRESSURE AT 6 FT DEPTH = 24,000 PSF.
 - ALLOWABLE SOIL BEARING PRESSURE AT 6 FT DEPTH = 12,000 PSF.
 - GROUND WATER TABLE IS AT OR BELOW FOUNDATION DEPTH.
 - MAXIMUM FROST PENETRATION DEPTH LESS THAN FOUNDATION DEPTH.
- WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES, SAFETY REGULATIONS AND UNLESS OTHERWISE NOTED, THE LATEST REVISION OF ACI 318, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE". PROCEDURES FOR THE PROTECTION OF EXCAVATIONS, EXISTING CONSTRUCTION AND UTILITIES SHALL BE ESTABLISHED PRIOR TO FOUNDATION INSTALLATION.
- CONCRETE MATERIALS SHALL CONFORM TO THE APPROPRIATE STATE REQUIREMENTS FOR EXPOSED STRUCTURAL CONCRETE.
- PROPORTIONS OF CONCRETE MATERIALS SHALL BE SUITABLE FOR THE INSTALLATION METHOD UTILIZED AND SHALL RESULT IN DURABLE CONCRETE FOR RESISTANCE TO LOCAL ANTICIPATED AGGRESSIVE ACTIONS. THE DURABILITY REQUIREMENTS OF ACI 318 CHAPTER 4 SHALL BE SATISFIED BASED ON THE CONDITIONS EXPECTED AT THE SITE. AS A MINIMUM, CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4,500 PSI IN 28 DAYS.
- MAXIMUM SIZE OF AGGREGATE SHALL NOT EXCEED SIZE SUITABLE FOR INSTALLATION METHOD UTILIZED OR 1/3 CLEAR DISTANCE BEHIND OR BETWEEN REINFORCING. MAXIMUM SIZE MAY BE INCREASED TO 2/3 CLEAR DISTANCE PROVIDED WORKABILITY AND METHODS OF CONSOLIDATION SUCH AS VIBRATING WILL PREVENT HONEYCOMBS OR VOIDS.
- REINFORCEMENT SHALL BE DEFORMED AND CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60 UNLESS OTHERWISE NOTED. SPLICES IN REINFORCEMENT SHALL NOT BE ALLOWED UNLESS OTHERWISE INDICATED.
- WELDING IS PROHIBITED ON REINFORCING STEEL AND EMBEDMENTS.
- MINIMUM CONCRETE COVER FOR REINFORCEMENT SHALL BE 3 INCHES (76 MM) UNLESS OTHERWISE NOTED. APPROVED SPACERS SHALL BE USED TO INSURE A 3 INCH (76 MM) MINIMUM COVER ON REINFORCEMENT.
- CONCRETE COVER FROM TOP OF FOUNDATION TO ENDS OF VERTICAL REINFORCEMENT SHALL NOT EXCEED 3 INCHES (76MM) NOR BE LESS THAN 2 INCHES (51MM).
- FOUNDATION DESIGN ASSUMES STRUCTURAL BACKFILL TO BE COMPACTED IN 8 INCH (200 MM) MAXIMUM LAYERS TO 95% OF MAXIMUM DRY DENSITY AT OPTIMUM MOISTURE CONTENT IN ACCORDANCE WITH ASTM D698. ADDITIONALLY, STRUCTURAL BACKFILL MUST HAVE A MINIMUM COMPACTED UNIT WEIGHT OF 110 POUNDS PER CUBIC FOOT (17 KN/M3)
- FOUNDATION DESIGN HAS BEEN BASED ON GEOTECHNICAL REPORT NO. 165-000-0063 DATED 4/12/2018 BY EAST KENTUCKY ENGINEERING, LLC.
- FOUNDATION DEPTH INDICATED IS BASED ON THE GRADE LINE DESCRIBED IN THE REFERENCED GEOTECHNICAL REPORT. FOUNDATION MODIFICATION MAY BE REQUIRED IN THE EVENT CUT OR FILL OPERATIONS HAVE TAKEN PLACE SUBSEQUENT TO THE GEOTECHNICAL INVESTIGATION.
- FOUNDATION DESIGN ASSUMES LEVEL GRADE AT STRUCTURE SITE.
- FOUNDATION DESIGN ASSUMES THE RECOMMENDATIONS IN THE REFERENCED GEOTECHNICAL REPORT CONCERNING VERIFICATION OF SUBSURFACE CONDITIONS ARE IMPLEMENTED PRIOR TO PLACEMENT OF CONCRETE.
- FOUNDATION INSTALLATION SHALL BE SUPERVISED BY PERSONNEL KNOWLEDGEABLE AND EXPERIENCED WITH THE PROPOSED FOUNDATION TYPE. CONSTRUCTION SHALL BE IN ACCORDANCE WITH GENERALLY ACCEPTED INSTALLATION PRACTICES.
- FOUNDATION DESIGN ASSUMES INSTALLATION PROCEDURES WILL INCORPORATE THE PROCEDURES RECOMMENDED IN THE REFERENCED GEOTECHNICAL REPORT.
- FOUNDATION DESIGN ASSUMES FIELD INSPECTIONS WILL BE PERFORMED TO VERIFY THAT CONSTRUCTION MATERIALS, INSTALLATION METHODS AND ASSUMED DESIGN PARAMETERS ARE ACCEPTABLE BASED ON CONDITIONS EXISTING AT THE SITE.
- FOR FOUNDATION AND ANCHOR TOLERANCES SEE DRAWING A810214.
- LOOSE MATERIAL SHALL BE REMOVED FROM BOTTOM OF EXCAVATION PRIOR TO CONCRETE PLACEMENT. SIDES OF EXCAVATION SHALL BE ROUGH AND FREE OF LOOSE CUTTINGS.
- CONCRETE SHALL BE PLACED IN A MANNER THAT WILL PREVENT SEGREGATION OF CONCRETE MATERIALS, INFILTRATION OF WATER OR SOIL AND OTHER OCCURRENCES WHICH MAY DECREASE THE STRENGTH OR DURABILITY OF THE FOUNDATION.
- CONCRETE PREFERABLY SHALL BE PLACED AGAINST UNDISTURBED SOIL. WHEN FORMS ARE NECESSARY, THEY SHALL BE REMOVED PRIOR TO PLACING STRUCTURAL BACKFILL.
- CONSTRUCTION JOINTS, IF REQUIRED AT THE BASE OF THE PIERS, MUST BE INTENTIONALLY ROUGHENED TO A FULL AMPLITUDE OF 1/4 INCH (6 MM). FOUNDATION DESIGN ASSUMES NO OTHER CONSTRUCTION JOINTS.
- TOP OF FOUNDATION OUTSIDE LIMITS OF ANCHOR BOLTS SHALL BE SLOPED TO DRAIN WITH A FLOATED FINISH. AREA INSIDE LIMITS OF ANCHOR BOLTS SHALL BE LEVEL WITH A SCRATCHED FINISH.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4" X 3/4" (19MM X 19MM) MINIMUM.

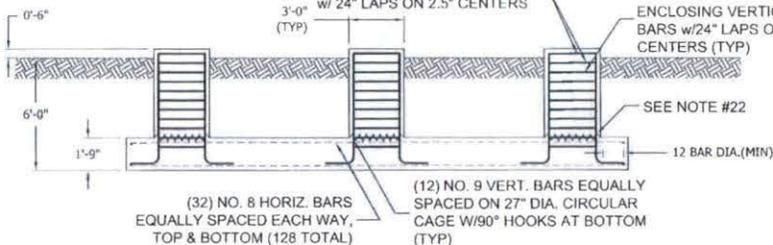
NOTE: SEE STRUCTURE ASSEMBLY DRAWING FOR FOUNDATION LAYOUT AND ANCHORAGE EMBEDMENT DRAWING NUMBER.



PLAN VIEW

(2) NO. 4 CIRCULAR TIES W/ SEISMIC HOOKS ENCLOSING VERTICAL BARS
3'-0" w/ 24" LAPS ON 2.5" CENTERS (TYP)

NO. 4 CIRCULAR TIES ENCLOSING VERTICAL BARS w/ 24" LAPS ON 6" CENTERS (TYP)



ELEVATION VIEW

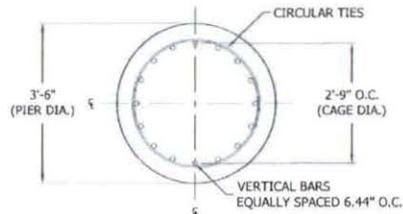
CONCRETE VOLUME (cu.yds)

	ROUND
PIER	3.7
PAD	47.3
TOTAL	51.0

FACTORED REACTIONS

Maximum O.T.M =	5,845.50 FT-K
Total Tower Wt =	52.08 KIPS
Total Shear =	52.43 KIPS
Max. Shear/Leg =	31.97 KIPS
Max. Ten./Leg =	292.68 KIPS
Max. Comp./Leg =	341.18 KIPS

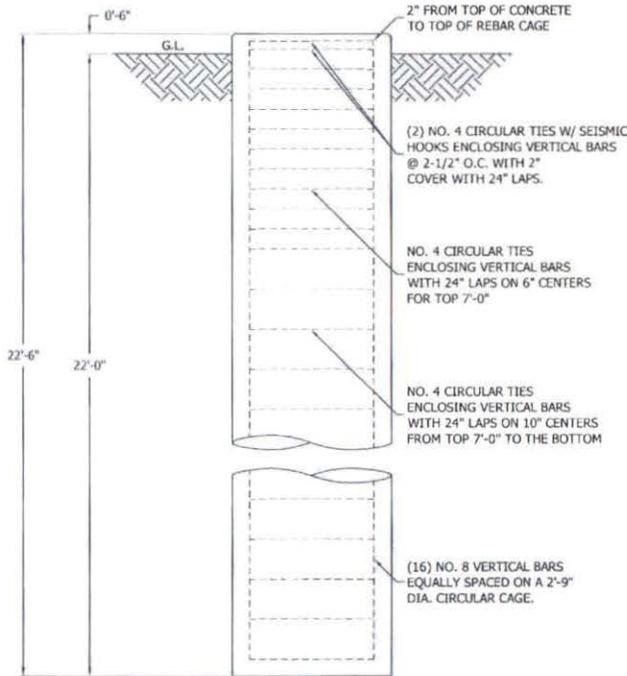
FILE NO.	226626				
REVISIONS					
REV	DESCRIPTION	OWN	CHK	APP	
 PO BOX 5999 PEORIA, IL 61601-5999 TOLL FREE 800-727-ROHN					
THIS DRAWING IS THE PROPERTY OF ROHN. IT IS NOT TO BE REPRODUCED, COPIED OR TRACED IN WHOLE OR IN PART WITHOUT OUR WRITTEN CONSENT.					
APPALACHIAN WIRELESS MAT WITH RAISED PIERS FOUNDATION DETAILS MOLUS, KY					
DWR:	AS	CHKD: HA	DATE:	7/20/2018	
ENGR:	HA	SHEET #:	1 OF 1		
PRJ. ENGR:	AS	PRJ. MGR:			
DRAWING NO:	226626-01-F1			REV:	0



PLAN VIEW

N.T.S.

NOTE:
CAGE DIA. FROM CENTERLINE OF VERTICAL BARS.



ELEVATION VIEW

N.T.S.

FACTORED REACTIONS/LEG

DOWNLOAD = 341.2 KIPS
UPLIFT = 292.7 KIPS
SHEAR = 32 KIPS

VOLUME OF CONCRETE

(1) FOUNDATION 8 CU. YDS
(3) FOUNDATIONS 24 CU. YDS

GENERAL NOTES:

- FOUNDATION DESIGN HAS BEEN DEVELOPED IN ACCORDANCE WITH GENERALLY ACCEPTED PROFESSIONAL ENGINEERING PRINCIPLES AND PRACTICES WITHIN THE LIMITS OF THE SUBSURFACE DATA PROVIDED. FOUNDATION DESIGN MODIFICATIONS MAY BE REQUIRED IN THE EVENT THE FOLLOWING DESIGN PARAMETERS ARE NOT APPLICABLE FOR THE SUBSURFACE CONDITIONS ENCOUNTERED.
 - DEPTH NEGLECTED FOR SKIN FRICTION = TOP 4.0 FT
 - AVERAGE ULTIMATE SKIN SHEAR FOR UPLIFT: 4.0 FT TO 22.0 FT DEPTH = 2200 PSF. ----
 - AVERAGE ULTIMATE SKIN SHEAR FOR DOWNLOAD: 4.0 FT TO 22.0 FT DEPTH = 2200 PSF. ----
 - ULTIMATE NET END BEARING AT 22.0 FT = 48.0 KSF.
 - GROUNDWATER TABLE BELOW FOUNDATION DEPTH.
- WORK SHALL BE IN ACCORDANCE WITH LOCAL CODES, SAFETY REGULATIONS AND UNLESS OTHERWISE NOTED, THE LATEST REVISION OF ACI 318, "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE". PROCEDURES FOR THE PROTECTION OF EXCAVATIONS, EXISTING CONSTRUCTION AND UTILITIES SHALL BE ESTABLISHED PRIOR TO FOUNDATION INSTALLATION.
- CONCRETE MATERIALS SHALL CONFORM TO THE APPROPRIATE STATE REQUIREMENTS FOR EXPOSED STRUCTURAL CONCRETE.
- PROPORTIONS OF CONCRETE MATERIALS SHALL BE SUITABLE FOR THE INSTALLATION METHOD UTILIZED AND SHALL RESULT IN DURABLE CONCRETE FOR RESISTANCE TO LOCAL ANTICIPATED AGGRESSIVE ACTIONS. THE DURABILITY REQUIREMENTS OF ACI 318 CHAPTER 4 SHALL BE SATISFIED BASED ON THE CONDITIONS EXPECTED AT THE SITE. AS A MINIMUM, CONCRETE SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4,500 PSI (31.0 MPA) IN 28 DAYS.
- MAXIMUM SIZE OF AGGREGATE SHALL NOT EXCEED SIZE SUITABLE FOR INSTALLATION METHOD UTILIZED OR 1/3 CLEAR DISTANCE BEHIND OR BETWEEN REINFORCING. MAXIMUM SIZE MAY BE INCREASED TO 2/3 CLEAR DISTANCE PROVIDED WORKABILITY AND METHODS OF CONSOLIDATION SUCH AS VIBRATING WILL PREVENT HONEYCOMBS OR VOIDS.
- REINFORCEMENT SHALL BE DEFORMED AND CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60 UNLESS OTHERWISE NOTED. SPLICES IN REINFORCEMENT SHALL NOT BE ALLOWED UNLESS OTHERWISE INDICATED.
- REINFORCING CAGES SHALL BE BRACED TO RETAIN PROPER DIMENSIONS DURING HANDLING AND THROUGHOUT PLACEMENT OF CONCRETE. WHEN TEMPORARY CASING IS UTILIZED, BRACING SHALL BE ADEQUATE TO RESIST FORCES OCCURRING FROM FLOWING CONCRETE DURING CASING EXTRACTION.
- WELDING IS PROHIBITED ON REINFORCING STEEL AND EMBEDMENTS.
- MINIMUM CONCRETE COVER FOR REINFORCEMENT SHALL BE 3 INCHES (76 MM) UNLESS OTHERWISE NOTED. APPROVED SPACERS SHALL BE USED TO INSURE A 3 INCH (76 MM) MINIMUM COVER ON REINFORCEMENT.
- SPACERS SHALL BE ATTACHED INTERMITTENTLY THROUGHOUT THE ENTIRE LENGTH OF VERTICAL REINFORCING CAGES TO INSURE CONCENTRIC PLACEMENT OF CAGES IN EXCAVATIONS.
- FOUNDATION DESIGN HAS BEEN BASED ON GEOTECHNICAL REPORT NO. 165-000-0063 DATED 4/12/2018 BY EAST KENTUCKY ENGINEERING, LLC.
- FOUNDATION DEPTH INDICATED IS BASED ON THE GRADE LINE DESCRIBED IN THE REFERENCED GEOTECHNICAL REPORT. FOUNDATION MODIFICATION MAY BE REQUIRED IN THE EVENT CUT OR FILL OPERATIONS HAVE TAKEN PLACE SUBSEQUENT TO THE GEOTECHNICAL INVESTIGATION.
- FOUNDATION DESIGN ASSUMES THE RECOMMENDATIONS IN THE REFERENCED GEOTECHNICAL REPORT CONCERNING VERIFICATION OF SUBSURFACE CONDITIONS ARE IMPLEMENTED PRIOR TO PLACEMENT OF CONCRETE.
- FOUNDATION INSTALLATION SHALL BE SUPERVISED BY PERSONNEL KNOWLEDGEABLE AND EXPERIENCED WITH THE PROPOSED FOUNDATION TYPE. CONSTRUCTION SHALL BE IN ACCORDANCE WITH GENERALLY ACCEPTED INSTALLATION PRACTICES.
- FOUNDATION DESIGN ASSUMES INSTALLATION PROCEDURES WILL INCORPORATE THE PROCEDURES RECOMMENDED IN THE REFERENCED GEOTECHNICAL REPORT.
- FOUNDATION DESIGN ASSUMES FIELD INSPECTIONS WILL BE PERFORMED TO VERIFY THAT CONSTRUCTION MATERIALS, INSTALLATION METHODS AND ASSUMED DESIGN PARAMETERS ARE ACCEPTABLE BASED ON CONDITIONS EXISTING AT THE SITE.
- FOR FOUNDATION INSTALLATION TOLERANCES SEE STRUCTURE ASSEMBLY DRAWING.
- LOOSE MATERIAL SHALL BE REMOVED FROM BOTTOM OF EXCAVATION PRIOR TO CONCRETE PLACEMENT. SIDES OF EXCAVATION SHALL BE ROUGH AND FREE OF LOOSE CUTTINGS.
- CONCRETE SHALL BE PLACED IN A MANNER THAT WILL PREVENT SEGREGATION OF CONCRETE MATERIALS, INFILTRATION OF WATER OR SOIL AND OTHER OCCURRENCES WHICH MAY DECREASE THE STRENGTH OR DURABILITY OF THE FOUNDATION.
- FREE FALL CONCRETE MAY BE USED PROVIDED FALL IS VERTICAL DOWN WITHOUT HITTING SIDES OF EXCAVATION, FORMWORK, REINFORCING BARS, FORM TIES, CAGE BRACING OR OTHER OBSTRUCTIONS. UNDER NO CIRCUMSTANCES SHALL CONCRETE FALL THROUGH WATER.
- CONSTRUCTION JOINTS, IF REQUIRED AT THE BASE OF THE PIERS, MUST BE INTENTIONALLY ROUGHENED TO A FULL AMPLITUDE OF 3/4 INCH (6 MM). FOUNDATION DESIGN ASSUMES NO OTHER CONSTRUCTION JOINTS.
- TOP OF FOUNDATION OUTSIDE LIMITS OF ANCHOR BOLTS SHALL BE SLOPED TO DRAIN WITH A FLOATED FINISH. AREA INSIDE LIMITS OF ANCHOR BOLTS SHALL BE LEVEL WITH A SCRATCHED FINISH.
- EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED 3/4" X 3/4" (19MM X 19MM) MINIMUM.
- FOUNDATION DESIGN ASSUMES CASING, IF USED, WILL NOT BE LEFT IN PLACE. EQUIPMENT, PROCEDURES, AND PROPORTIONS OF CONCRETE MATERIALS SHALL INSURE CONCRETE WILL NOT BE ADVERSELY DISTURBED UPON CASING REMOVAL.
- DRILLING FLUID, IF USED, SHALL BE FULLY DISPLACED BY CONCRETE AND SHALL NOT BE DETRIMENTAL TO CONCRETE OR SURROUNDING SOIL. CONTAMINATED CONCRETE SHALL BE REMOVED FROM TOP OF FOUNDATION AND REPLACED WITH FRESH CONCRETE.

NOTE: SEE STRUCTURE ASSEMBLY DRAWING FOR FOUNDATION LAYOUT AND ANCHORAGE EMBEDMENT DRAWING NUMBER.

FILE NO.		226626		
REVISIONS				
REV	DESCRIPTION	DNW	CHK	APP
PO BOX 5999 PEORIA, IL 61601-5999 TOLL FREE 800-727-ROHN				
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APPALACHIAN WIRELESS DRILLED PIER FOUNDATION DETAILS MOLLUS, KY				
DNW:	AS	CHKD: HA	DATE: 7/20/2018	
ENGR:	HA	SHEET #:		1 OF 1
PRJ. ENGR:	AS	PRJ. MGR:		
DRAWING NO:	226626-01-F2			REV: 0

File: W:\Jobs\2018\226626\226626.out
Contract: 226626
Project: 180 FT RT TOWER
Date and Time: 7/20/2018 9:46:34 AM

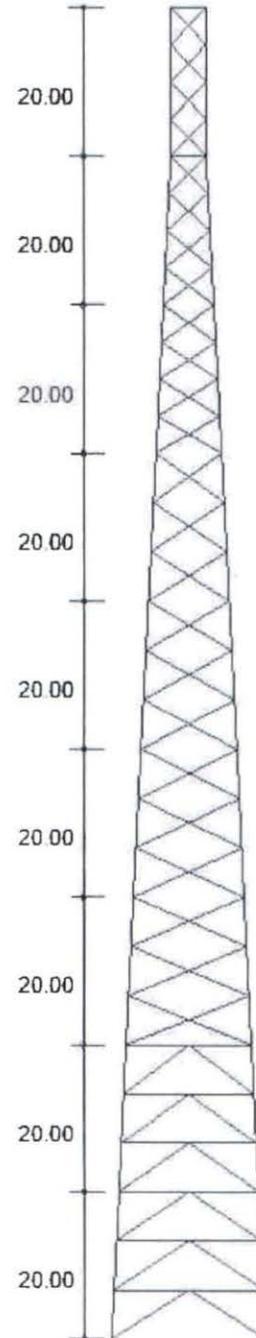
Revision: 0
Site: MOLUS- KY
Engineer: AS

HA

DESIGN SPECIFICATION

Design Standard: ANSI/TIA-222-G-2005 Add.2
Ultimate Design Wind Speed (No Ice) = 105.0 (mph)
Nominal Design Wind Speed (No Ice) = 81.3 (mph)
Basic Wind Speed (With Ice) = 30.0 (mph)
Design Ice Thickness = 0.50 (in)
Structure Class = II
Exposure Category = C
Topographic Category = 1

Sct	Length (ft)	Top W. (in)	Bot Width (in)
1	20.00	228.24	252.24
2	20.00	204.24	228.24
3	20.00	180.24	204.24
4	20.00	156.24	180.24
5	20.00	131.32	156.24
6	20.00	106.40	131.32
7	20.00	81.96	106.40
8	20.00	57.53	81.96
9	20.00	56.99	57.53



MAXIMUM BASE REACTIONS

Download (Kips)	341.2
Uplift (Kips)	292.7
Shear (Kips)	32.0
O.T.M. (Ft-Kips)	5,845.5

(8) 1" x 70" ANHCOR BOLTS PER LEG
(24) TOTAL



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Revision: 0
 Site: MOLUS- KY
 Engineer: AS

Section A: PROJECT DATA

Project Title: 180 FT RT TOWER
 Customer Name: APPALACHIAN WIRELESS
 Site: MOLUS- KY
 Contract No.: 226626
 Revision: 0
 Engineer: AS
 Date: Jul 20 2018
 Time: 09:45:15 AM

Design Standard: ANSI/TIA-222-G-2005 Addendum 2

GENERAL DESIGN CONDITIONS

Start wind direction: 0.00 (Deg)
 End wind direction: 330.00 (Deg)
 Increment wind direction: 30.00 (Deg)
 Elevation above ground: 0.00 (ft)
 Gust Response Factor Gh: 0.85
 Structure class: II
 Exposure category: C
 Topographic category: 1
 Material Density: 490.1 (lbs/ft³)
 Young's Modulus: 29000.0 (ksi)
 Poisson Ratio: 0.30
 Weight Multiplier: 1.25
 Minimum Bracing Resistance as per 4.4.1

WIND ONLY CONDITIONS:

Ultimate Design Wind Speed (No Ice): 105.00 (mph)
 Nominal Design Wind Speed (No Ice): 81.33 (mph)
 Directionality Factor Kd: 0.85
 Importance Factor I: 1.00
 Wind Load Factor: 1.60
 Dead Load Factor: 1.20
 Dead Load Factor for Uplift: 0.90

WIND AND ICE CONDITIONS:

Basic Wind Speed (With Ice): 30.00 (mph)
 Directionality Factor Kd: 0.85
 Wind Load Importance Factor Iw: 1.00
 Ice Thickness Importance Factor Ii: 1.00
 Ice Thickness: 0.50 (in)
 Ice Density: 56.19 (lbs/ft³)
 Wind Load Factor: 1.00
 Dead Load Factor: 1.20
 Ice Load Factor: 1.00

WIND ONLY SERVICEABILITY CONDITIONS:

Serviceability Wind Speed: 60.00 (mph)
 Directionality Factor Kd: 0.85
 Importance Factor I: 1.00
 Wind Load Factor: 1.00
 Dead Load Factor: 1.00

EARTHQUAKE CONDITIONS:

Site class definition: B
 Spectral response acceleration Ss: 0.371
 Spectral response acceleration S1: 0.102
 Acceleration-based site coefficient Fa: 1.000
 Velocity-based site coefficient Fv: 1.000
 Design spectral response acceleration Sds: 0.247
 Design spectral response acceleration Sd1: 0.068
 Seismic analysis method: 1
 Fundamental frequency of structure f1: 1.829
 Total seismic shear Vs (Kips) : 2.16

Analysis performed using: Robot Millenium Finite Element Analysis Software (by Robobat)



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Revision: 0
 Site: MOLUS- KY
 Engineer: AS

Section B: STRUCTURE GEOMETRY

TOWER GEOMETRY

Cross-Section	Height (ft)	Tot Height (ft)	# of Section	Bot Width (in)	Top Width (in)
Triangular	180.00	180.00	9	252.24	56.99

SECTION GEOMETRY

Sec #	Sec. Name	Elevation (ft)		Widths (in)		Legs (lbs)	Brcg. (lbs)	Masses (lbs)		Database (lbs)	Brcg. Clear. (in)	
		Bottom	Top	Bottom	Top			Sec.Brc	Int.Brc			
9	RTS04	160.00	180.00	58	57	434	329	0	0	763	0	0.787
8	RTT06	140.00	160.00	82	58	570	518	0	0	1088	0	0.787
7	RTT08	120.00	140.00	106	82	941	856	0	0	1797	0	0.787
6	RTT10	100.00	120.00	131	106	1127	824	0	0	1951	0	0.787
5	RTT12	80.00	100.00	156	131	1562	1145	0	0	2707	0	0.787
4	RTT14	60.00	80.00	180	156	1714	1296	0	0	3010	0	0.787
3	RTT16	40.00	60.00	204	180	1714	1913	0	0	3627	0	0.787
2	RTT18*	20.00	40.00	228	204	2150	1989	0	305	4443	0	0.787
1	RTT20*	0.00	20.00	252	228	2150	2396	0	411	4957	0	0.787
Total Mass:						12362	11265	0	716	24342	0	

PANEL GEOMETRY

Sec#	Pnl#	Type	SecBrcg	Mid. Horiz Continuous	Horiz	Height (ft)	Bottom Width (in)	Top Width (in)	Plan Bracing	Hip Bracing	Gusset Plate Area (ft^2)	Gusset Plate Weight (lbs)
9	4	X	(None)		Yes	5.0	57.1	57.0	(None)	(None)	0.300	0.00
9	3	X	(None)		None	5.0	57.3	57.1	(None)	(None)	0.300	0.00
9	2	X	(None)		None	5.0	57.4	57.3	(None)	(None)	0.300	0.00
9	1	X	(None)		None	5.0	57.5	57.4	(None)	(None)	0.300	0.00
8	4	X	(None)		Yes	5.0	63.6	57.5	(None)	(None)	0.300	0.00
8	3	X	(None)		None	5.0	69.7	63.6	(None)	(None)	0.300	0.00
8	2	X	(None)		None	5.0	75.9	69.7	(None)	(None)	0.300	0.00
8	1	X	(None)		None	5.0	82.0	75.9	(None)	(None)	0.300	0.00
7	4	X	(None)		None	5.0	88.1	82.0	(None)	(None)	0.300	0.00
7	3	X	(None)		None	5.0	94.2	88.1	(None)	(None)	0.300	0.00
7	2	X	(None)		None	5.0	100.3	94.2	(None)	(None)	0.300	0.00
7	1	X	(None)		None	5.0	106.4	100.3	(None)	(None)	0.300	0.00
6	3	X	(None)		None	6.7	114.7	106.4	(None)	(None)	0.300	0.00
6	2	X	(None)		None	6.7	123.0	114.7	(None)	(None)	0.300	0.00
6	1	X	(None)		None	6.7	131.3	123.0	(None)	(None)	0.300	0.00
5	3	X	(None)		None	6.7	139.6	131.3	(None)	(None)	0.300	0.00
5	2	X	(None)		None	6.7	147.9	139.6	(None)	(None)	0.300	0.00
5	1	X	(None)		None	6.7	156.2	147.9	(None)	(None)	0.300	0.00
4	3	X	(None)		None	6.7	164.2	156.2	(None)	(None)	0.300	0.00
4	2	X	(None)		None	6.7	172.2	164.2	(None)	(None)	0.300	0.00
4	1	X	(None)		None	6.7	180.2	172.2	(None)	(None)	0.300	0.00
3	3	X	(None)		None	6.7	188.2	180.2	(None)	(None)	0.300	0.00
3	2	X	(None)		None	6.7	196.2	188.2	(None)	(None)	0.300	0.00
3	1	X	(None)		None	6.7	204.2	196.2	(None)	(None)	0.300	0.00
2	3	K	(None)		Yes	6.7	212.2	204.2	2-Subdiv.	(None)	0.300	0.00
2	2	K	(None)		Yes	6.7	220.2	212.2	2-Subdiv.	(None)	0.300	0.00
2	1	K	(None)		Yes	6.7	228.2	220.2	2-Subdiv.	(None)	0.300	0.00
1	3	K	(None)		Yes	6.7	236.2	228.2	2-Subdiv.	(None)	0.300	0.00
1	2	K	(None)		Yes	6.7	244.2	236.2	2-Subdiv.	(None)	0.300	0.00
1	1	K	(None)		Yes	6.7	252.2	244.2	2-Subdiv.	(None)	0.300	0.00

MEMBER PROPERTIES

Sec/Member	Type	Description	Steel	Conn.	Bolt	Bolt End	Edge	Gusset	Gusset	Bolt	Dble
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Revision: 0
 Site: MOLUS- KY
 Engineer: AS

Pnl	Grade	Type	#-Size	Grade	Dist.	Dist.	Thick.	Grade	Space	Mem.
Pnl Spacing										
Stitch										
Bolt										
(ft)			(in)		(in)	(in)	(in)		(in)	(in)
9/4	Leg	PIPE 2.875x0.203	A500 gr.CSTension	4-0.750	A325X					
9/4	Diag	L1 3/4x1 3/4x1/8	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
9/4	Horiz	L1 1/2x1 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	0.690	0.250	A572 gr.50	2.000
9/3	Leg	PIPE 2.875x0.203	A500 gr.CSTension	4-0.750	A325X					
9/3	Diag	L1 3/4x1 3/4x1/8	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
9/2	Leg	PIPE 2.875x0.203	A500 gr.CSTension	4-0.750	A325X					
9/2	Diag	L1 3/4x1 3/4x1/8	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
9/1	Leg	PIPE 2.875x0.203	A500 gr.CSTension	4-0.750	A325X					
9/1	Diag	L1 3/4x1 3/4x1/8	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
8/4	Leg	PIPE 3.500x0.216	A500 gr.CSTension	4-0.875	A325X					
8/4	Diag	L1 3/4x1 3/4x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
8/4	Horiz	L1 1/2x1 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	0.690	0.250	A572 gr.50	2.000
8/3	Leg	PIPE 3.500x0.216	A500 gr.CSTension	4-0.875	A325X					
8/3	Diag	L1 3/4x1 3/4x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
8/2	Leg	PIPE 3.500x0.216	A500 gr.CSTension	4-0.875	A325X					
8/2	Diag	L1 3/4x1 3/4x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
8/1	Leg	PIPE 3.500x0.216	A500 gr.CSTension	4-0.875	A325X					
8/1	Diag	L1 3/4x1 3/4x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	0.870	0.250	A572 gr.50	2.000
7/4	Leg	PIPE 4x0.318	A500 gr.CSTension	5-0.875	A325X					
7/4	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
7/3	Leg	PIPE 4x0.318	A500 gr.CSTension	5-0.875	A325X					
7/3	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
7/2	Leg	PIPE 4x0.318	A500 gr.CSTension	5-0.875	A325X					
7/2	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
7/1	Leg	PIPE 4x0.318	A500 gr.CSTension	5-0.875	A325X					
7/1	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
6/3	Leg	PIPE 4.500x0.337	A500 gr.CSTension	5-1.000	A325X					
6/3	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
6/2	Leg	PIPE 4.500x0.337	A500 gr.CSTension	5-1.000	A325X					
6/2	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
6/1	Leg	PIPE 4.500x0.337	A500 gr.CSTension	5-1.000	A325X					
6/1	Diag	L2 1/2x2 1/2x3/16	A529 gr.50Bolted	1-0.500	A325X	1.250	1.250	0.250	A572 gr.50	2.000
5/3	Leg	PIPE 5.563x0.375	A500 gr.CSTension	6-1.000	A325X					
5/3	Diag	L3x3x3/16	A529 gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572 gr.50	2.000
5/2	Leg	PIPE 5.563x0.375	A500 gr.CSTension	6-1.000	A325X					
5/2	Diag	L3x3x3/16	A529 gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572 gr.50	2.000
5/1	Leg	PIPE 5.563x0.375	A500 gr.CSTension	6-1.000	A325X					



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Revision: 0
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 Engineer: AS

5/1	Diag	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
4/3	Leg	PIPE 6.625x0.340	A500	gr.CSTension	6-1.000	A325X						
4/3	Diag	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
4/2	Leg	PIPE 6.625x0.340	A500	gr.CSTension	6-1.000	A325X						
4/2	Diag	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
4/1	Leg	PIPE 6.625x0.340	A500	gr.CSTension	6-1.000	A325X						
4/1	Diag	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
3/3	Leg	PIPE 6.625x0.340	A500	gr.CSTension	6-1.000	A325X						
3/3	Diag	L3x3x1/4	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
3/2	Leg	PIPE 6.625x0.340	A500	gr.CSTension	6-1.000	A325X						
3/2	Diag	L3x3x1/4	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
3/1	Leg	PIPE 6.625x0.340	A500	gr.CSTension	6-1.000	A325X						
3/1	Diag	L3x3x1/4	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.250	A572	gr.50	2.000
2/3	Leg	PIPE 6.625x0.432	A500	gr.CSTension	6-1.000	A325X						
2/3	Diag	L3x3x1/4	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
2/3	Horiz	L3x3x3/16	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
2/3	PlanH1	L2 1/2x2 1/2x3/16	A529	gr.50Bolted	1 0.625	A325X	1.500	1.250	0.250	A572	gr.50	2.000
2/2	Leg	PIPE 6.625x0.432	A500	gr.CSTension	6-1.000	A325X						
2/2	Diag	L3x3x1/4	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
2/2	Horiz	L3x3x3/16	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
2/2	PlanH1	L2 1/2x2 1/2x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.250	0.250	A572	gr.50	2.000
2/1	Leg	PIPE 6.625x0.432	A500	gr.CSTension	6-1.000	A325X						
2/1	Diag	L3x3x1/4	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
2/1	Horiz	L3x3x3/16	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
2/1	PlanH1	L2 1/2x2 1/2x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.250	0.250	A572	gr.50	2.000
1/3	Leg	PIPE 6.625x0.432	A500	gr.CSTension	8-1.000	A325X						
1/3	Diag	L3 1/2x3 1/2x1/4	A529	gr.50Bolted	2-0.625	A325X	1.500	2.000	0.375	A572	gr.50	2.000
1/3	Horiz	L3x3x3/16	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
1/3	PlanH1	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
1/2	Leg	PIPE 6.625x0.432	A500	gr.CSTension	8-1.000	A325X						
1/2	Diag	L3 1/2x3 1/2x1/4	A529	gr.50Bolted	2-0.625	A325X	1.500	2.000	0.375	A572	gr.50	2.000
1/2	Horiz	L3x3x3/16	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
1/2	PlanH1	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
1/1	Leg	PIPE 6.625x0.432	A500	gr.CSTension	8-1.000	A325X						
1/1	Diag	L3 1/2x3 1/2x1/4	A529	gr.50Bolted	2-0.625	A325X	1.500	2.000	0.375	A572	gr.50	2.000
1/1	Horiz	L3x3x3/16	A529	gr.50Bolted	2-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000
1/1	PlanH1	L3x3x3/16	A529	gr.50Bolted	1-0.625	A325X	1.500	1.620	0.375	A572	gr.50	2.000



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Section C: ANTENNA DATA

Structure Azimuth from North: 0

ANTENNAS

Ant No.	Elev. (ft)	Antenna (#) Type	Ant. Azim.	Mount. Radius (ft)	Mount Type	Tx Line (#)Type	Mounting Pipe Size (in)	Length (ft)	Full Shielded	Ka
1	145.00	(1) HP8	0	4.00		0				1.00
		Vert. Offset	0.00 (ft)							
2	145.00	(1) HP8	180	4.00		120				1.00
		Vert. Offset	0.00 (ft)							

ANTENNA AND MOUNT WIND AREAS AND WEIGHTS

Ant No.	Antenna/Mount	Frontal Bare Area (ft) ²	Lateral Bare Area (ft) ²	Frontal Iced Area (ft) ²	Lateral Iced Area (ft) ²	Weight Bare (lbs)	Weight Iced (lbs)	Frequency Ghz	Allowable Signal Loss dB	Gh Mount Ka
1	HP8	69.63	4.85	69.63	4.85	447.53	1674.43	6.00	10	0.85
2	HP8	69.63	4.85	69.63	4.85	447.53	1674.43	6.00	10	0.85



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Section D: TRANSMISSION LINE DATA

Transmission Lines Position

No.	Bot El (ft)	Top El (ft)	Desc.	Radius (ft)	Az.	Orient.	No.	No. of Rows	Vert.	Antenna	User Ka
1	0.00	180.00	3/8 CABLE	13.00	0.00	0.00	1	1	No		
2	0.00	180.00	RC0.75-Cnd	10.58	60.00	5.00	1	1	No		
3	0.00	175.00	TX Ladder	7.01	60.00	30.00	1	1	No		
4	0.00	175.00	LDF5P-50A	7.92	60.00	20.00	4	1	No		
5	155.00	175.00	LDF7P-50A	1.77	60.00	30.00	6	1	No		
6	0.00	165.00	TX Ladder	7.01	180.00	150.00	1	1	No		
7	0.00	165.00	LDF5P-50A	7.92	180.00	140.00	4	1	No		
8	135.00	165.00	LDF7P-50A	2.45	180.00	150.00	6	1	No		
9	125.00	155.00	LDF7P-50A	2.79	60.00	30.00	12	2	No		
10	0.00	145.00	EW63	6.46	180.00	160.00	2	1	No		
11	105.00	135.00	LDF7P-50A	3.47	180.00	150.00	12	2	No		
12	0.00	125.00	LDF7P-50A	7.01	60.00	30.00	18	2	No		
13	0.00	105.00	LDF7P-50A	7.01	180.00	150.00	18	2	No		

Transmission Lines Details

No.	Desc.	Width (in)	Depth (in)	Unit Mass (lb/ft)	Line Spacing (in)	Row Spacing (in)
1	3/8 CABLE	0.38	0.38	1.00	2.750	2.750
2	RC0.75-Cnd	1.05	1.05	1.09	2.750	2.750
3	TX Ladder	4.70	1.50	4.00	2.750	2.750
4	LDF5P-50A	1.10	1.10	0.33	2.250	2.750
5	LDF7P-50A	2.01	2.01	0.92	2.250	2.750
6	TX Ladder	4.70	1.50	4.00	2.750	2.750
7	LDF5P-50A	1.10	1.10	0.33	2.250	2.750
8	LDF7P-50A	2.01	2.01	0.92	2.250	2.750
9	LDF7P-50A	2.01	2.01	0.92	2.250	2.750
10	EW63	1.16	2.01	0.51	2.250	2.750
11	LDF7P-50A	2.01	2.01	0.92	2.250	2.750
12	LDF7P-50A	2.01	2.01	0.92	2.250	2.750
13	LDF7P-50A	2.01	2.01	0.92	2.250	2.750



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Section F: POINT LOAD DATA

Structure Azimuth from North:0.00

POINT LOADS

No.	Description	Elev. (ft)	Radius (ft)	Azim. (Deg)	Orient. (Deg)	Vertical Offset (ft)	Tx Line	Comments
1	BEACON & LR	180.00	1.00	0.0	0.0	0.00		
2	CARRIER	175.00	1.00	0.0	0.0	0.00		
3	CARRIER	165.00	1.00	0.0	0.0	0.00		
4	CARRIER	155.00	1.00	0.0	0.0	0.00		
5	CARRIER	135.00	1.00	0.0	0.0	0.00		
6	CARRIER	125.00	1.00	0.0	0.0	0.00		
7	CARRIER	105.00	1.00	0.0	0.0	0.00		

POINT LOADS WIND AREAS AND WEIGHTS

No.	Description	Frontal Bare Area (ft^2)	Lateral Bare Area (ft^2)	Frontal Iced Area (ft^2)	Lateral Iced Area (ft^2)	Weight Bare (Kips)	Weight Iced (Kips)	Gh
1	BEACON & LR	5.00	5.00	10.00	10.00	0.25	0.50	0.85
2	CARRIER	128.00	128.00	248.00	248.00	3.25	7.10	0.85
3	CARRIER	128.00	128.00	248.00	248.00	3.25	7.10	0.85
4	CARRIER	128.00	128.00	248.00	248.00	3.25	7.10	0.85
5	CARRIER	128.00	128.00	248.00	248.00	3.25	7.10	0.85
6	CARRIER	128.00	128.00	248.00	248.00	3.25	7.10	0.85
7	CARRIER	128.00	128.00	248.00	248.00	3.25	7.10	0.85



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Section H: STRUCTURE DISPLACEMENT DATA

Load Combination Wind Only - Serviceability

Node	Elev. (ft)	N-S Disp (in)	W-E Disp (in)	Vert. Disp (in)	N-S Rot (Deg)	W-E Rot (Deg)	Twist (Deg)
111	180.0	9.2	8.3	-0.1	0.48	0.43	-0.15
108	175.0	8.7	7.8	-0.1	0.49	0.44	-0.15
105	170.0	8.2	7.3	-0.1	0.48	0.43	-0.13
102	165.0	7.7	6.9	-0.1	0.48	0.43	-0.14
99	160.0	7.2	6.4	-0.1	0.46	0.41	-0.12
96	155.0	6.7	6.0	-0.1	0.45	0.41	-0.12
93	150.0	6.2	5.6	-0.1	0.41	0.37	-0.09
90	145.0	5.8	5.2	-0.1	0.42	0.38	-0.11
87	140.0	5.3	4.8	-0.1	0.37	0.33	0.07
84	135.0	4.9	4.5	-0.1	0.39	0.35	-0.09
81	130.0	4.5	4.1	-0.1	0.33	0.30	0.06
78	125.0	4.2	3.8	-0.1	0.35	0.32	-0.08
75	120.0	3.8	3.5	-0.1	0.30	0.27	0.05
72	113.3	3.4	3.1	-0.1	0.30	0.27	-0.06
69	106.7	3.0	2.7	-0.1	0.26	0.24	0.04
66	100.0	2.6	2.4	-0.1	0.25	0.23	-0.04
63	93.3	2.3	2.0	-0.1	0.22	0.20	0.03
60	86.7	2.0	1.8	-0.1	0.21	0.19	-0.03
57	80.0	1.7	1.5	-0.1	0.19	0.17	0.02
54	73.3	1.4	1.3	-0.1	0.18	0.16	-0.02
51	66.7	1.1	1.0	-0.1	0.16	0.14	0.02
48	60.0	0.9	0.8	0.0	0.14	0.12	-0.02
45	53.3	0.7	0.7	0.0	0.12	0.11	-0.02
42	46.7	0.6	0.5	0.0	0.10	0.09	0.01
38	40.0	0.4	0.4	0.0	0.08	0.08	-0.01
32	33.3	0.3	0.3	0.0	0.07	0.06	-0.01
26	26.7	0.2	0.2	0.0	0.06	0.05	-0.01
20	20.0	0.1	-0.1	0.0	0.04	0.04	-0.01
14	13.3	0.1	-0.1	0.0	0.03	-0.03	0.00
8	6.7	0.0	0.0	0.0	0.02	-0.02	0.00
3	0.0	0.0	0.0	0.0	0.00	0.00	0.00



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Section J: ANTENNA DISPLACEMENT DATA

Load Combination Wind Only - Serviceability

Wind Direction

Maximum displacements

Ant.	Elev. (ft)	N-S Disp (in)	W-E Disp (in)	Vert. Disp (in)	N-S Rot (Deg)	W-E Rot (Deg)	Twist Tot (Deg)	Allow. (Deg)
1	145.00	5.8	5.2	-0.1	0.42	0.38	-0.11	1.11
2	145.00	5.8	5.2	-0.1	0.42	0.38	-0.11	1.11



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Section L: STRENGTH ASSESSMENT SORTED DATA

Load Combination Max Envelope
 Wind Direction Maximum

Sec	Pnl	Elev.	MType	Desc.	Len	kl/r	Gov. comp. cap. (Kips)	Gov. tens. cap. (Kips)	Max Compr. (Kips)	Max Tens. (Kips)	Asses. Ratio
		(ft)			(ft)						
9	4	175.00	Leg	PIPE 2.875x0.203	5.00	63.4	57.1	76.5	0.9	0.3	0.02
9	3	170.00	Leg	PIPE 2.875x0.203	5.00	63.4	57.1	76.5	5.3	2.1	0.09
9	2	165.00	Leg	PIPE 2.875x0.203	5.00	63.4	57.1	76.5	11.1	7.3	0.19
9	1	160.00	Leg	PIPE 2.875x0.203	5.00	63.4	57.1	76.5	20.2	13.9	0.35
8	4	155.00	Leg	PIPE 3.500x0.216	5.01	51.8	82.5	100.4	28.6	22.4	0.35
8	3	150.00	Leg	PIPE 3.500x0.216	5.01	51.8	82.5	100.4	42.7	32.8	0.52
8	2	145.00	Leg	PIPE 3.500x0.216	5.01	51.8	82.5	100.4	51.2	41.7	0.62
8	1	140.00	Leg	PIPE 3.500x0.216	5.01	51.8	82.5	100.4	63.1	52.1	0.77
7	4	135.00	Leg	PIPE 4x0.318	5.01	45.9	142.0	165.6	74.0	61.7	0.52
7	3	130.00	Leg	PIPE 4x0.318	5.01	45.9	142.0	165.6	86.9	71.0	0.61
7	2	125.00	Leg	PIPE 4x0.318	5.01	45.9	142.0	165.6	99.5	82.3	0.70
7	1	120.00	Leg	PIPE 4x0.318	5.01	45.9	142.0	165.6	112.3	91.6	0.79
6	3	113.33	Leg	PIPE 4.500x0.337	6.68	54.2	160.1	198.4	127.9	105.8	0.80
6	2	106.67	Leg	PIPE 4.500x0.337	6.68	54.2	160.1	198.4	141.3	118.2	0.88
6	1	100.00	Leg	PIPE 4.500x0.337	6.68	54.2	160.1	198.4	158.2	131.8	0.99
5	3	93.33	Leg	PIPE 5.563x0.375	6.68	43.6	239.3	275.0	172.7	144.8	0.72
5	2	86.67	Leg	PIPE 5.563x0.375	6.68	43.6	239.3	275.0	187.6	158.7	0.78
5	1	80.00	Leg	PIPE 5.563x0.375	6.68	43.6	239.3	275.0	200.5	170.6	0.84
4	3	73.33	Leg	PIPE 6.625x0.340	6.68	36.0	274.8	302.1	214.1	183.0	0.78
4	2	66.67	Leg	PIPE 6.625x0.340	6.68	36.0	274.8	302.1	226.2	194.1	0.82
4	1	60.00	Leg	PIPE 6.625x0.340	6.68	36.0	274.8	302.1	239.0	205.6	0.87
3	3	53.33	Leg	PIPE 6.625x0.340	6.68	36.0	274.8	302.1	250.4	215.8	0.91
3	2	46.67	Leg	PIPE 6.625x0.340	6.68	36.0	274.8	302.1	262.4	226.4	0.96
3	1	40.00	Leg	PIPE 6.625x0.340	6.68	36.0	274.8	302.1	273.3	235.9	0.99
2	3	33.33	Leg	PIPE 6.625x0.432	6.68	36.4	343.5	330.3	279.5	240.7	0.81
2	2	26.67	Leg	PIPE 6.625x0.432	6.68	36.4	343.5	330.3	290.4	250.0	0.85
2	1	20.00	Leg	PIPE 6.625x0.432	6.68	36.4	343.5	330.3	301.2	259.1	0.88
1	3	13.33	Leg	PIPE 6.625x0.432	6.68	36.4	343.5	378.5	311.7	267.9	0.91
1	2	6.67	Leg	PIPE 6.625x0.432	6.68	36.4	343.5	378.5	322.0	276.4	0.94
1	1	0.00	Leg	PIPE 6.625x0.432	6.68	36.4	343.5	378.5	332.2	284.7	0.97
9	4	175.00	Diag	L1 3/4x1 3/4x1/8	6.90	107.2	8.1	6.8	0.9	1.0	0.16
9	3	170.00	Diag	L1 3/4x1 3/4x1/8	6.91	107.3	8.1	6.8	2.5	2.4	0.35
9	2	165.00	Diag	L1 3/4x1 3/4x1/8	6.92	107.5	8.1	6.8	2.5	2.7	0.39
9	1	160.00	Diag	L1 3/4x1 3/4x1/8	6.92	107.6	8.1	6.8	5.4	5.2	0.78
8	4	155.00	Diag	L1 3/4x1 3/4x3/16	7.11	115.6	9.7	9.7	5.0	4.5	0.51
8	3	150.00	Diag	L1 3/4x1 3/4x3/16	7.48	121.2	9.5	9.7	5.6	5.7	0.59
8	2	145.00	Diag	L1 3/4x1 3/4x3/16	7.86	128.4	8.5	9.7	5.4	5.2	0.63
8	1	140.00	Diag	L1 3/4x1 3/4x3/16	8.26	135.8	7.6	9.7	6.7	6.5	0.89
7	4	135.00	Diag	L2 1/2x2 1/2x3/16	8.67	103.7	9.7	9.7	6.2	6.3	0.65
7	3	130.00	Diag	L2 1/2x2 1/2x3/16	9.09	107.7	9.7	9.7	7.5	7.3	0.77
7	2	125.00	Diag	L2 1/2x2 1/2x3/16	9.52	111.8	9.7	9.7	6.9	7.2	0.74
7	1	120.00	Diag	L2 1/2x2 1/2x3/16	9.96	115.9	9.7	9.7	8.3	8.1	0.85
6	3	113.33	Diag	L2 1/2x2 1/2x3/16	11.37	131.9	9.7	9.7	8.2	8.5	0.88
6	2	106.67	Diag	L2 1/2x2 1/2x3/16	11.94	139.1	9.7	9.7	8.1	7.9	0.83
6	1	100.00	Diag	L2 1/2x2 1/2x3/16	12.52	146.4	9.5	9.7	8.6	8.7	0.90
5	3	93.33	Diag	L3x3x3/16	13.11	126.0	15.2	14.7	8.7	8.6	0.58
5	2	86.67	Diag	L3x3x3/16	13.71	132.2	14.1	14.7	8.4	8.5	0.59
5	1	80.00	Diag	L3x3x3/16	14.32	138.5	12.8	14.7	8.3	8.2	0.65
4	3	73.33	Diag	L3x3x3/16	14.93	143.6	11.9	14.7	8.3	8.4	0.70
4	2	66.67	Diag	L3x3x3/16	15.53	149.8	11.0	14.7	8.3	8.3	0.76
4	1	60.00	Diag	L3x3x3/16	16.13	156.1	10.1	14.7	8.3	8.3	0.82
3	3	53.33	Diag	L3x3x1/4	16.74	162.4	12.3	15.2	8.3	8.3	0.67
3	2	46.67	Diag	L3x3x1/4	17.35	168.7	11.4	15.2	8.3	8.3	0.73
3	1	40.00	Diag	L3x3x1/4	17.97	175.0	10.6	15.2	8.4	8.4	0.79



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Contract: 226626

Project: 180 FT RT TOWER

Date and Time: 7/20/2018 9:46:34 AM

Revision: 0

Site: MOLUS- KY

Engineer: AS

2	3	33.33	Diag	L3x3x1/4	11.08	167.0	11.7	30.4	10.0	10.0	0.86
2	2	26.67	Diag	L3x3x1/4	11.34	170.3	11.2	30.4	10.0	10.0	0.89
2	1	20.00	Diag	L3x3x1/4	11.62	173.6	10.8	30.4	10.0	10.0	0.92
1	3	13.33	Diag	L3 1/2x3 1/2x1/4	11.89	157.1	15.5	30.4	9.9	9.9	0.64
1	2	6.67	Diag	L3 1/2x3 1/2x1/4	12.17	160.0	14.9	30.4	9.9	9.9	0.67
1	1	0.00	Diag	L3 1/2x3 1/2x1/4	12.45	162.9	14.4	30.4	9.9	9.9	0.69
9	4	175.00	Horiz	L1 1/2x1 1/2x3/16	4.75	172.6	4.0	8.5	0.6	0.6	0.16
8	4	155.00	Horiz	L1 1/2x1 1/2x3/16	4.79	172.3	4.0	8.5	2.1	2.1	0.51
2	3	33.33	Horiz	L3x3x3/16	8.51	145.8	11.6	24.3	8.0	8.0	0.69
2	2	26.67	Horiz	L3x3x3/16	8.84	149.9	10.9	24.3	8.1	8.0	0.74
2	1	20.00	Horiz	L3x3x3/16	9.18	154.1	10.4	24.3	8.2	8.1	0.79
1	3	13.33	Horiz	L3x3x3/16	9.51	158.3	9.8	24.3	8.3	8.2	0.84
1	2	6.67	Horiz	L3x3x3/16	9.84	162.4	9.3	24.3	8.3	8.3	0.89
1	1	0.00	Horiz	L3x3x3/16	10.18	166.6	8.9	24.3	8.4	8.4	0.95
2	3	33.33	PlanH1	L2 1/2x2 1/2x3/16	8.51	208.4	4.7	14.1	0.1	0.1	0.01
2	2	26.67	PlanH1	L2 1/2x2 1/2x3/16	8.84	216.6	4.3	14.1	0.1	0.1	0.01
2	1	20.00	PlanH1	L2 1/2x2 1/2x3/16	9.18	224.7	4.0	14.1	0.1	0.1	0.01
1	3	13.33	PlanH1	L3x3x3/16	9.51	193.4	6.6	14.7	0.1	0.1	0.01
1	2	6.67	PlanH1	L3x3x3/16	9.84	200.2	6.1	14.7	0.1	0.1	0.01
1	1	0.00	PlanH1	L3x3x3/16	10.18	207.0	5.7	14.7	0.1	0.1	0.01



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 Contract: 226626
 Project: 180 FT RT TOWER
 Date and Time: 7/20/2018 9:46:34 AM

Revision: 0
 Site: MOLUS- KY
 Engineer: AS

Section M: SECTION PROPERTIES DATA

Sec	Pan	Memb. Type	Steel Grade	Conn. Type	Bolts	Bolt Size (in)	Bolt Grade	End Dist. (in)	Gusset Thick. (in)	Kl/r	Comp Cap. (Kips)	Tens Cap. (Kips)	Bolt Cap. (Kips)	Bear. Cap. (Kips)	Block Shear (Kips)	
9	4	Leg	A500	gr.CS	Tension	4	0.750	A325X	1.125	N/A	63.4	57.1	76.5	121.7T	N/A	N/A
9	4	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	107.2	8.1	12.4	9.7S	7.8	6.8
9	4	Horiz	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	172.6	4.0	15.0	9.7S	11.7	8.5
9	3	Leg	A500	gr.CS	Tension	4	0.750	A325X	1.125	N/A	63.4	57.1	76.5	121.7T	N/A	N/A
9	3	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	107.3	8.1	12.4	9.7S	7.8	6.8
9	2	Leg	A500	gr.CS	Tension	4	0.750	A325X	1.125	N/A	63.4	57.1	76.5	121.7T	N/A	N/A
9	2	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	107.5	8.1	12.4	9.7S	7.8	6.8
9	1	Leg	A500	gr.CS	Tension	4	0.750	A325X	1.125	N/A	63.4	57.1	76.5	121.7T	N/A	N/A
9	1	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	107.6	8.1	12.4	9.7S	7.8	6.8
8	4	Leg	A500	gr.CS	Tension	4	0.875	A325X	1.313	N/A	51.8	82.5	100.4	167.9T	N/A	N/A
8	4	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	115.6	10.5	18.3	9.7S	11.7	10.2
8	4	Horiz	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	172.3	4.0	15.0	9.7S	11.7	8.5
8	3	Leg	A500	gr.CS	Tension	4	0.875	A325X	1.313	N/A	51.8	82.5	100.4	167.9T	N/A	N/A
8	3	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	121.2	9.5	18.3	9.7S	11.7	10.2
8	2	Leg	A500	gr.CS	Tension	4	0.875	A325X	1.313	N/A	51.8	82.5	100.4	167.9T	N/A	N/A
8	2	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	128.4	8.5	18.3	9.7S	11.7	10.2
8	1	Leg	A500	gr.CS	Tension	4	0.875	A325X	1.313	N/A	51.8	82.5	100.4	167.9T	N/A	N/A
8	1	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	135.8	7.6	18.3	9.7S	11.7	10.2
7	4	Leg	A500	gr.CS	Tension	5	0.875	A325X	1.313	N/A	45.9	142.0	165.6	209.9T	N/A	N/A
7	4	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	103.7	18.5	28.5	9.7S	11.7	13.6
7	3	Leg	A500	gr.CS	Tension	5	0.875	A325X	1.313	N/A	45.9	142.0	165.6	209.9T	N/A	N/A
7	3	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	107.7	17.4	28.5	9.7S	11.7	13.6
7	2	Leg	A500	gr.CS	Tension	5	0.875	A325X	1.313	N/A	45.9	142.0	165.6	209.9T	N/A	N/A
7	2	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	111.8	16.3	28.5	9.7S	11.7	13.6
7	1	Leg	A500	gr.CS	Tension	5	0.875	A325X	1.313	N/A	45.9	142.0	165.6	209.9T	N/A	N/A
7	1	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	115.9	15.1	28.5	9.7S	11.7	13.6
6	3	Leg	A500	gr.CS	Tension	5	1.000	A325X	1.500	N/A	54.2	160.1	198.4	275.3T	N/A	N/A
6	3	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	131.9	11.7	28.5	9.7S	11.7	13.6
6	2	Leg	A500	gr.CS	Tension	5	1.000	A325X	1.500	N/A	54.2	160.1	198.4	275.3T	N/A	N/A
6	2	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	139.1	10.5	28.5	9.7S	11.7	13.6
6	1	Leg	A500	gr.CS	Tension	5	1.000	A325X	1.500	N/A	54.2	160.1	198.4	275.3T	N/A	N/A
6	1	Diag	A529	gr.50	Bolted	1	0.500	A325X	1.250	0.250	146.4	9.5	28.5	9.7S	11.7	13.6
5	3	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	43.6	239.3	275.0	330.3T	N/A	N/A
5	3	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	126.0	15.5	34.6	15.2S	14.7	17.5
5	2	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	43.6	239.3	275.0	330.3T	N/A	N/A
5	2	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	132.2	14.1	34.6	15.2S	14.7	17.5
5	1	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	43.6	239.3	275.0	330.3T	N/A	N/A
5	1	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	138.5	12.8	34.6	15.2S	14.7	17.5
4	3	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.0	274.8	302.1	330.3T	N/A	N/A
4	3	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	143.6	11.9	34.6	15.2S	14.7	17.5
4	2	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.0	274.8	302.1	330.3T	N/A	N/A
4	2	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	149.8	11.0	34.6	15.2S	14.7	17.5
4	1	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.0	274.8	302.1	330.3T	N/A	N/A
4	1	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	156.1	10.1	34.6	15.2S	14.7	17.5
3	3	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.0	274.8	302.1	330.3T	N/A	N/A
3	3	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	162.4	12.3	45.6	15.2S	19.5	23.2
3	2	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.0	274.8	302.1	330.3T	N/A	N/A
3	2	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	168.7	11.4	45.6	15.2S	19.5	23.2
3	1	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.0	274.8	302.1	330.3T	N/A	N/A
3	1	Diag	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	175.0	10.6	45.6	15.2S	19.5	23.2
2	3	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.4	343.5	378.5	330.3T	N/A	N/A



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Revision: 0
 Site: MOLUS- KY
 Engineer: AS

2	3	Diag	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	167.0	11.7	45.6	30.4S	39.0	32.3
2	3	Horiz	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	145.8	11.6	34.6	30.4S	29.4	24.3
2	3	PlanH1	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	208.4	4.7	27.7	15.2S	14.7	14.1
2	2	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.4	343.5	378.5	330.3T	N/A	N/A
2	2	Diag	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	170.3	11.2	45.6	30.4S	39.0	32.3
2	2	Horiz	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	149.9	10.9	34.6	30.4S	29.4	24.3
2	2	PlanH1	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	216.6	4.3	27.7	15.2S	14.7	14.1
2	1	Leg	A500	gr.CS	Tension	6	1.000	A325X	1.500	N/A	36.4	343.5	378.5	330.3T	N/A	N/A
2	1	Diag	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	173.6	10.8	45.6	30.4S	39.0	32.3
2	1	Horiz	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	154.1	10.4	34.6	30.4S	29.4	24.3
2	1	PlanH1	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.250	224.7	4.0	27.7	15.2S	14.7	14.1
1	3	Leg	A500	gr.CS	Tension	8	1.000	A325X	1.500	N/A	36.4	343.5	378.5	440.4T	N/A	N/A
1	3	Diag	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	157.1	15.5	54.8	30.4S	39.0	36.9
1	3	Horiz	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	158.3	9.8	34.6	30.4S	29.4	24.3
1	3	PlanH1	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.375	193.4	6.6	34.6	15.2S	14.7	17.5
1	2	Leg	A500	gr.CS	Tension	8	1.000	A325X	1.500	N/A	36.4	343.5	378.5	440.4T	N/A	N/A
1	2	Diag	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	160.0	14.9	54.8	30.4S	39.0	36.9
1	2	Horiz	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	162.4	9.3	34.6	30.4S	29.4	24.3
1	2	PlanH1	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.375	200.2	6.1	34.6	15.2S	14.7	17.5
1	1	Leg	A500	gr.CS	Tension	8	1.000	A325X	1.500	N/A	36.4	343.5	378.5	440.4T	N/A	N/A
1	1	Diag	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	162.9	14.4	54.8	30.4S	39.0	36.9
1	1	Horiz	A529	gr.50	Bolted	2	0.625	A325X	1.500	0.375	166.6	8.9	34.6	30.4S	29.4	24.3
1	1	PlanH1	A529	gr.50	Bolted	1	0.625	A325X	1.500	0.375	207.0	5.7	34.6	15.2S	14.7	17.5



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Project: 180 FT RT TOWER
Date and Time: 7/20/2018 9:46:34 AM

Revision: 0
Site: MOLUS- KY
Engineer: AS

Section N: LEG REACTION DATA

Load Combination	Max Envelope				
Wind Direction	Maximum				
	Force-Y Download (Kips)	Force-Y Uplift (Kips)	Shear-X (Kips)	Shear-Z (Kips)	Max Shear (Kips)
	341.18	292.68			31.97



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Engineer: AS

Section 0: TOWER FOUNDATION DATA

Load Combination	Max Envelope						
Wind Direction	Maximum						
Axial Load (Kips)	Shear Load-X (Kips)	Shear Load-Z (Kips)	Total Shear (Kips)	Moment-X (Kipsft)	Moment-Y (Kipsft)	Moment-Z (Kipsft)	Total Moment (Kipsft)
62.50	-45.93	-25.28	52.43	-2779.18	1.65	5142.57	5845.50
62.50	-52.52	0.00	52.52	-4.98	-10.92	5831.52	5831.52

Customer: APPALACHIAN WIRELESS
 Project: 180 FT RT TOWER
 Site: MOLUS- KY
 Engr. File: 226626
 Build Code: ANSI/TIA-222-G-2005



E1

Mat Foundation

ver.2.2.9

Design Parameters

Description	Load Case					Service
	1	2	3	4	5	
Total Moment, ft-kips	5,845.50	5,839.33	887.38	301.06	294.71	2,017.34
Total Shear, kips	52.43	52.43	7.19	2.16	2.16	18.11
Total Tower Wt, kips	62.50	46.87	132.90	62.50	46.87	52.08
Max. Uplift, kips	287.12	292.68	2.39	.00	.22	87.90
Shear, kips	28.29	28.59	1.61	9.09	.42	9.09
Max Download, kips	341.18	335.62	92.72	37.37	31.81	127.94
Shear	31.97	31.67	6.80	2.50	2.20	11.62
Soil L.F.	1.20	0.90	1.20	1.20	0.90	1.00
Concrete L.F.	1.20	0.90	1.20	1.20	0.90	1.00

Foundation	
Ht. AGL, ft	0.50
Depth, ft.	6.00
Tower	
Face Width, ft	21.02
Offset, in	42.00
Soil	
Blow Count	N/A
Inplace Unit Wt, pcf	110.00
Submerged Unit Wt, pcf	60.00
Friction Angle, ϕ , deg.	30.00
Cohesion, ksf	N/A
Uplift Angle, deg.	30.00
Water Depth, ft	None
Ult Bearing Capacity, ksf	24.00

Mat	
Thickness, ft	1.75
Width, ft	27.00
EA, in	15.00
Batter, in/ft	0.00

Pier	
Height, ft	4.75
Diameter, ft	3.00
No. Piers	3
Shape	Round

Anchor Bolts	
Diameter, in	1.0000
No.	8
Length, in	70.00
Bolt Circle, in	13.75
Projection, in	6.00

Pocket	
Diameter, in	N/A
Thickness, ft	N/A

Concrete	
28 Day Strength, ksi	4.50
Dry Unit Wt, pcf	150.00
Wet Unit Wt, pcf	88.00

Rebar Fy	
Vertical, ksi	60.00
Circular, ksi	60.00
Horizontal, ksi	60.00

ALLOWABLE BEARING PRESSURE = 12,000 PSF

Results

ϕM_N - Parallel Axis 6,905.48 ft-kips
 ϕM_N - Diagonal Axis 7,598.91 ft-kips
 Moment - Interaction Ratio 0.921
 ϕV_N - Lateral Load 139.26 kips
 Lateral Load - Interaction Ratio 0.377

Final Mat Dimension : 27.00 x 27.00 x 1.75 ft. thick w/ (3) 3.00 ft. Dia. Piers

Final Pocket Dimension : Pockets not required

Total Volume of Concrete : 51.0 yd³

Designed By: AS
 Date: 20 Jul.18 @ 01:25 PM

Checked By: HA
 Date: 7/20/18

Customer: APPALACHIAN WIRELESS
 Project: 180 FT RT TOWER
 Site: MOLUS- KY
 Engr. File: 226626
 Build Code: ANSI/TIA-222-G-2005



Mat Foundation

ver.2.2.9

OTM Capacity

Controlling Load Case: 2 [Wind w/Min. Dead Load]
 Foundation Width = 27.00 ft
 $M_U = 6,362.4$ ft-kips

	ϕM_N , ft-kips	x, ft	N	σ_{ur}
Parallel	6,905.5	2.700	0.100	10.15
Diagonal	7,598.9	8.538	0.224	10.15

$\phi M_N = 6,905.48$ ft-kips IRatio = 0.921
 $\phi V_N = 139.26$ kips IRatio = 0.377

Mat Design

$\gamma_c = 121.67$ pcf

Exterior Slab	x, ft	N	σ_R , ksf	P_s , kips	P_{su} , kips	Moment, ft-kips/ft		Shear, kips/ft	
						DownLoad Side	Uplift Side	DownLoad Side	Uplift Side
Parallel	4.500	0.167	4.55	24.33	0.00	22.04	7.89	13.10	3.82
Diagonal	11.763	0.308	4.00	24.33	0.00	74.84	27.71	19.64	7.27

Interior Slab	Moment, ft-kips/ft			Shear, kips/ft		
	DownLoad Side	Uplift Side		DownLoad Side	Uplift Side	Soil Pressure Termination
	16.07	62.19		4.05	7.83	5.80

Punching Shear	Download			Uplift			Description
	Interior	Edge	Corner	Interior	Edge	Corner	
$b_{m,}$ ft	15.97	13.96	10.91	13.31	12.63	10.25	2-Way Shear
V_{su} , psi	127.74	154.96	209.32	131.19	145.23	190.98	
ϕV_c , psi	228.08	228.08	228.08	228.08	228.08	228.08	
IR	0.56	0.68	0.92	0.58	0.64	0.84	
$M_{m,}$ ft-kips	91.1			81.5			Moment transfer to slab
$B_{e,}$ ft	7.1			6.7			
$M_{u,}$ ft-kips/ft	12.8			12.1			
Edge Distances: a = 4.86 ft. b = 2.99 ft. c = 3.93 ft.							

Summary	Max. Value	Utilization
Slab Moment, ft-kips/ft	74.84	0.962
Slab Shear, kips/ft	19.64	0.897
Punching Shear, psi	209.32	0.918
Soil Bearing Required, σ_{UR} , ksf	6.07	0.253

Mat Reinforcement	
Min. Steel Area (Strength)	.891 in ² /ft.
Min. Steel Area (Temperature)	.227 in ² /ft.
Steel Strain Actual	0.013
Minimum Steel Strain Required	0.005

32 - #8 Horizontal bars equally spaced @10.26 in., each way, top and bottom, total of 128, $A_s = 0.931$ in²/ft

Designed By: AS
 Date: 20 Jul,18 @ 01:25 PM

Checked By: HA
 Date: 7/20/18

Customer: APPALACHIAN WIRELESS
Project: 180 FT RT TOWER
Site: MOLUS- KY
Engr. File: 226626
Build Code: ANSI/TIA-222-G-2005



Mat Foundation

ver.2.2.9

Pier Design

Controlling Load Case: 2 [Wind w/Min. Dead Load]

C = 335.62 kips	Vc = 31.67 kips	Mc = 150.43 ft-kips
T = 292.68 kips	Vt = 28.59 kips	Mt = 135.80 ft-kips
Fy = 60.00 ksi	Fyt = 60.00 ksi	L.F. = 1.00
H = 36.00 in.	Ds = 27.00 in.	F'c = 4.50 ksi
U = 1.00	Irs = Round	

*** NOTE: Pier cross section is Round ***

SUMMARY OF ANALYSIS

Minimum area of steel required	= 10.159 in ²	(Rhom in = 0.0100)
Area of steel provided.	= 11.992 in ²	(Rhoactual = 0.0118)
Maximum steel area limit	= 81.430 in ²	(Rhomax = 0.0800)

(12) #9 Vertical Bars equally spaced w/ #4 Circular Ties @ 6" on center.

CIRCULAR TIE DATA

Size	Spacing
3	7.3
4	12.0
5	12.0
6	12.0

Use spacing shown or maximum tie spacing specified in ACI 318, Section 7.10.5 for compression reinforcement, whichever is less.

DEVELOPMENT LENGTH MODIFIERS FOR BAR DEVELOPMENT

Modifier for tension development = 1.000

Modifier for compression development = 0.151

REQUIRED Ld = MODIFIER * BASIC Ld * ACI 318 MODIFIERS, (12 in. min.)

Designed By: AS
Date: 20 Jul,18 @ 01:25 PM

Checked By: HA
Date: 7/20/18

Page iii

File no: 226626

Customer: **APPALACHIAN WIRELESS**

Date 07/20/18

By: AS

Description: **180 FT RT TOWER**

Page 1

Chk: HA 7/20/18

MOLUS, KY

Ver. 11/16/01

F2

FACTORED REACTIONS / LEG

COMPRESSION = 341.18 k (8) - 1 " dia A.B. per leg
 UPLIFT = 292.68 k $f'_c = 4,500$ psi
 SHEAR = 31.97 k $f_v = 60,000$ psi

SOIL PARAMETERS

- A) Depth neglected for skin friction = Top 4.0 ft
- B) Average ultimate skin shear for uplift:
4.0 ft to 22.0 ft depth = 2200 psf.
- C) Average ultimate skin shear for download:
4.0 ft to 22.0 ft depth = 2200 psf.
- D) Ultimate net end bearing at 22.0 ft = 48.00 ksf.
- E) Groundwater table below foundation depth.

USE 3'- 6" DIAMETER AND 22'- 0" DEEP DRILLED PIER WITH 0'- 6" CAP

Perimeter = 11.00 ft Area = 9.62 ft²
 Total Download = 341.18 + [1.2 x 0.15 - 0.75 x 0.120] x 22 x 9.62 =
 = 360.7 k
 Tension Capacity = 9.62 x (22.5 x 0.15 + 0.0 x 0.09) x 0.90 +
 11.00 x (2.200 x 18.0) x 0.75 =
 29.2 + 326.7 = 355.9 k
 355.9 >= 292.68 OK
 Comp. Capacity = 9.62 x 48.00 x 0.75 +
 11.00 x (2.200 x 18.0) x 0.75 =
 346.3 + 326.7 = 673.0 k
 673.0 >= 360.7 OK

LATERAL - SEE ATTACHED CALCULATIONS USING WIGGINS METHOD

Max M = 274.65 ft-k Max V = 39.24 k

REINFORCEMENT - SEE ATTACHED SHAFT PROGRAM

USE 16 # 4 - # 8 BARS VERTICAL WITH TIES AT 6" IN TOP 7.0 FT AND AT 10" IN REST OF PIER
 {33.0 in Cage Diameter}

CONCRETE VOLUME = 9.62 x 22.5 / 27 = 8.0 cu yds / pier

 ** WIGGINS METHOD **

 ** DETERMINE MAXIMUM LATERAL SOIL PRESSURE **
 ** AND MAXIMUM MOMENT IN THE SHAFT FOR **
 ** A DRILLED PIER FOUNDATION **
 ***** Fri Jul 20 13:19:55 2018 *****
 Ver. 2.3 NT

FORMULAS USED

$$S1 = \frac{6 \cdot P \cdot (1+N)}{D \cdot L \cdot (1-N) \cdot (1-N)}$$

$$S2 = \frac{(N+3) \cdot (N+3) \cdot S1}{8 \cdot (N+1) \cdot (N+2)}$$

$$K = \frac{1 - (N \cdot N)}{2 \cdot (2+N)}$$

$$Y = \frac{L \cdot (1-K) - NL}{2}$$

$$M = P \cdot (NL + 5/8 \cdot Y)$$

$$V = S1 \cdot D \cdot K \cdot L / 2 \text{ or } P \text{ whichever is greater}$$

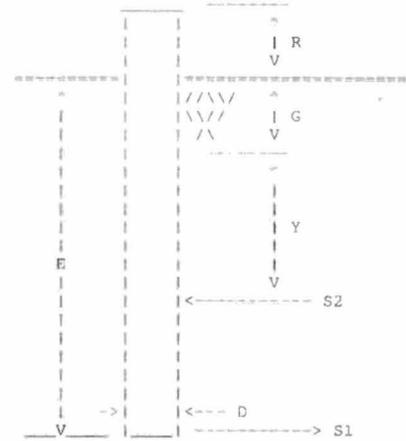
$$L = (MA/P) + R + E$$

$$NL = (MA/P) + R + G$$

$$N = NL / L$$

$$SP1 = S1 / E$$

$$SP2 = S2 / (Y+G)$$



Diameter of Pier = D = 3.50 ft
 Projection Above Grade = R = .50 ft
 Embedment Depth = E = 22.00 ft
 Depth of Soil Ignored = G = 4.00 ft

Equivalent Length of Pier = L = 22.50 ft
 Length for NO Soil Resistance = NL = 4.50 ft
 Applied Moment at Top of Pier = MA = .00 ft-k
 Shear at Top of Pier = P = 31.97 kips

MAXIMUM LATERAL SOIL PRESSURES

K = .2182
 Y = 6.55 ft
 S1 = 4.56 / ksf
 S2 = 2.214 ksf
 SP1 = 208 psf/ft
 SP2 = 210 psf/ft

MAXIMUM VALUES IN SHAFT

M = 274.65 ft-k
 V = 39.24 kips

 ** COMPARISION DATA **

226626
 APPALACHIAN WIRELESS

BROMS -----> SAND
 PHI = 30.0 degrees
 DENSITY = 100.00 pcf
 E = 18.11 ft
 Max. M = 279.66 ft-k
 Max. V = 97.59 kips
 Ls = 12.827 ft

CLAY
 C = 1.00 ksf
 E = 14.69 ft
 Max. M = 216.27 ft-k
 Max. V = 58.36 kips

EIA REV. E NORMAL SOIL -----> E = 11.16 ft

EIA REV. F NORMAL SOIL -----> E = 14.13 ft

*&l8DNAME: AS

FILE NO. 226626

PAGE NO. 1

SHAFT REINFORCING PROGRAM VER. 91.7

DESIGNED BY: AS
 ENG. FILE NO.: 226626
 DATE: 07/20/18

CUSTOMER: APPALACHIAN WIRELESS
 DESCRIPTION: 180 FT RT TOWERMOLUS, KY

INPUT DATA

C = 341.18 Kips Vc = 39.24 Kips Mc = 274.65 Ft-K
 T = 292.68 Kips Vt = 39.24 Kips Mt = 274.65 Ft-K
 Fy = 60.00 Ksi Fyt = 60.00 Ksi L.F. = 1.00
 H = 42.00 In. Ds = 33.00 In. F'c = 4.50 Ksi

U = 1.00

Irs = 1

*** SHAFT CROSS SECTION IS ROUND ***

SUMMARY OF ANALYSIS

Minimum area of steel req'd. = 12.28 sq.in. (Rhomn = 0.0089)

Maximum steel area limit = 110.84 sq.in. (Rhomax = 0.0800)

CIRCULAR TIE DATA

Vu < .85*Vc/2, shear reinforcement is not required.

For No. 4 circular ties, Smax = 11.43 Inches /

For No. 5 circular ties, Smax = 15.27 Inches

For No. 6 circular ties, Smax = 15.27 Inches

DLMT = MODIFIER FOR TENSION DEVELOPMENT = 1.000

DLMC = MODIFIER FOR COMPRESSION DEVELOPMENT = .313

REQUIRED Ld = MODIFIER * BASIC Ld * ACI 318 MODIFIERS (12 in. min.)

DLMT = MODIFIER FOR TENSION DEVELOPMENT = 1.000

DLMC = MODIFIER FOR COMPRESSION DEVELOPMENT = .339

REQUIRED Ld = MODIFIER * BASIC Ld * ACI 318 MODIFIERS (12 in. min.)



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2018-ASO-5845-OE

Issued Date: 05/07/2018

Ali Kuzehkanani
East Kentucky Network, LLC
8300 Greensboro Drive, Suite 1200
Tysons, VA 22102

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Tower Molus
Location:	Molus, KY
Latitude:	36-49-03.50N NAD 83
Longitude:	83-29-47.22W
Heights:	1424 feet site elevation (SE) 190 feet above ground level (AGL) 1614 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 L Change 1.

This determination expires on 11/07/2019 unless:

- (a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
- (b) extended, revised, or terminated by the issuing office.
- (c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA. This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Communications Commission (FCC) because the structure is subject to their licensing authority.

If we can be of further assistance, please contact our office at (404) 305-6531, or darin.clipper@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2018-ASO-5845-OE.

Signature Control No: 360146925-364486255

(DNE)

Darin Clipper
Supervisor

Attachment(s)
Case Description
Frequency Data
Map(s)

cc: FCC

Case Description for ASN 2018-ASO-5845-OE

A new 180' tower with top-mounted antennas (overall height of 190' AGL).

Frequency Data for ASN 2018-ASO-5845-OE

LOW FREQUENCY	HIGH FREQUENCY	FREQUENCY UNIT	ERP	ERP UNIT
6	7	GHz	55	dBW
6	7	GHz	42	dBW
10	11.7	GHz	55	dBW
10	11.7	GHz	42	dBW
17.7	19.7	GHz	55	dBW
17.7	19.7	GHz	42	dBW
21.2	23.6	GHz	55	dBW
21.2	23.6	GHz	42	dBW
614	698	MHz	1000	W
614	698	MHz	2000	W
698	806	MHz	1000	W
806	901	MHz	500	W
806	824	MHz	500	W
824	849	MHz	500	W
851	866	MHz	500	W
869	894	MHz	500	W
896	901	MHz	500	W
901	902	MHz	7	W
929	932	MHz	3500	W
930	931	MHz	3500	W
931	932	MHz	3500	W
932	932.5	MHz	17	dBW
935	940	MHz	1000	W
940	941	MHz	3500	W
1670	1675	MHz	500	W
1710	1755	MHz	500	W
1850	1910	MHz	1640	W
1850	1990	MHz	1640	W
1930	1990	MHz	1640	W
1990	2025	MHz	500	W
2110	2200	MHz	500	W
2305	2360	MHz	2000	W
2305	2310	MHz	2000	W
2345	2360	MHz	2000	W
2496	2690	MHz	500	W

TOPO Map for ASN 2018-ASO-5845-OE



From: Ali Kuzehkanani AKuzehkanani@fcclaw.com
Subject: FW: 638 - KAZC study request for a construction of a new site near Molus
Date: March 20, 2018 at 9:18 AM
To: Raina Helton rhelton@ekn.com
Cc: Lynn Haney lhaney@ekn.com, m.thacker@tgtel.com, Pamela Gist pgist@fcclaw.com



FYI

From: Houlihan, John F (KYTC) <John.Houlihan@ky.gov>
Sent: Monday, March 19, 2018 2:57 PM
To: Ali Kuzehkanani <akuzehkanani@fcclaw.com>
Subject: RE: 638 - KAZC study request for a construction of a new site near Molus

No permit is required from the KAZC. Thank you
Kentucky Airport Zoning Commission (KAZC)

John Houlihan, Administrator
Department of Highways, District Six
421 Buttermilk Pike
Covington, KY 41017

Office 859-341-2700, Desk 859-341-2707 Ext. 292, Cell 502-330-3955

KAZC webpage: <https://transportation.ky.gov/Aviation/Pages/airportzoning.aspx>

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From: Ali Kuzehkanani [<mailto:akuzehkanani@fcclaw.com>]
Sent: Monday, March 19, 2018 2:51 PM
To: Houlihan, John F (KYTC) <John.Houlihan@ky.gov>
Cc: 'Raina Helton' <rhelton@ekn.com>; Lynn Haney <lhaney@ekn.com>; m.thacker@tgtel.com;
Pamela Gist <pgist@fcclaw.com>
Subject: 638 - KAZC study request for a construction of a new site near Molus

Dear John:

Forwarded herewith in accordance with KRS 183.990 and Chapter 50 of Title 602 of the Kentucky Administrative Regulations, is an "Application for Permit to Construct or Alter a Structure" (Form TC 56-50) for a 190-foot communications support structure (Molus) proposed near Molus (Harlan), KY. The site is located at approximately 0.3 miles NW of Molus (Harln), KY at geographic coordinates (NAD83) N 36-49-03.50; W 83-29-47.22.

Attached is a copy of the electronic FAA 7460-1 filing. A copy of the final FAA determination will be provided to you as soon as it is issued.

Please let me know if you have any questions or require any additional information.

Thank you in advance for your help in this matter.

Regards,

Ali Kuzehkanani

Director of Engineering

Lukas, LaFuria, Gutierrez & Sachs, LLP

8300 Greensboro Drive, Suite 1200

Tysons, VA 22102

Direct (703) 584-8667

Mobile (703) 927-1961

Fax (703) 584-8696

Email ali@fcclaw.com

Email akuzehkanani@fcclaw.com

Driving Directions for Molus

Beginning at East Central Street beside the Harlan County Courthouse drive approximately 750ft to the intersection of 421 & West Central Street. Turn right onto 421 and drive 1 mile to the intersection of 421 & U.S. 119. Turn left onto U.S. 119. Continuing on for 12.4 miles then on your right you will see Vanover Hill Road. Turn right onto Vanover Hill Road. Drive .3 miles and our site road will be on your right (sign will be posted). Drive approximately .2 miles (signs will be posted).

Prepared by:

Daryl Bartley

CELL SITE COMPLIANCE AGENT

East Kentucky Network, LLC

D/b/a Appalachian Wireless

(606) 791-0310 (cell)

dbartley@ekn.com

Molus

Location:

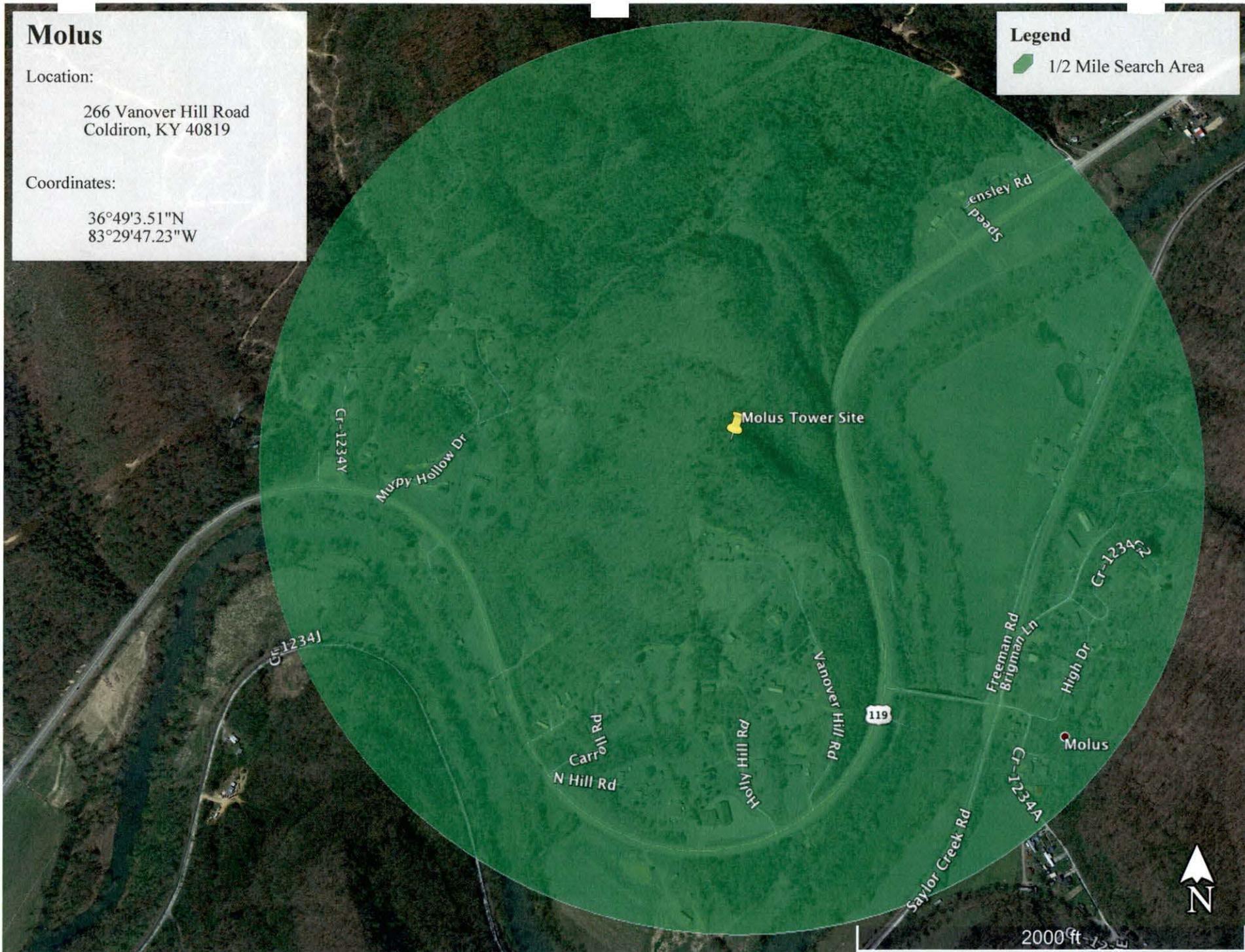
266 Vanover Hill Road
Coldiron, KY 40819

Coordinates:

36°49'3.51"N
83°29'47.23"W

Legend

 1/2 Mile Search Area





MEMORANDUM OF LEASE

THIS MEMORANDUM OF LEASE is made and entered into on this 5th day of March, 2018, with a commencement date of March 1, 2018 (the “**Commencement Date**”), by and between **BRISTOL BELCHER** and **VANESSA BELCHER**, a married couple, with an address of 12280 South US Highway 119, Coldiron, Kentucky 40819; and **BOBBY BELCHER** and **RHONDA BELCHER**, a married couple, with an address of 12298 S US Highway 119, Coldiron, Kentucky 40819, hereinafter referred to as “**Lessors**”, and **EAST KENTUCKY NETWORK, LLC D/B/A APPALACHIAN WIRELESS**, a Kentucky limited liability company, with a mailing address of 101 Technology Trail, Ivel, Kentucky, 41642, hereinafter referred to as “**Lessee**.”

WITNESSETH

1. **Demised Premises.** For good and valuable consideration, Lessors leased to Lessee, and Lessee has leased from Lessors that certain tract of real estate located in Harlan County, Kentucky, and being a portion of the same land conveyed to Lessors by Deed dated January 17, 2018, and recorded on January 18, 2018, in Deed Book 472, Page 530, in the Harlan County Clerk’s Office. Said property is more particularly described in the description **attached** hereto and made a part hereof as **Exhibit A** and the plat **attached** hereto and made a part hereof as **Exhibit B**, prepared by James W. Caudill, Licensed Professional Land Surveyor (hereinafter referred to as the “**Premises**”). The Lessors have also granted unto Lessee full and complete rights of ingress, egress and regress to and from the Premises over any property owned by Lessors, including, but not limited to, the property conveyed to Bristol and Vanessa Belcher by Deed dated January 11, 2002, of record in Deed Book 363, Page 199 of the Harlan County Clerk’s Office, and other associated rights for installation of utilities, maintenance, and other purposes.

2. **Term.** The initial term of the Lease is for a period of five (5) years from the Commencement Date set forth above.

3. **Renewals.** The Lease shall automatically renew for an additional seven (7) terms of five (5) years each, unless Lessee provides sixty (60) days written notice prior to the end of the current term that it does not wish to renew.

4. **Binding Effect.** All of the terms, conditions, and covenants hereof shall be binding and inure to the benefit of the parties and their respective heirs, representatives, successors, and assigns.

5. **Purpose.** This Memorandum of Lease is prepared solely for the purpose of recordation, and is not intended to, nor shall it be deemed to, modify any of the terms and conditions set forth in the Lease, nor to construe any of the rights, duties or responsibilities of Lessors and Lessee. In the event of any conflict between the terms and conditions of this Memorandum and the terms and conditions of the Lease, the terms and conditions of the Lease shall supersede and control.

IN WITNESS WHEREOF, Lessors and Lessee have caused their names to be signed hereto, as of the date(s) indicated below.

LESSORS:



BRISTOL BELCHER



VANESSA BELCHER



BOBBY BELCHER

Rhonda Belcher
RHONDA BELCHER

COMMONWEALTH OF KENTUCKY,
COUNTY OF Harlan, TO WIT;

The foregoing instrument was acknowledged before me on this 26th day of February, 2018, by Bristol Belcher and Vanessa Belcher, Lessors.

Cindy McCarty
Notary Public

My Commission Expires 9-2-2020



COMMONWEALTH OF KENTUCKY,
COUNTY OF Harlan, TO WIT;

The foregoing instrument was acknowledged before me on this 26th day of February, 2018, by Bobby Belcher and Rhonda Belcher, Lessors.

Cindy McCarty
Notary Public

My Commission Expires 9-2-2020



LESSEE:

EAST KENTUCKY NETWORK, LLC D/B/A
APPALACHIAN WIRELESS

W A Gillum

By: W.A. Gillum

Its: CEO/ General Manager

COMMONWEALTH OF KENTUCKY
COUNTY OF Floyd

The foregoing instrument was acknowledged before me on this 5th day of March, 2018, by W.A. Gillum, CEO/General Manager of East Kentucky Network, LLC d/b/a Appalachian Wireless, Lessee.

Raina L. Helton

Notary Public

My Commission Expires 2-6-2020



This instrument was prepared by:

Krystal Branham

Krystal Branham, Attorney

101 Technology Trail

Ivel, Kentucky 41642

(606) 339-1006

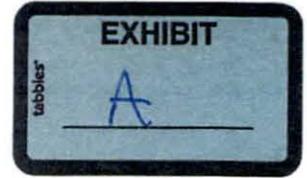
LOT DESCRIPTION

Property of
Bristol Belcher
12280 S. Highway 119
Coldiron, KY 40819

And

Bobby Belcher
12298 S. Highway 119
Coldiron, KY 40819

Off State Highway 119 Near Molus
in Harlan County, KY
February 20, 2018



A certain tract or parcel of land lying and being in Harlan County, Kentucky, and being a portion of the property conveyed to Bristol Belcher, a married person, and Bobby Belcher, a married person, by Deed of Conveyance dated January 17, 2018, from Pearl Belcher and his wife, Brenda Belcher, of record in Deed Book 472 Page 530, in the office of the Harlan County Clerk, Harlan, Kentucky. The property is further bounded and described as follows:

Lot 1A

Beginning on a set iron pin with cap marked LS#2259 on the ridge near an old wire fence, and having NAD83 KY Single Zone Coordinates of: N:3465082.65 E:5581002.44; thence severing the property of Bristol Belcher and Bobby Belcher (Deed Book 472, page 530) and running down the hill South 71 deg 01 min 10 sec West, a distance of 171.00 feet to a set iron pin with cap marked LS#2259 on the hillside; thence running with the side of the hill North 20 deg 00 min 03 sec West, a distance of 142.00 feet to a set iron pin with cap marked LS#2259 on the hillside; thence running back up the hill North 57 deg 04 min 47 sec East, a distance of 157.62 feet to a set iron pin with cap marked LS#2259 on the ridge near an old wire fence; thence continuing with the ridge and generally with the old wire fence South 32 deg 02 min 16 sec East, a distance of 89.96 feet to a set iron pin with cap marked LS#2259 on the ridge near the old wire fence, and on the east side of a knob; thence continuing with the ridge and generally with the old wire fence South 19 deg 07 min 27 sec East, a distance of 92.32 feet, to a set iron pin with cap marked LS#2259 on the ridge near the old wire fence, and also being the point of beginning. Containing a calculated area of 27221.4 square feet, or 0.625 acres.

Also to be included is a right of way for an access road from the public road to Lot 1A.

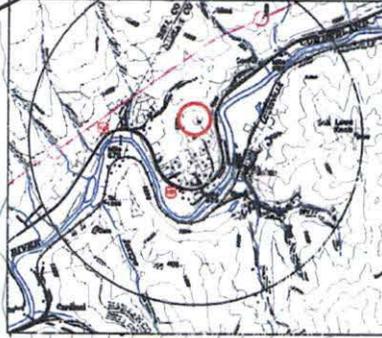
Unless stated otherwise, any monument referred to herein as "set iron pin with cap" is a set 1/2" diameter rebar, at least eighteen (18") in length, with a plastic cap stamped "LS-2259". All bearings stated herein are referred to NAD83, KY single zone of the Kentucky state plane system.

This survey was performed on February 20, 2018 by James W. Caudill, a Kentucky Licensed Professional Land Surveyor No. 2259.



James W. Caudill
James W. Caudill, PLS #2259
2-20-18

APPALACHIAN WIRELESS
 101 TECHNOLOGY TRAIL
 IVEL, KY. 41642
 PROPOSED TOWER SITE
 OFF HWY 119 NEAR MOLUS
 IN HARLAN COUNTY, KY.



VICINITY MAP
 NO SCALE

MAP:5 PARCEL:13.01
 BRISTOL BELCHER AND
 BOBBY BELCHER
 DB:472 PG:530

MAP:5 PARCEL:13
 VERONICA AND MANFRED ANGLIN, JR.
 DEED BOOK:352 PG:450

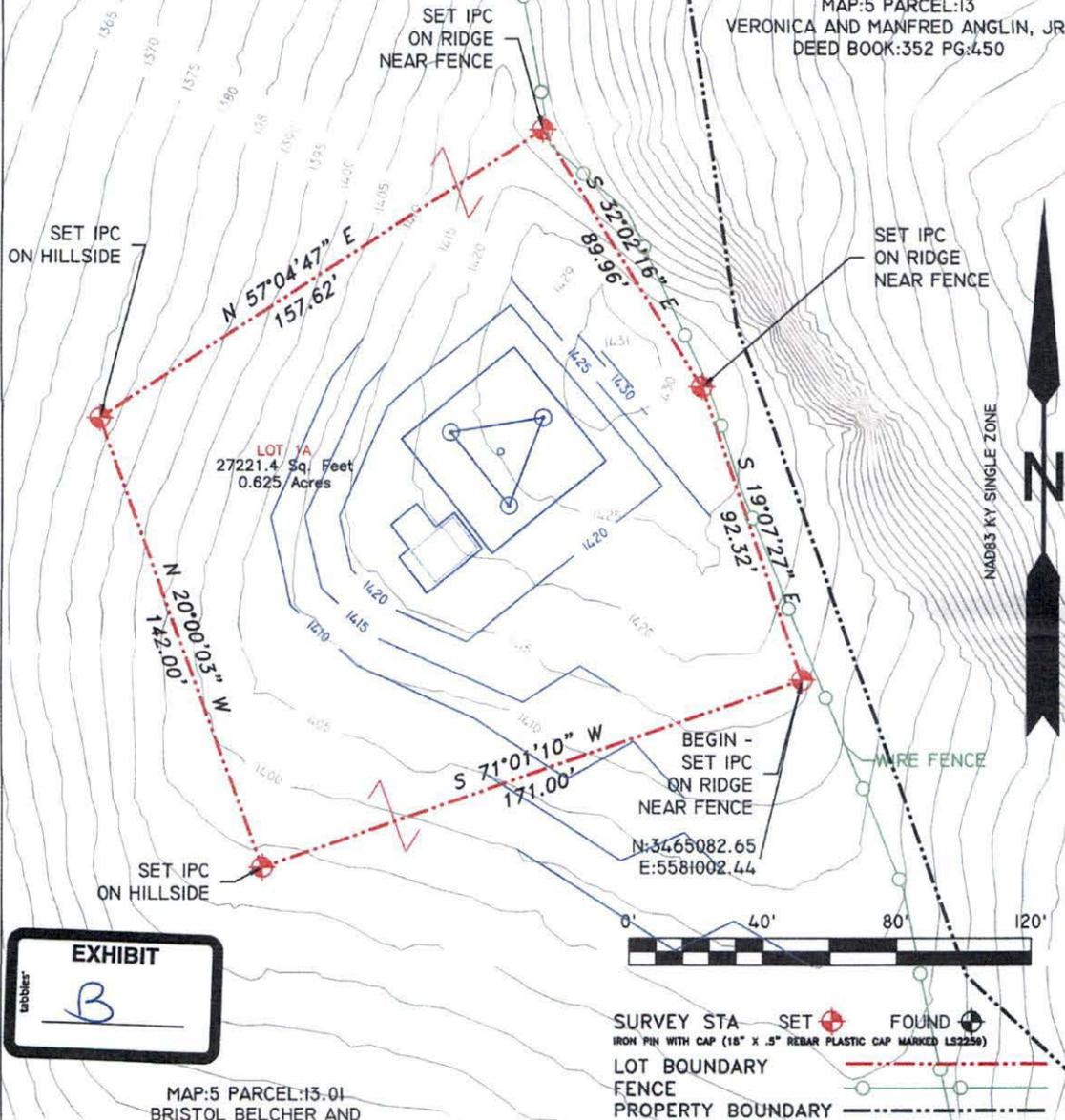


EXHIBIT
 B

SURVEY STA SET FOUND
 IRON PIN WITH CAP (18" X .5" REBAR PLASTIC CAP MARKED LS2259)

LOT BOUNDARY
 FENCE
 PROPERTY BOUNDARY

MAP:5 PARCEL:13.01
 BRISTOL BELCHER AND
 BOBBY BELCHER
 DB:472 PG:530

STATE OF KENTUCKY
 JAMES W. CAUDILL
 LS 2259
 LICENSED PROFESSIONAL LAND SURVEYOR

URBAN CLASS SURVEY
 I HEREBY CERTIFY THAT THIS PLAT DEPICTS A SURVEY MADE BY ME, BY THE METHOD OF RANDOM TRAVERSE. THE BEARINGS SHOWN HEREON HAVE NOT BEEN ADJUSTED FOR CLOSURE. THIS SURVEY AND PLAT MEETS OR EXCEEDS THE MINIMUM STANDARDS OF GOVERNING AUTHORITIES. THE UNADJUSTED ERROR OF CLOSURE WAS 1 IN 65290.
 James W. Caudill 2259 2-20-18
 NAME PLS# DATE

PLAT OF SURVEY		
DRAWN JWC	DATE 02/20/18	SUBDIVISION OF THE PROPERTY OF BRISTOL BELCHER 12280 S. HWY 119 BOBBY BELCHER 12298 S. HWY 119 COLDIRON, KY 40819 DEED BOOK:472 PAGE:530 IN OFFICE OF HARLAN CO. CLERK
APPROVED	DATE	
SCALE 1" = 40'	SHEET 1 OF 1	SURVEYED BY JAMES W. CAUDILL LS2259 2999 PERKINS/MADDEN ROAD AMBURGEY, KY 41773

STATE OF KENTUCKY
COUNTY OF HARLAN

I, DONNA G HOSKINS, CLERK OF THE COUNTY IN AND FOR THE
COUNTY AND STATE AFORESAID, CERTIFY THAT THE FOREGOING

Memorandum of Lease, WAS ON THE 13th
DAY OF March, 2018. AT 11:22 A.M.

LODGED FOR RECORD WHEREUPON HE SAME WITH THE FOREGOING
AND THIS CERTIFICATE HAVE DULY RECORDED IN MY OFFICE IN

Lease BOOK 53 PAGE 428

WITNESSED MY HAND THIS 13th DAY OF March, 2018.

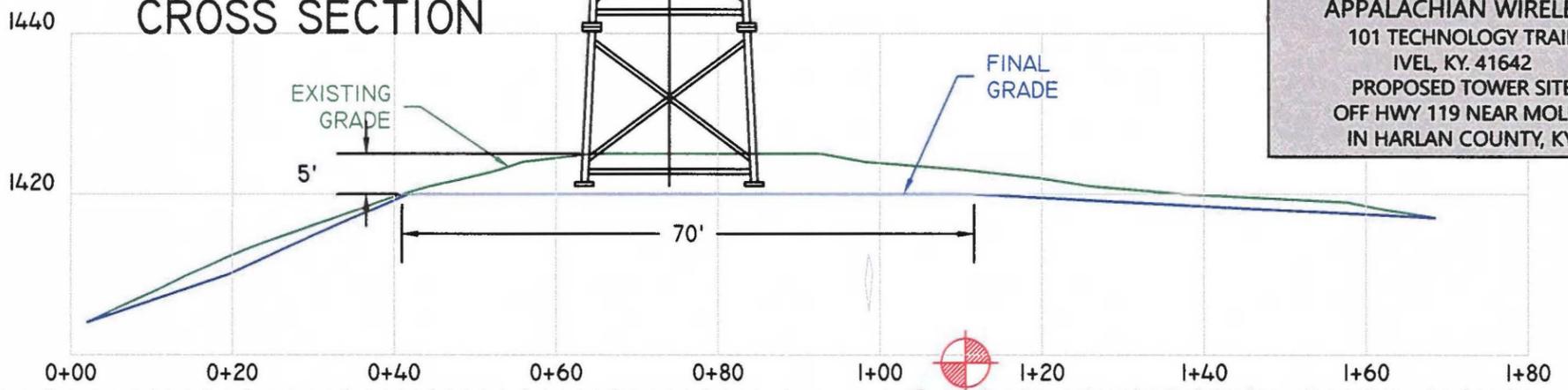
DONNA G HOSKINS, HARLAN COUNTY CLERK

BY April Lewis D.C
APRIL LEWIS

Filed: 03/13/2018 11:22:51 AM
Donna Hoskins, County Clerk
Harlan County, KY

APRIL LEWIS

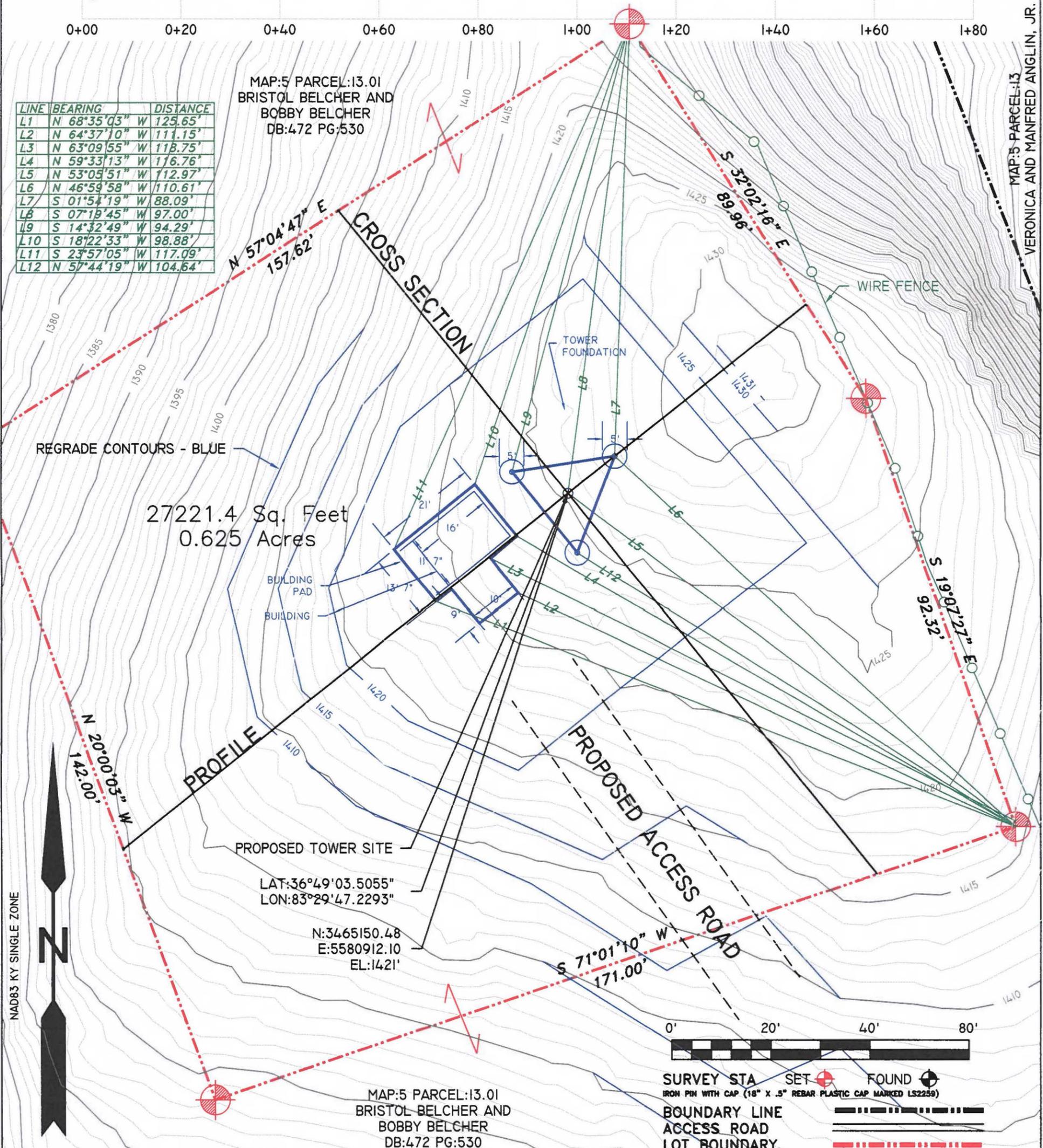
CROSS SECTION



APPALACHIAN WIRELESS
101 TECHNOLOGY TRAIL
IVEL, KY. 41642
PROPOSED TOWER SITE
OFF HWY 119 NEAR MOLUS
IN HARLAN COUNTY, KY.

LINE	BEARING	DISTANCE
L1	N 68°35'03" W	125.65'
L2	N 64°37'10" W	111.15'
L3	N 63°09'55" W	118.75'
L4	N 59°33'13" W	116.76'
L5	N 53°05'51" W	112.97'
L6	N 46°59'58" W	110.61'
L7	S 01°54'19" W	88.09'
L8	S 07°15'45" W	97.00'
L9	S 14°32'49" W	94.29'
L10	S 18°22'33" W	98.88'
L11	S 23°57'05" W	117.09'
L12	N 57°44'19" W	104.64'

MAP:5 PARCEL:13.01
BRISTOL BELCHER AND
BOBBY BELCHER
DB:472 PG:530



NAD83 KY SINGLE ZONE

27221.4 Sq. Feet
0.625 Acres

LAT:36°49'03.5055"
LON:83°29'47.2293"

N:3465150.48
E:5580912.10
EL:1421'

MAP:5 PARCEL:13.01
BRISTOL BELCHER AND
BOBBY BELCHER
DB:472 PG:530

SURVEY STA **SET** **FOUND**
IRON PIN WITH CAP (18" X .5" REBAR PLASTIC CAP MARKED LS2259)
BOUNDARY LINE
ACCESS ROAD
LOT BOUNDARY

"I CERTIFY THAT THE LATITUDE 36° 49' 03.5055"N AND LONGITUDE 83° 29' 47.2293"W ARE WITHIN +/- 50 FEET HORIZONTALLY; AND THE SITE ELEVATION 1421.0 FT. MSL, IS WITHIN +/- 20 FEET VERTICALLY. WITH A STRUCTURE HEIGHT OF 180 FT AGL, THE OVERALL HEIGHT IS 1601 FT. AMSL. THE HORIZONTAL DATUM (COORDINATES) IS IN TERMS OF THE NORTH AMERICAN DATUM OF 1983 (NAD 83). THE VERTICAL DATUM HEIGHTS ARE IN TERMS OF THE NORTH AMERICAN VERTICAL DATUM OF 1988, AND ARE DETERMINED TO THE NEAREST FOOT."

SIGNED: *James W. Caudill* 2-23-18
PRINTED: JAMES W. CAUDILL PE #12305 & LS #2259

-THE PROPOSED TOWER HAS BEEN LOCATED USING DUAL FREQUENCY GPS UNIT PROCESSED BY "OPUS"
-STATE PLANE COORDINATES NAD 83 KY SINGLE ZONE N:3465150.48, E:5580912.10, EL 1425' EXISTING GRD TOP OF PROPOSED FOUNDATION EL:1421'-TOP TOWER EL 1601'
-PRECISION: HORIZONTAL=50' VERTICAL=20'
-THIS SURVEY MEETS OBSTACLE ACCURACY CODE 2C.
-PROPERTY LINE INFORMATION TAKEN FROM DEEDS

STATE OF KENTUCKY
JAMES W. CAUDILL
LS 2259
LICENSED PROFESSIONAL LAND SURVEYOR

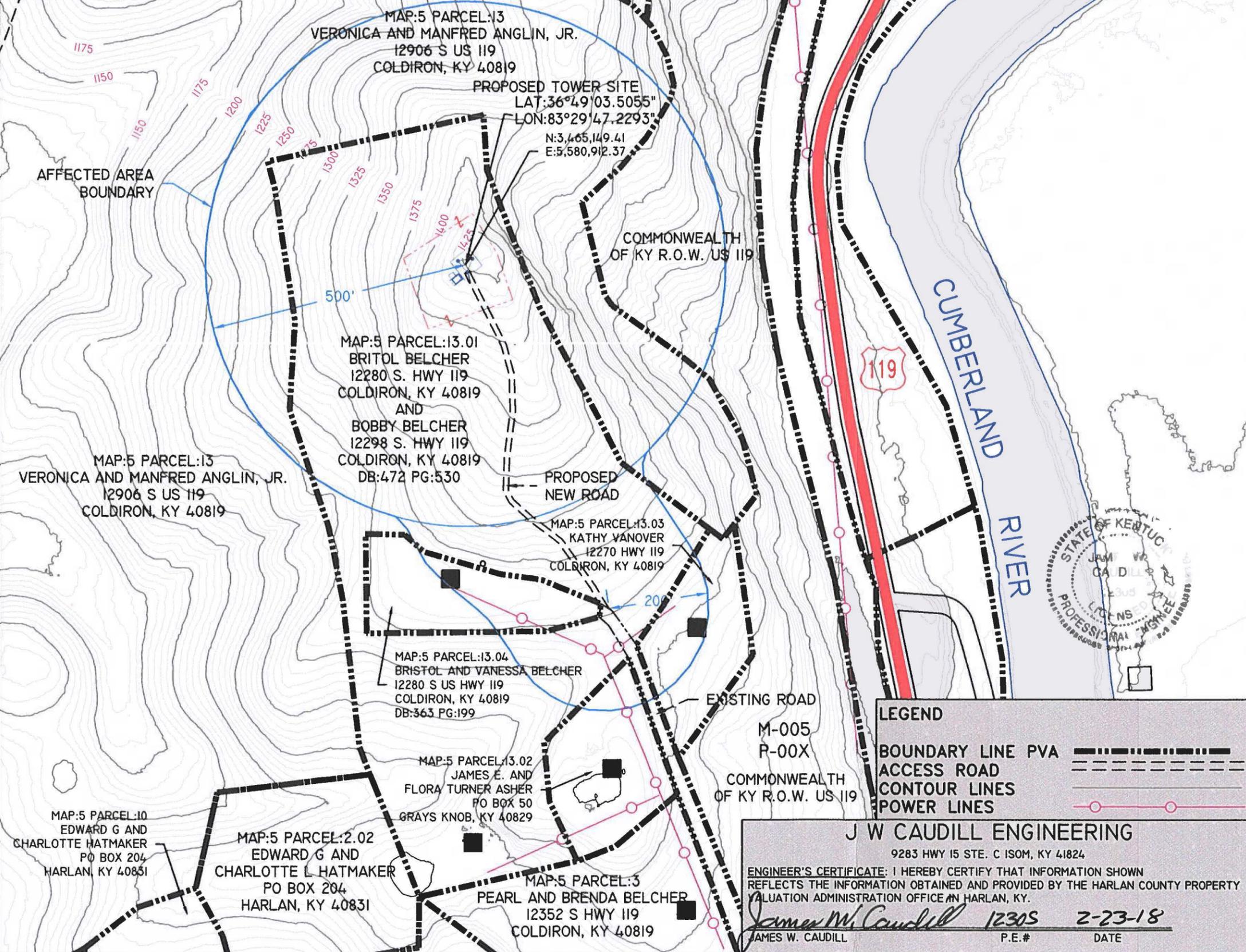
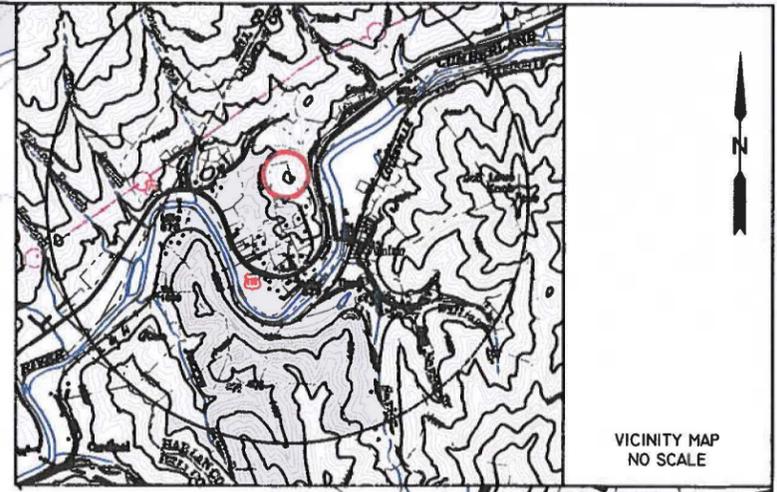


NOTE: SEE FOUNDATION DRAWINGS FOR DETAILS.

PROPOSED SITE PLAN AND STRUCTURE LOCATION MOLUS TOWER APPALACHIAN WIRELESS		
DRAWN JWC	DATE 02/23/18	BRISTOL BELCHER TR. VANOVER HILL ROAD OFF HIGHWAY 119 NEAR MOLUS IN HARLAN COUNTY, KY.
APPROVED	DATE	
SCALE 1" = 20'	SHEET 2 OF 3	PROJECT NO. MOLUS/MOLUS202C

APPALACHIAN WIRELESS
 101 TECHNOLOGY TRAIL
 IVEL, KY. 41642
 MOLUS PROPOSED TOWER SITE
 OFF HIGHWAY 119 NEAR MOLUS
 IN HARLAN COUNTY, KY.

M-005
 P-00X



MAP:5 PARCEL:13
 VERONICA AND MANFRED ANGLIN, JR.
 12906 S US 119
 COLDIRON, KY 40819

MAP:5 PARCEL:13.01
 BRITOL BELCHER
 12280 S. HWY 119
 COLDIRON, KY 40819
 AND
 BOBBY BELCHER
 12298 S. HWY 119
 COLDIRON, KY 40819
 DB:472 PG:530

MAP:5 PARCEL:13
 VERONICA AND MANFRED ANGLIN, JR.
 12906 S US 119
 COLDIRON, KY 40819

MAP:5 PARCEL:13.03
 KATHY VANOVER
 12270 HWY 119
 COLDIRON, KY 40819

MAP:5 PARCEL:13.04
 BRISTOL AND VANESSA BELCHER
 12280 S US HWY 119
 COLDIRON, KY 40819
 DB:363 PG:199

MAP:5 PARCEL:13.02
 JAMES E. AND
 FLORA TURNER ASHER
 PO BOX 50
 GRAYS KNOB, KY 40829

MAP:5 PARCEL:2.02
 EDWARD G AND
 CHARLOTTE L HATMAKER
 PO BOX 204
 HARLAN, KY 40831

MAP:5 PARCEL:3
 PEARL AND BRENDA BELCHER
 12352 S HWY 119
 COLDIRON, KY 40819

PROPOSED NEW ROAD

EXISTING ROAD

20'

LEGEND

BOUNDARY LINE PVA

ACCESS ROAD

CONTOUR LINES

POWER LINES

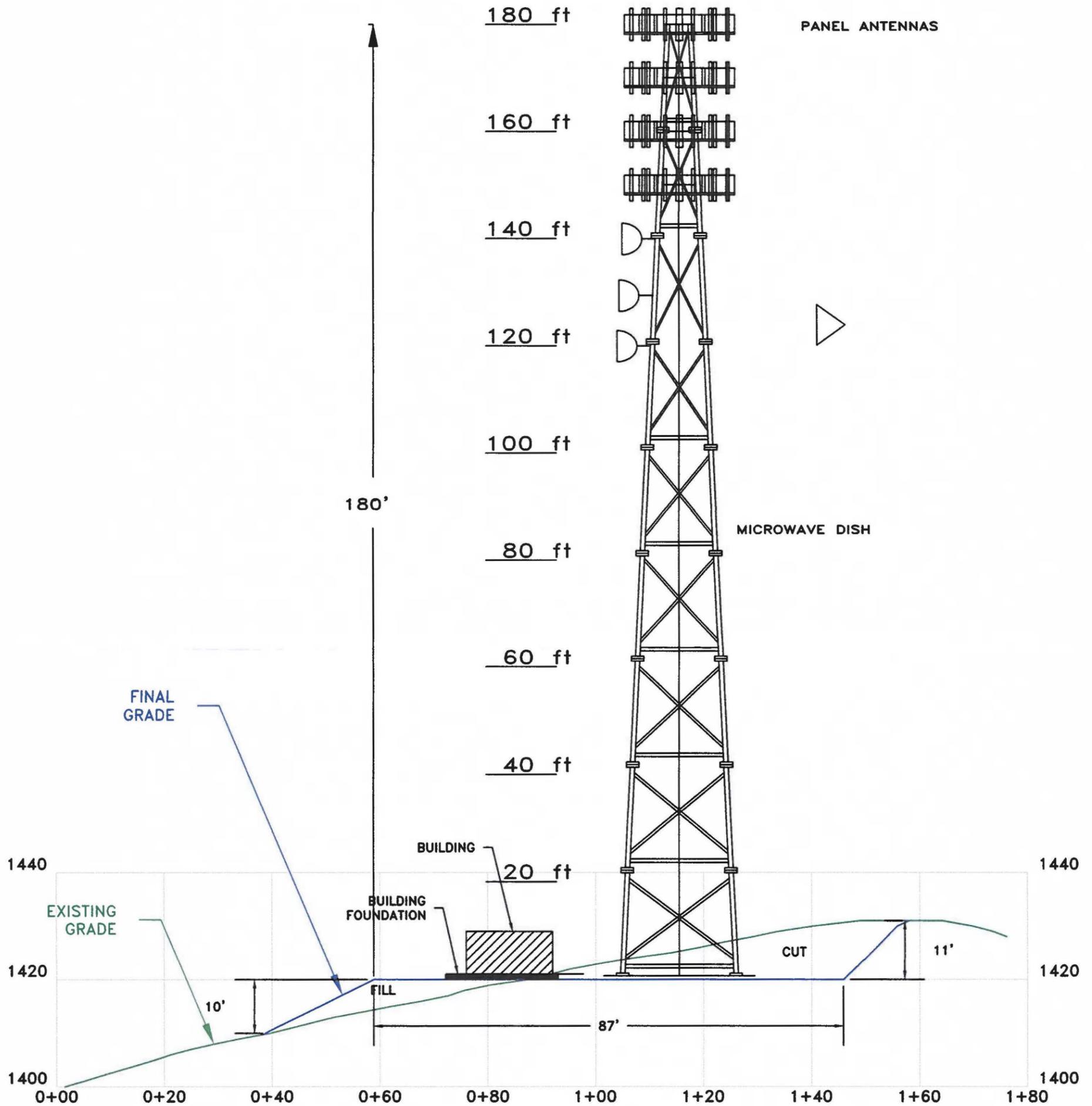
J W CAUDILL ENGINEERING
 9283 HWY 15 STE. C ISOM, KY 41824

ENGINEER'S CERTIFICATE: I HEREBY CERTIFY THAT INFORMATION SHOWN
 REFLECTS THE INFORMATION OBTAINED AND PROVIDED BY THE HARLAN COUNTY PROPERTY
 VALUATION ADMINISTRATION OFFICE IN HARLAN, KY.

James W. Caudill 12305 2-23-18
 JAMES W. CAUDILL P.E.# DATE

PROPOSED SITE PLAN AND STRUCTURE LOCATION MOLUS TOWER APPALACHIAN WIRELESS		
DRAWN JWC	DATE 02/23/18	STRUCTURES AND PROPERTY OWNERS WITHIN 500' BELCHER TRACT OFF OF HIGHWAY 119 NEAR MOLUS IN HARLAN COUNTY
APPROVED	DATE	
SCALE 1" = 200'	SHEET 1 OF 3	PROJECT NO. MOLUS/MOLUS200

PROFILE WITH TOWER



SCALE 1" = 20'



NOTE: SEE FOUNDATION DRAWINGS FOR DETAILS

THIS IS A VERTICAL PROFILE SKETCH OF THE TOWER INDICATING THE PROPOSED ANTENNA AND DISH ELEVATIONS. NO DESIGN CRITERIA WAS CONSIDERED IN THE PREPARATION OF THIS DRAWING.

James W. Caudill 12305 2-23-18
 JAMES W. CAUDILL PE #. DATE



PROPOSED SITE PLAN AND STRUCTURE LOCATION MOLUS TOWER APPALACHIAN WIRELESS		
DRAWN JWC	DATE 02/23/18	BRISTOL BELCHER TR. VANOVER HILL ROAD OFF HIGHWAY 119 NEAR MOLUS IN HARLAN COUNTY, KY.
APPROVED	DATE	
SCALE 1" = 20'	SHEET 3 OF 3	PROJECT NO. MOLUS/MOPRO20_120

Utility ID	Utility Name	Utility Type	Class	City	State
4107900	365 Wireless, LLC	Cellular	D	Atlanta	GA
4109300	Access Point, Inc.	Cellular	D	Cary	NC
4108300	Air Voice Wireless, LLC	Cellular	A	Bloomfield Hill	MI
4110650	Alliant Technologies of KY, L.L.C.	Cellular	C	Morristown	NJ
44451184	Alltel Communications, LLC	Cellular	A	Basking Ridge	NJ
4110850	AltaWorx, LLC	Cellular	C	Fairhope	AL
4107800	American Broadband and Telecommunications Company	Cellular	C	Toledo	OH
4108650	AmeriMex Communications Corp.	Cellular	D	Dunedin	FL
4105100	AmeriVision Communications, Inc. d/b/a Affinity 4	Cellular	D	Virginia Beach	VA
4110700	Andrew David Balholm dba Norcell	Cellular	C	Clayton	WA
4108600	BCN Telecom, Inc.	Cellular	D	Morristown	NJ
4110550	Blue Casa Mobile, LLC	Cellular	D	Santa Barbara	CA
4108750	Blue Jay Wireless, LLC	Cellular	C	Carrollton	TX
4111050	BlueBird Communications, LLC	Cellular	C	New York	NY
4202300	Bluegrass Wireless, LLC	Cellular	A	Elizabethtown	KY
4107600	Boomerang Wireless, LLC	Cellular	B	Hiawatha	IA
4105500	BullsEye Telecom, Inc.	Cellular	D	Southfield	MI
4110050	CampusSims, Inc.	Cellular	D	Boston	MA
4100700	Cellco Partnership dba Verizon Wireless	Cellular	A	Basking Ridge	NJ
4106600	Cintex Wireless, LLC	Cellular	D	Rockville	MD
4111000	ComApp Technologies LLC	Cellular	C	Melrose	MA
4101900	Consumer Cellular, Incorporated	Cellular	A	Portland	OR
4106400	Credo Mobile, Inc.	Cellular	A	San Francisco	CA
4108850	Cricket Wireless, LLC	Cellular	A	San Antonio	TX
4001900	CTC Communications Corp. d/b/a EarthLink Business I	Cellular	D	Grand Rapids	MI
10640	Cumberland Cellular Partnership	Cellular	A	Elizabethtown	KY
4101000	East Kentucky Network, LLC dba Appalachian Wireless	Cellular	A	Ivel	KY
4002300	Easy Telephone Service Company dba Easy Wireless	Cellular	D	Ocala	FL
4109500	Enhanced Communications Group, LLC	Cellular	D	Bartlesville	OK
4110450	Excellus Communications, LLC	Cellular	D	Chattanooga	TN
4105900	Flash Wireless, LLC	Cellular	C	Concord	NC
4104800	France Telecom Corporate Solutions L.L.C.	Cellular	D	Oak Hill	VA
4109350	Global Connection Inc. of America	Cellular	D	Norcross	GA
4102200	Globalstar USA, LLC	Cellular	B	Covington	LA
4109600	Google North America Inc.	Cellular	A	Mountain View	CA
33350363	Granite Telecommunications, LLC	Cellular	D	Quincy	MA
4106000	GreatCall, Inc. d/b/a Jitterbug	Cellular	A	San Diego	CA
10630	GTE Wireless of the Midwest dba Verizon Wireless	Cellular	A	Basking Ridge	NJ
4110600	Horizon River Technologies, LLC	Cellular	C	Atlanta	GA
4103100	i-Wireless, LLC	Cellular	A	Newport	KY
4109800	IM Telecom, LLC d/b/a Infiniti Mobile	Cellular	D	Tulsa	OK
22215360	KDDI America, Inc.	Cellular	D	New York	NY
10872	Kentucky RSA #1 Partnership	Cellular	A	Basking Ridge	NJ
10680	Kentucky RSA #3 Cellular General	Cellular	A	Elizabethtown	KY
10681	Kentucky RSA #4 Cellular General	Cellular	A	Elizabethtown	KY
4109750	Konatel, Inc. dba telecom.mobi	Cellular	D	Johnstown	PA
4110900	Lunar Labs, Inc.	Cellular	C	Detroit	MI
4107300	Lycamobile USA, Inc.	Cellular	D	Newark	NJ
4108800	MetroPCS Michigan, LLC	Cellular	A	Bellevue	WA
4109650	Mitel Cloud Services, Inc.	Cellular	D	Mesa	AZ
4202400	New Cingular Wireless PCS, LLC dba AT&T Mobility, PCS	Cellular	A	San Antonio	TX
10900	New Par dba Verizon Wireless	Cellular	A	Basking Ridge	NJ
4000800	Nextel West Corporation	Cellular	D	Overland Park	KS
4001300	NPCR, Inc. dba Nextel Partners	Cellular	D	Overland Park	KS

4001800	OnStar, LLC	Cellular	A	Detroit	MI
4110750	Onvoy Spectrum, LLC	Cellular	C	Plymouth	MN
4109050	Patriot Mobile LLC	Cellular	D	Southlake	TX
4110250	Plintron Technologies USA LLC	Cellular	D	Bellevue	WA
33351182	PNG Telecommunications, Inc. dba PowerNet Global Communications	Cellular	D	Cincinnati	OH
4202100	PowerTel/Memphis, Inc. dba T-Mobile	Cellular	A	Bellevue	WA
4107700	Puretalk Holdings, LLC	Cellular	A	Covington	GA
4106700	Q Link Wireless, LLC	Cellular	A	Dania	FL
4108700	Ready Wireless, LLC	Cellular	B	Hiawatha	IA
4110500	Republic Wireless, Inc.	Cellular	D	Raleigh	NC
4111100	ROK Mobile, Inc.	Cellular	C	Culver City	CA
4106200	Rural Cellular Corporation	Cellular	A	Basking Ridge	NJ
4108550	Sage Telecom Communications, LLC dba TruConnect	Cellular	D	Los Angeles	CA
4109150	SelecTel, Inc. d/b/a SelecTel Wireless	Cellular	D	Freemont	NE
4106300	SI Wireless, LLC	Cellular	A	Carbondale	IL
4110150	Spectrotel, Inc. d/b/a Touch Base Communications	Cellular	D	Neptune	NJ
4200100	Sprint Spectrum, L.P.	Cellular	A	Atlanta	GA
4200500	SprintCom, Inc.	Cellular	A	Atlanta	GA
4109550	Stream Communications, LLC	Cellular	D	Dallas	TX
4110200	T C Telephone LLC d/b/a Horizon Cellular	Cellular	D	Red Bluff	CA
4202200	T-Mobile Central, LLC dba T-Mobile	Cellular	A	Bellevue	WA
4002500	TAG Mobile, LLC	Cellular	D	Carrollton	TX
4109700	Telecom Management, Inc. dba Pioneer Telephone	Cellular	D	South Portland	ME
4107200	Telefonica USA, Inc.	Cellular	D	Miami	FL
4108900	Telrite Corporation dba Life Wireless	Cellular	D	Covington	GA
4108450	Tempo Telecom, LLC	Cellular	D	Kansas City	MO
4109950	The People's Operator USA, LLC	Cellular	D	New York	NY
4109000	Ting, Inc.	Cellular	A	Toronto	ON
4110400	Torch Wireless Corp.	Cellular	D	Jacksonville	FL
4103300	Touchtone Communications, Inc.	Cellular	D	Whippany	NJ
4104200	TracFone Wireless, Inc.	Cellular	D	Miami	FL
4002000	Truphone, Inc.	Cellular	D	Durham	NC
4110300	UVNV, Inc.	Cellular	D	Costa Mesa	CA
4105700	Virgin Mobile USA, L.P.	Cellular	A	Atlanta	GA
4110800	Visible Service LLC	Cellular	C	Lone Tree	CO
4106500	WiMacTel, Inc.	Cellular	D	Palo Alto	CA
4110950	Wing Tel Inc.	Cellular	C	New York	NY
4109900	Wireless Telecom Cooperative, Inc. dba theWirelessFreeway	Cellular	D	Louisville	KY