



Frankfort Plant Board

BID INVITATION #1716

ISSUED ON

August 19, 2021

BY:

**THE ELECTRIC & WATER PLANT BOARD OF THE CITY
OF FRANKFORT, KENTUCKY**

FOR:

Radio Tower & Related Ground Equipment

TO BE OPENED ON:

September 2, 2021 at 2:00PM

Invitation to Bid
For the
Frankfort Electric and Water Plant Board

Radio Tower and Related Grounding
Equipment

ITB Number: 1716

8/19/2021

The purpose of this document is to provide interested parties with information to enable them to prepare and submit a bid for the purchase and installation of one Radio Tower and Related Grounding Equipment in the City of Frankfort, Kentucky.

1.0 Procurement and Contracting Office

PROCUREMENT INFORMATION	
ITB Number: 1716	ITB Title: Radio Tower and Related Grounding Equipment
Bid Due Date and Time: September 2, 2021 at 2:00 p.m. local time	Number of Pages: 52
Project Owner's Representative: Lee Moore, 911Consult, Inc. Phone: (334) 451-0513 Email: lee.moore@911consult.com	Issue Date: August 19, 2021

INSTRUCTIONS TO VENDORS	
Submit Bid to: Jennifer Hellard Purchasing Agent Frankfort Electric and Water Plant Board 305 Hickory Dr. Frankfort, KY 40601 Phone: (502) 352-4422	Label Envelope/Package: ITB Title/Number: 1716 Radio Tower and Related Grounding Equipment
	Special Instructions: None

VENDOR INFORMATION	
(Fill in the information fields below and return this form with ITB response)	
Vendor Name/Address:	Authorized Vendor Signatory:
DUNS NUMBER:	(Please print name and sign in ink)
Vendor Phone Number:	Vendor Fax Number:
Vendor Federal I.D. Number:	Vendor Email Address:
Total number of bid pages:	

2.0 Project Description

2.1 The Frankfort Electric and Water Plant Board (FEWPB) will receive sealed bids, priced on a firm fixed price basis, to provide all necessary equipment, materials, labor and supervision necessary, as outlined in this Invitation to Bid (ITB) for the construction of one (1) radio tower, appropriately designed concrete foundation, ice bridge and related grounding and bonding system to support one (1) radio tower site for use in FEWPB operations.

2.2 The FEWPB is seeking a single General Contractor (herein "Vendor" or "Contractor") to conduct the construction efforts to procure and construct all equipment required in this ITB.

3.0 Calendar of Events

	DATE	EVENT
3.1	08/19/21	Date of issue of the ITB
3.2	08/25/21	Mandatory Virtual Pre-Bid meeting at 1:00pm EDT
3.3	08/27/21	Last day for submitting written inquiries before 4:00pm EDT
3.4	08/31/21	E-Mail Notifications to vendors of supplements or revisions (If any)
3.5	09/02/21	Bids due from vendors and opened at 2:00pm EDT

4.0 Definitions

The following definitions are used throughout the ITB:

- 4.1 **FEWPB or FPB**
The Frankfort Electric and Water Plant Board
- 4.2 **ITB**
Invitation to Bid
- 4.3 **Tanglewood Tower Site**
96 Tanglewood Dr Frankfort, KY 40601
- 4.4 **User**
FEWPB staff
- 4.5 **Vendor or Contractor**
A firm submitting a bid in response to this ITB

5.0 Pre-Bid Conference

5.1 A Mandatory Virtual Pre-Bid Conference will be held on the date and time listed in the Calendar of Events for “Mandatory Pre-Bid conference” using a private GoToMeeting video conference room. Requests for pre-bid meeting invitations must be sent to lee.moore@911consult.com

5.2 All interested vendors must attend the Virtual Pre-Bid Conference.

5.3 The video conference will be recorded as proof of attendance.

5.4 Any vendor not having a duly authorized representative on the video conference will not be allowed to bid on this project.

5.5 Addenda and written answers to questions will only be provided to the vendors who attend the Virtual Pre-Bid conference.

6.0 Bid Instructions

6.1 General Instructions

6.1.1 Vendors must submit one signed, printed original and one electronic (USB drive) copy of all materials required for acceptance of their bid on or before the date and time listed on the Calendar of Events for “Bids due from vendors” to the ITB point of contact.

6.1.2 Vendors must submit one signed, printed original of any Addenda issued with this ITB on or before the date and time listed on the Calendar of Events for “Bids due from vendors” to the ITB point of contact.

6.1.3 The original copy of the bid shall be submitted on 8.5 by 11 inch paper. The electronic copy shall be sent on USB drive and shall include one copy in Microsoft Word format and one copy in Adobe Acrobat PFD format.

6.1.4 All bid packages shall be clearly marked “Radio Tower and Related Grounding Equipment” followed by “Invitation to Bid Number 1716” followed by the name of the vendor, their complete address, telephone number, the name of the contact person and the State of Kentucky General contractor’s license number displayed on the outside. The bid package must be sealed. If more than one bid is submitted, each bid shall be submitted in separate envelopes. All vendors must use the provided bid form.

6.1.5 Bids may be withdrawn, modified and resubmitted by the vendor prior to the bid due date and time.

6.1.6 Any questions concerning this ITB must be submitted in writing by e-mail on or before the date and time listed on the Calendar of Events for “Last day for submitting written inquiries” to the Project Owner’s Representative. A written e-mail response will be sent to all such requests.

6.1.7 If clarifications to this ITB are required, it will be done in the form of an Addendum.

6.1.8 Any Addenda issued to the ITB will be sent electronically to the e-mail address listed on the Pre-Bid sign in sheet for each vendor. It is the vendor’s responsibility to verify with the ITB point of contact if any Addenda have been issued. The FEWPB is not bound by any oral representations, clarifications, or changes made in the written specifications by FEWPB employees, unless such clarification of change is provided to vendors in written addendum form.

6.1.9 All sealed bids will be opened on the date and time specified in the Calendar of Events at the location specified in Section 1.0 Procurement and Contracting Office. Vendors and the general public are invited to attend the opening. No decision will be made as to the award of the ITB at that time.

6.1.10 Bids not received by the stated date and time will not be considered and will be returned to the vendor.

6.1.11 Unsealed bids will not be considered and will be returned to the vendor.

6.1.12 Emailed or faxed bids will not be considered and will be returned to the vendor.

6.1.13 Unsigned bids will be considered non-responsive.

6.1.14 Unsigned Addenda, if any, will be considered non-responsive.

6.1.15 Procurement of all goods, contracts, equipment, professional services and non-professional services shall be done in accordance with the provisions of the Kentucky Revised Statute 424.260.

6.1.16 The FEWPB provides equal opportunities for all businesses and does not discriminate against any vendor regardless of race, color, creed, sex, national origin, handicap or any other protected status in consideration for an award.

6.1.17 All bids shall be typewritten or in ink on the form(s) prepared by the FEWPB. Bids prepared in pencil will not be accepted. All bids must be signed by officials of the corporation or company duly authorized to sign bids. Any bid submitted without being signed will automatically be rejected. All corrections or erasures shall be initialed and dated by the person authorized to sign bids. Whiteout should not be used. If a correction is made, line through the incorrect amount and write in the correct bid amount.

6.1.18 The name of a certain brand, make, manufacturer, or definite specification is to denote design intent and the quality standard of the article desired but does not restrict the vendor on the specified brand, make, manufacturer or specification names, unless otherwise noted. It is set forth to convey the general style, type, character, and quality of the article desired by the FEWPB. Whenever a brand, make, manufacturer, or the words "or approved equal" appear in the specifications, they shall be interpreted to mean an item of material or equipment similar to that named, and which is suited to the same use as that named. However, the vendor should be aware that the FEWPB may reject the alternate, depending on whether the substitute material can meet the specifications and design intent of the specified material.

6.1.19 It will be assumed that all bids are based upon the specifications unless the vendor stipulated to the contrary on the response; in which case, the vendor shall point out in detail any and all deviations from the specifications. Vendors having items, which do not meet the specifications, may offer the same on an optional basis.

6.1.20 The vendor shall guarantee that the units submitted for their bid shall be new, and of the latest and most improved model of the current production and shall be of first quality as to workmanship and materials used in said units. All modification shall be made at the factory. Equipment shall not have been operated for any purpose other than routine operational testing. Demonstrators will not be accepted.

6.1.21 Should a vendor decide not to honor a contract, the FEWPB has the right to re-bid the item or take the second low bid.

6.1.22 FEWPB reserves the right to reject any or all bids and nothing herein or the submission of a bid shall obligate FEWPB to award a contract.

6.2 Formatting Instructions

6.2.1 Vendors are urged to use this document as the basis for all responses. An Adobe Acrobat PDF version and Microsoft Word version of this document is available upon request.

6.2.2 Bids must be organized with the following headings. Each heading should be separated by tabs or otherwise clearly marked. Bids shall be organized and presented in the order as specified below.

6.2.2.1 Introduction

6.2.2.2 Company history

6.2.2.3 Description of staff/support personnel

6.2.2.4 ITB Response (include this entire document as a template)

6.3 Response Instructions

6.3.1 Each numbered section in the ITB ***must be answered by attaching one of the following responses to each numbered section by the vendor or the bid will be considered non-responsive:***

6.3.1.1 **Understood** – Response to a numbered item in the ITB that does not require an answer to a requirement.

6.3.1.2 **Comply** – The proposed system meets this requirement completely as it currently exists.

6.3.1.3 **Complies with Alternative** – The proposed system meets this requirement through an alternative solution. The alternative solution must be fully explained.

6.3.1.4 **Complies with Exception** – The proposed system meets only part of this requirement. The exception must be fully explained.

6.3.1.5 **Does not Comply** – The proposed system does not comply with this requirement.

6.4 Reasonable Accommodation

The FEWPB will provide reasonable accommodations, including the provision of informational material in limited alternative formats, for qualified individuals with disabilities upon request. If you need accommodations at a bid opening/vendor conference, contact the procurement point of contact.

6.5 On-Site Visit

It is strongly advised that all vendors make a site visit during the time period between the release of this ITB and final date for written questions to review the existing equipment for technical compatibility. All site visits must be coordinated through the ITB point of contact.

6.6 Proprietary Information

The FEWPB is subject to the statutes relating to public records. Materials shall be submitted in confidence and shall remain confidential and are exempt from disclosure to the extent allowed by law.

All such requests for confidentiality will be evaluated by the FEWPB. Should a legal challenge arise regarding a specific vendor's request for confidentiality, it shall be the vendor's responsibility to defend such challenges. The FEWPB reserves the right to disclose part of or all of the information determined not to meet the exemptions of the appropriate statutes.

6.7 Obligation to Purchase

The FEWPB incurs no obligation to award this contract by extending this ITB. The FEWPB is also not liable for any cost incurred by vendors in replying to this ITB. Any vendor choosing to keep information confidential or requesting such shall be solely liable for any responsibility to defend such confidentiality should a legal question arise and shall hold the FEWPB harmless from such responsibility or liability arising regarding any specific vendor's request for confidentiality.

6.8 Patents

If a vendor's solution violates or could violate any United States patents you must outline these in your response. The FEWPB shall not be held responsible should the successful vendor's solution infringe on any existing and awarded patents from other companies and/or entities. Legal costs and liability are transferred to the selected vendor for the defense of such actions.

6.9 Bid Bond

A Bid Bond payable to the FEWPB, in an amount not less than five (5%) percent of the amount of the bid must accompany the bid response. The bid bond/deposit shall be in the form of a cashier's check drawn on a Kentucky bank or an original bid bond executed by a surety company duly authorized and qualified to make such bonds in the State of Kentucky, payable to the FEWPB.

6.10 Performance Bond

The successful vendor to whom the contract is Awarded, shall replace the Bid Bond and furnish at his expense an acceptable Performance Bond (Surety Bond) to the FEWPB, in the amount equal to one hundred (100%) percent of the contract price as awarded. This bond will remain in effect until completion of the contract.

6.11 Labor and Materials Bond

The successful vendor shall furnish at his expense an acceptable Payment of Labor, Materials, Foodstuffs and Supplies Bond (Surety Bond) to the FEWPB, in the amount not less than one hundred (100%) percent of the contract price, with the obligation that the Contractor shall promptly make payment to all persons furnishing him or them with labor, materials, foodstuffs, or supplies for, or in, the prosecution of the work, including the payment of the reasonable attorney's fees incurred by successful claimants or plaintiffs in suits on said bond. The date of neither bond shall be earlier than the date of the contract agreement. This bond will remain in effect until completion of the contract.

6.12 Insurance

Contractor shall secure and maintain the required insurance at his/her expense, throughout the duration of the Contract, insurance of such types and in such amounts as may be necessary to protect himself/herself and FPB and others against all hazards or risks of loss as a result of Contractor's operations under the Contract whether such operations be by Contractor or by

any subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be legally liable. Failure of Contractor to maintain coverage shall not relieve him/her of any contractual responsibility or litigation. The insurance coverage shall be as follows:

6.12.1 At least \$2,000,000 limits for commercial general liability, business auto liability, professional liability, and employer's liability with umbrella limits of \$10,000,000.

6.12.2 Commercial aggregate limits of at least \$2,000,000 with the general aggregate limit applicable per project.

6.12.3 Workman's Compensation - \$1,000,000 for bodily injury caused by accident and \$1,000,000 for bodily injury caused by disease.

6.12.4 All insurance shall be secured from or countersigned by an agent or surety company recognized in good standing and authorized to do business in the State of Kentucky with a rating of "A-" or better. The Contractor shall provide a certificate of insurance satisfactory to FPB evidencing existence of such insurance prior to beginning any work. FPB shall be named as an additional insured on a primary and non-contributory basis on the commercial general liability, business auto and employer's general liability policies.

6.12.5 The commercial general liability policy should also:

Be an occurrence coverage form equivalent to ISO's CG 00 01 10 01.

Include coverage for liability arising from premises-operations, independent contractors, products-completed operations, personal and advertising injury and liability assumed under an insured contract (including tort liability of another assumed in a business contract).

Include no endorsements or modifications arising from explosion, collapse, underground property damage or work performed by Subcontractors.

Include a waiver of subrogation.

Name FEWPB as an additional insured on a primary and non-contributory basis for ongoing and completed work using ISO form, CG 20 10 11 85 or a combination of ISO forms, CG 20 10 10 01 and CG 20 37 10 01.

Additionally, we require that your business will:

Carry completed operations insurance for three years.

Name FPB as an additional insured on a primary and non-contributory basis on your commercial general liability insurance for three years.

Provide at least thirty (30) days' written notice prior to cancellation or termination of your commercial general liability, business auto liability, professional liability, and employers' liability,

6.13 Indemnity

The work performed by the Contractor shall be at the risk of the Contractor exclusively. To the fullest extent permitted by law, Contractor shall indemnify, defend (at Contractor's sole expense) and hold harmless, the FPB, affiliated companies of FPB, its partners, joint ventures, representatives, members, designees, officers, directors, shareholders, employees, agents, successors, and assigns ("Indemnified Parties"), from and against any and all claims for bodily injury, death or damage to property, demands, damages, actions, causes of action, suits, losses, judgments, obligations and any liabilities of any kind, costs and expenses (including but not limited to investigative and repair costs, attorneys' fees and costs, and consultants' fees and costs) ("Claims") which arise from or are in any way connected with the Work performed, materials furnished, or services provided under this Agreement by Contractor or its agents or Subcontractors including claims or liability for intellectual property and claims for infringement of copyrights, patents or trademarks arising out of the processes, information, materials, or data used or incorporated into the Work by Contractor, or the improper or unauthorized use of these rights by Contractor or any Subcontractor.

These indemnity and defense obligations shall apply to any acts or omissions, negligent or willful misconduct of Contractor, its employees or agents or Subcontractors, whether active or passive. Said indemnity and defense obligations shall further apply, whether or not said claims arise out of the concurrent act, omission, or negligence of the Indemnified Parties, whether active or passive. Contractor shall not be obligated to indemnify and defend the Indemnified Parties for claims found to be due to the sole negligence or willful misconduct of Indemnified Parties.

This indemnity provision shall survive termination of any Contract.

6.14 Patent and Copyright Indemnity

Contractor shall indemnify, defend and hold FPB harmless, at Contractor's expense, against any claim, suit or proceeding brought against FPB resulting from, relating to, or arising out of a claim for an infringement of a patent, copyright, trademark, or misappropriation of a trade secret of a third party. Contractor will take up the defense and also pay any costs including, without limitation, reasonable attorneys' fees, experts fees, expenses or damages awarded to third parties or incurred by FPB relating to such defense provided that FPB provides to Contractor: (i) prompt written notice of any such claim, (ii) all reasonably available information and assistance, and (iii) the right to control the defense and any settlement reasonable of such claim. Contractor may settle, at Contractor's sole expense, any claim, suit or other action against FPB for which Contractor is responsible under this Section provided that such settlement

shall not otherwise affect Contractor's obligations to FPB under this Agreement. FPB reserves the right to employ counsel at its own expense and participate in the defense of any claim.

Upon notice of an alleged infringement or if in Contractor's opinion such a claim is likely, or if FPB's rights hereunder are restricted by a valid court order, then Contractor may, at its option and sole expense: (i) procure the right to continue using the alleged infringing material; (ii) replace the material with non-infringing material which is materially equivalent in features, functionality and quality; or (iii) modify the material to make it non-infringing while retaining all material features, functionality and quality.

Contractor's obligations and duties set forth in this Article shall not apply to a claim of infringement by a third party if: (i) the claim of infringement arises out of modifications or alterations neither made nor authorized by Contractor provided that the claim would have been avoided by the absence of such modifications or alterations; (ii) FPB is using other than the most current release of the software or hardware made generally available if such claim would have been prevented by the use of such release at the time the alleged infringement occurred; (iii) the claim of infringement arises out of the combination of software with hardware or software not provided by Contractor; (iv) the claim of infringement directly results from Specifications provided to Contractor by FPB or approved by FPB; or (v) if FPB has materially breached this Agreement and such breach remains uncured.

6.15 Independent Contractor

Contractor's relationship to FPB in the performance of this Agreement is that of an Independent Contractor. The personnel performing the Services under the Agreement shall at all times be under Contractor's exclusive direction and control and shall be employees of Contractor and not employees of FPB. Contractor shall be fully liable for all acts and omissions of its employees, Subcontractors, and their suppliers and shall be specifically responsible for sufficient supervision and examination to assure compliance in every respect with Agreement requirements. There shall be no contractual relationship between any Subcontractors or supplier of Contractor and FPB by virtue of this Agreement. No provision of this Agreement shall be for the benefit of any party except FPB and Contractor. Contractor shall pay all wages, salaries and other amounts due its employees in connection with this Agreement and shall be responsible for all reports and obligations respecting them, such as Social Security, Income Tax Withholding, Unemployment Compensation, Workers' Compensation and similar matters.

6.16 Equal Employment Opportunity

CONTRACTOR AND ANY SUBCONTRACTOR SHALL ABIDE BY THE REQUIREMENTS OF EXECUTIVE ORDER 11246, 41 CFR §§ 60-1.4(A), 60-300.5(A) AND 60-741.5(A). THESE REGULATIONS PROHIBIT DISCRIMINATION AGAINST QUALIFIED INDIVIDUALS BASED ON THEIR STATUS AS PROTECTED VETERANS OR INDIVIDUALS WITH DISABILITIES, AND PROHIBIT DISCRIMINATION AGAINST ALL INDIVIDUALS BASED ON THEIR RACE,

COLOR, RELIGION, SEX, SEXUAL ORIENTATION, GENDER IDENTITY OR NATIONAL ORIGIN. MOREOVER, THESE REGULATIONS REQUIRE THAT COVERED PRIME CONTRACTORS AND SUBCONTRACTORS TAKE AFFIRMATIVE ACTION TO EMPLOY AND ADVANCE IN EMPLOYMENT INDIVIDUALS WITHOUT REGARD TO RACE, COLOR, RELIGION, SEX, SEXUAL ORIENTATION, GENDER IDENTITY, NATIONAL ORIGIN, PROTECTED VETERAN STATUS OR DISABILITY.

6.17 Geotechnical Data

A separate document, "FEWPB - Soils Report for Tanglewood Tower", (attached hereto as Ex. A) provides core sample analysis for the site. Utilization of analysis provided by the FEWPB does not relieve the selected contractor of the responsibility for structural integrity and performance. Additionally, any costs associated with the foundation design and construction will be the sole responsibility of the successful vendor.

Any use or reliance on any geotechnical data is done solely at Contractor's own risk. No warranties, either express or implied, are intended or made. Bidder is responsible for any interpretation or conclusion Bidder draws from any technical data contained in such reports.

Finally, it is the responsibility of the Bidder to visit the site and conduct as thorough examination as Bidder deems necessary to prepare an accurate and thorough bid.

7.0 Bid Evaluation Process

The evaluation and selection of a vendor will be based on the information submitted in the vendor's bid plus recommendations by references and any requested on-site visits or oral presentations.

7.1 General Requirements Evaluation

The bids will be reviewed by the General Requirements Evaluation Committee to determine how well each vendor's bid compares to the stated General Requirements. This committee may include administrative, legal and financial representatives as selected by the FEWPB. The FEWPB may request further clarification from individual vendors in the event of incomplete or missing information. Vendors shall respond in writing to any requests for clarification. In the event that all vendors do not meet one or more of the General Requirements, the FEWPB reserves the right to continue the evaluation of the bids and may select the bid which most closely meets the requirements specified in this ITB. Failure to meet any of the General Requirements may result in the bid being considered non-responsive.

7.2 Technical Requirements Evaluation

Bids will be reviewed by the Technical Review Committee to determine how well each vendor's bid compares to the stated Technical Requirements. The committee may include administrative, dispatch and technical representatives as selected by the FEWPB. The FEWPB may request further clarification from individual vendors in the event of incomplete or missing information. Vendors shall respond in writing to any requests for clarification. The committee may verify references, request oral presentations, conduct on-site visits and use the results of these actions in preparing a recommendation. In the event that all vendors do not meet one or more of the Technical Requirements, the FEWPB reserves the right to continue the evaluation of the bids and may select the bid which most closely meets the requirements specified in this ITB.

7.3 Pricing Evaluation

Bids will have the Attachment A Formal Bid Pricing Document reviewed by the Pricing Evaluation Committee for completeness and accuracy. This committee may include administrative and financial representatives as selected by the FEWPB. Failure to use the Attachment A Pricing Document may result in the bid being considered non-responsive.

8.0 Award Process and Contract Requirements

8.1 Procurement of all goods, contracts, equipment, professional services and non-professional services shall be done in accordance with the provisions of the Kentucky Revised Statute 424.260.

8.2 The contract shall be awarded to the lowest responsible and responsive vendor, unless the FEWPB finds that all bids are unreasonable or that it is not to the interest of the Awarding Authority to accept any of the bids. In any case, nothing herein obligates FPB to award a contract.

8.3 Bids may be rejected if they contain any omissions, alterations of forms, additions not called for, conditional bids, alternate bids not called for, incomplete bids, erasures, or irregularities of any kind. However, the FEWPB may reject any and all bids or waive technical errors if, in its judgment, the best interests of the FEWPB will be promoted.

8.4 The low vendor must notify the FEWPB in writing, within three working days after the opening of bids, that a mistake was made. This notice may be given within this time frame whether or not award has been made.

8.5 The FEWPB reserves the right to waive minor irregularities in bids received.

8.6 The FEWPB may terminate the contract, in whole or in part, without showing cause upon giving at least a thirty (30) days written notice to the vendor. The FEWPB and the vendor may agree upon reasonable termination costs to be paid to the vendor which amount shall include payment for goods or services delivered and accepted up to the date of termination.

9.0 General Requirements

9.1 Qualifications and Experience

9.1.1 The vendor shall be a company primarily engaged in the business of Public Works Radio Tower construction for a minimum of 5 years.

9.1.2 The vendor shall have the overall capability to provide the services described within this ITB proven through manufacturer agreements, technical certifications, qualified engineering, installation and maintenance resource capacity and capability, past similar installations, and current customer references.

9.1.3 The vendor shall have a distribution and equipment depot(s) capable of providing access to adequate spare parts, materials and testing equipment needed to maintain the equipment that is being proposed.

9.1.4 The vendor shall have a successful history in providing the equipment, services and support to similar governmental entities.

9.1.5 The vendor shall be able to show installed equipment in the field of the same design to be proposed.

9.1.6 The vendor shall be licensed to do business in the State of Kentucky.

9.1.7 The vendor shall obtain and is responsible for any costs associated with required City/County business license and any other permits required to perform the work prior to contract signing.

9.1.8 The vendor shall be responsible for any costs associated for aid to construction required by any utilities.

9.1.9 The vendor shall be responsible for any costs associated with permitting required by the local authority having jurisdiction (AHJ).

9.2 Business History and Financial Data

9.2.1 The vendor submitting the bid shall describe their business history that demonstrates the ability to provide engineering, installation and maintenance services through the life of the contract.

9.3 Manufacturer/Integrator Design Confirmation

9.3.1 The manufacturer of the tower shall confirm that the tower design and configuration, as stated in the bid, has been reviewed and approved in writing by the manufacturer's engineering and post-sales support group.

9.4 Vendor References

9.4.1 The vendor submitting the bid shall include in their response a list of at least three organizations, including points of contact (name, address, telephone number and email address), which can be used as references for systems installed by the vendor (not the manufacturer/integrator) of similar design to the system described in this ITB.

9.4.2 These organizations will be contacted to determine the quality of work performed and personnel assigned to the project. The results of the references will be provided to the evaluation team. Incorrect contact information will invalidate the reference.

10.0 Site Work

10.1 The FEWPB has already had rough grading performed and the site has been graveled. The vendor will be responsible for removing all spoils and returning the site to pre-construction condition.

11.0 Proposed Tower Information

The FEWPB desires to purchase one (1) 160' freestanding, self-supporting lattice design radio tower. The tower will be located on FEWPB owned property. Wherever the name of a particular company is used, "or equal" items may be proposed. FPB will be the sole judge of any proposed "or equal" item's suitability.

11.1 Tower Design Criteria

The minimum design criteria for the proposed tower is shown below. The Contractor is responsible for designing and constructing a tower to meet the specified criteria and all industry performance standards and requirements.

11.2 Tower Structure Specifications

11.2.1 Vendor will furnish and install one (1) new self-supporting communications tower designed for 90 MPH (115 MPH ASCE 7-10) basic wind speed (30 MPH with 1/4" radial ice) in accordance with ANSI/TIA 222-REV G.

11.2.2 Structure Class II defined as Structures used for services that may be provided by other means or structures.

11.2.3 Exposure Category C defined as open terrain with scattered obstructions having heights generally less than 30 ft. This category includes flat, open country and grasslands.

11.2.4 Topographic Category 1 defined as flat or rolling terrain with no abrupt changes in general topography. No increase in wind loading is required for this category.

11.3 160 Foot Self-Support Tower Design Loading

The tower shall be designed to handle the attached loading plus 100 percent (100%) additional load and not exceed 100% total design load.

11.3.1 PEWB Tanglewood

Antenna Mount Height	Quantity	Antenna Make	Antenna Model	Line Size	Bracket Type
160	1	Lightning Rod	5-foot extension	n/a	Leg Mount
155	1	Wade Antenna	WL7-13/S-TVC	RG6	4-foot Sidearm
155	1	Wade Antenna	WL7-13/S-TVC	RG6	4-foot Sidearm
150	1	CommScope	DB224	7/8"	4-foot Sidearm
150	1	Wade Antenna	WL 1469S-TVC	RG6	4-foot Sidearm
145	1	Wade Antenna	WL 1469S-TVC	RG6	4-foot Sidearm
145	1	Wade Antenna	WL 1469S-TVC	RG6	4-foot Sidearm
140	1	Wade Antenna	WL 1469S-TVC	RG6	4-foot Sidearm
140	1	Wade Antenna	WL 1469S-TVC	RG6	4-foot Sidearm
135	1	Wade Antenna	WL 1469S-TVC	RG6	4-foot Sidearm
135	1	Wade Antenna	J 55-FM-TVC	RG6	4-foot Sidearm

130	1	Wade Antenna	J 56-162-TVC	RG6	4-foot Sidearm
130	1	Wade Antenna	WCM-3-TVC	RG6	4-foot Sidearm

11.3.2 The FEWPB will provide the antennas, coax cable and connectors listed in 11.3.1 to the vendor for installation on the tower.

11.3.3 The vendor shall perform a Return Loss test on each coaxial lead to verify the cable system quality and that the measured value is less than -20 db. Using a 50 ohm load. Printed test results shall be created and provided to the customer.

11.3.4 The vendor shall perform a Return Loss test on each coaxial lead (complete system) and verify that the measured value is less than -15 db. The test equipment shall be connected to the coaxial protection device inside the communication shelter. Printed test results shall be created and provided to the customer.

11.3.5 The vendor shall perform a Distance to Fault (DTF) on each coaxial lead to verify the complete antenna system quality. Printed test results shall be created and provided to the customer.

11.4 Foundation Design

11.4.1 Owner has obtained a subsurface exploration and geotechnical soils report. The report shall discuss the field procedures, site and soil conditions and is included as a separate document.

11.4.2 The foundation type shall be as specified in the geotechnical report for the site.

11.4.3 Reinforcing steel shall conform to ASTM A615 Grade 60 unless otherwise noted.

11.4.4 Concrete work shall comply with all applicable ACI code specifications and standards and shall have a compressive strength of 3600 psi at twenty-eight (28) days.

11.4.4.1 Three (3) cylinder compression test sets shall be created for each 20 cubic yards of concrete used.

11.4.4.2 Tests shall be performed by a testing lab hired by the contractor and approved by the FEWPB.

11.4.4.3 Vendor shall provide PDF copies of the concrete tests.

11.4.5 The foundation system shall be designed for the tower specified in this document and stamped and signed by a registered Professional Engineer licensed in the State of Kentucky.

11.5 Submittals and Drawings

11.5.1 The Contractor shall provide a complete drawing package to include the following:

11.5.1.1 Overview/Title page.

11.5.1.2 Overall site map with tower location (provided by the FEWPB).

11.5.1.3 Detailed site layout to include dimensions of tower and ice bridge.

11.5.1.4 Tower elevation with antenna placement.

11.5.1.5 Grounding layout and components.

11.5.1.6 Foundation details for the tower.

11.5.2 Submittals shall be submitted for approval of the tower.

11.5.3 All drawings shall be stamped and certified by a qualified professional engineer licensed to practice in the State of Kentucky that is responsible for their preparation.

11.5.4 Tower foundation drawings shall show the following information at minimum:

11.5.4.1 Reference to the soil/geotechnical report, including file number, date and firm performing report, used in calculations and design.

11.5.4.2 Required concrete compressive strength to be achieved at 28 days

11.5.4.3 Grade and/or type of reinforcing bar

11.5.4.4 Concrete coverage requirements

11.5.4.5 Whether welding of rebar is permitted

11.5.4.6 Whether cold joints are permitted; if so, the joining procedure shall be specified.

11.5.4.7 Whether permanent steel casings are permitted for caisson installations

11.5.4.8 Whether temporary steel casings are or may be required due to the expected soil conditions

11.5.4.9 Any recommended concrete installation techniques such as a tremie pour.

11.5.4.10 References to all codes (and sections of codes) applicable for the design

11.5.5 Plan, elevation and section views depicting a minimum of the following:

11.5.5.1 Length, depth, and width

11.5.5.2 Diameter

11.5.5.3 Finish grade with respect to top of foundation

11.5.5.4 Rebar size and placement

11.5.5.5 Anchor bolt size, type and placement

11.5.5.6 Above finish grade requirement for anchor heads (typically a minimum of 12 in.)

11.5.5.7 Estimated cubic yards of concrete per pier, caisson, mat, block or other type of foundation.

11.5.6 Backfill requirements such as but not limited to:

11.5.6.1 Material type

11.5.6.2 Thickness of lifts (typically lifts not more than 12 in. thick are acceptable).

11.5.6.3 Applicable compaction requirements; such 95% of modified proctor maximum dry density.

11.5.6.4 Applicable sub-grade compaction requirements. Upon completion of the excavation the designer may require certain compaction densities.

11.5.6.5 Any other pertinent information that may be abstracted from the soils report, such as a high-water table or large boulders.

11.5.6.6 Any other pertinent construction or design information or considerations.

11.6 Tower Materials

11.6.1 All tower steel shall be galvanized. Individual pieces of truss-type supports shall be galvanized before assembly.

11.6.2 Tower legs shall be solid rod and diagonals shall be of angle material. Assembly bolts shall be A325, galvanized and include a locking device.

11.6.3 Anchor bolts shall be galvanized for the upper 14". Anchor bolt nuts shall be galvanized.

11.6.4 One vertical cable ladder shall be installed to top of the tower (30 line minimum capacity). Cable ladder shall have holes for both snap-in hangers and butterfly hangers.

11.6.5 One (1) 24" wide cable ice bridge from tower to shelter building with capacity for at least 30 lines. Bridge should include posts, 3-level trapeze, and hardware. Bridge should have a minimum height of 10-feet above ground. Length not to exceed 20 feet.

11.6.6 The tower shall include a cable safety climb system meeting all OSHA and ANSI requirements including ANSI A14.3.

11.6.7 The tower shall include step bolts on each leg.

11.6.8 The tower shall include a Class II air terminal with extension for 5 foot height above top of tower.

11.7 This section blank

11.8 This section blank

11.9 Foundation Preparation and Backfilling

11.9.1 All excavations on which concrete is to be placed shall be substantially horizontal on undisturbed and unfrozen soil and shall be free of loose material and excess ground water. Methods for removing excess ground water shall be provided if required.

11.9.2 The foundation area shall be graded to provide water runoff and prevent water from standing. The final grade shall slope away in all directions from the foundation.

11.9.3 After completion of the foundation and other construction below grade, and before backfilling, clean area of vegetation, trash, debris, and inorganic materials.

11.9.4 The vendor shall repair the site to pre-construction condition.

11.10 Placing of concrete

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

11.10.2 All forming shall be true and rigid, thoroughly braced, and sufficiently strong to safely carry all dead and live loads to which it may be subjected.

11.10.3 All steel reinforcement shall be furnished and installed in accordance with the approved foundation drawing. Unless otherwise specified or shown on plans, reinforcement shall consist of preformed bars of intermediate grade, manufactured from new billet stock. Metal reinforcement shall conform to the requirements of the latest version of Specifications for Deformation of Preformed Steel Bars for Concrete Reinforcement, ASTM A615-68, or applicable jurisdictional code, whichever is more stringent.

11.10.4 Anchors, bolts, and miscellaneous iron work shall be set as shown in the drawings before pouring concrete.

11.10.5 Embedded items shall be held rigidly in place during placing and curing of concrete.

11.10.6 Placing rebar in position as the concrete is placed shall not be permitted.

11.10.7 Concrete shall be vibrated and thoroughly consolidated around all embedded items.

11.10.8 Concrete shall be so deposited that there will be no separation or segregation of aggregate. Maximum free drop shall not exceed 2.43 m (8 ft.).

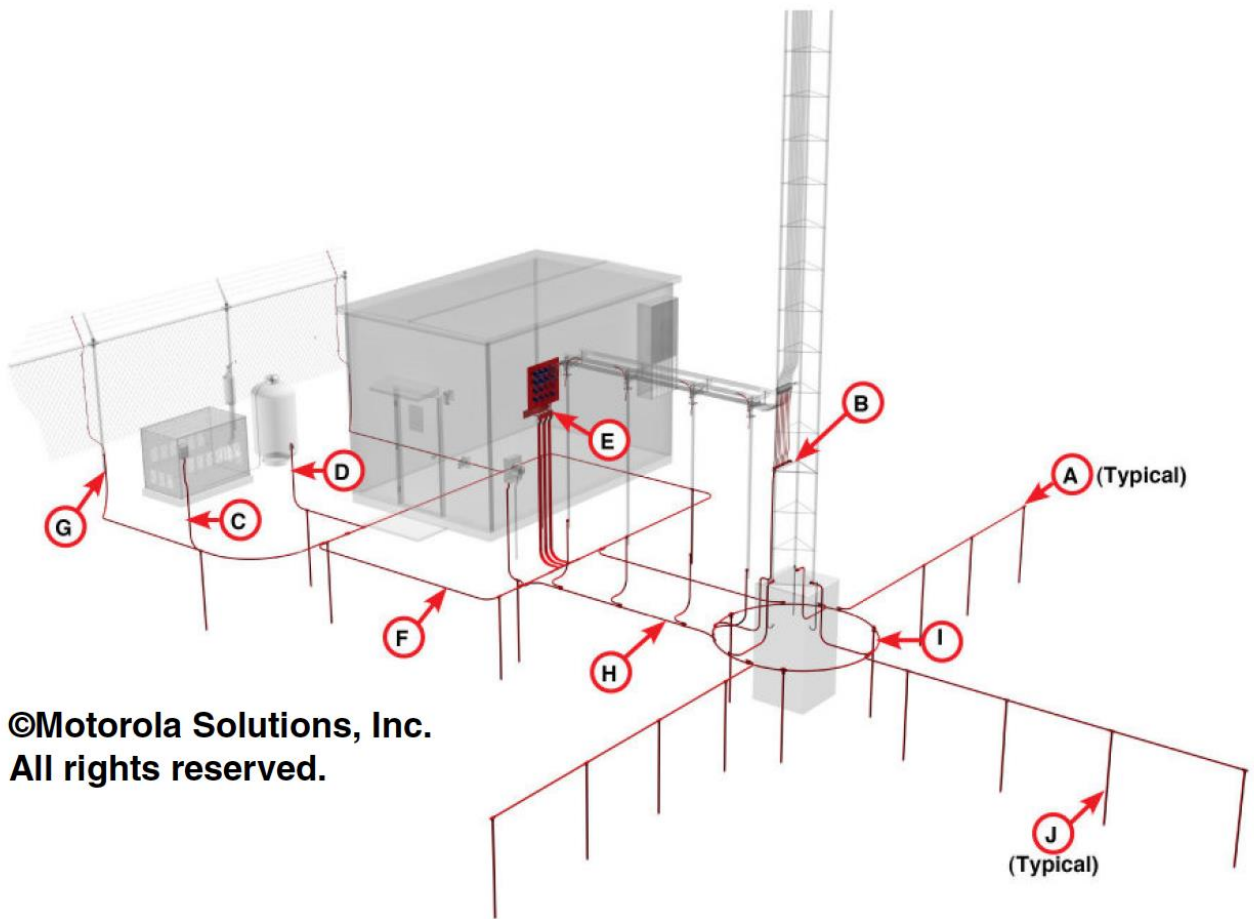
11.10.9 Concrete shall not be placed when the outdoor temperature is below 4.5° C (40 degrees F) nor when the concrete is likely to be subjected to freezing temperatures before final set, except when adequate provisions have been made for protection.

11.10.10 Per the geotechnical report provided, it is recommended that reinforcing steel and pier concrete be placed the same day as the shaft is drilled.

11.11 Grounding

The vendor shall provide all ground wire, ground rods, exothermic welds, lugs and other grounding materials necessary to meet or exceed Motorola R56-2017 standards.

Typical Tower Grounding Plan – not to scale. Final design shall be approved in the submittal process.



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A:	Grounding Radials
B:	Tower Ground Bus Bar and Down Conductors
C:	Generator Grounding Conductor
D:	Fuel Tank Grounding Conductor
E:	External Ground Bus Bar
F:	Shelter Ground Ring
G:	Fence Grounding Conductor
H:	Ground Ring Bonding Conductor (2 minimum)
I:	Tower Ground Ring
J:	Earthing Electrodes (Ground Rods)

11.12 Ground Rod Specifications

11.12.1 Ground rods shall be constructed of copper-clad steel, solid copper, hot-dipped or galvanized steel.

11.12.2 Ground rods shall have a minimum length of 2.4 m (8 ft.)

11.12.3 Ground rods shall have a minimum diameter of 15.9 mm (0.625 in.)

11.12.4 Ground rods shall be free of paint or other nonconductive coatings

11.12.5 Ground rods shall be installed in a manner to prevent deformation of the top of the rods.

11.13 Ground Rod Installation

11.13.1 The upper end of the ground rods shall be buried to the depth of the ground ring, typically 30 in. minimum below finished grade. The upper end of the ground rods should be buried to the same depth as the ground ring to allow for easy bonding to the ground ring.

11.13.2 Ground rods shall be installed between 10' and 15' apart and shall not be installed closer to one another than the sum of their respective lengths, when possible.

11.13.3 The method of bonding grounding conductors to ground rods shall be exothermic welding or irreversible high compression (12 ton) listed fittings.

11.13.4 Ground rods that cannot be driven straight down, due to contact with rock formations, may be driven at an oblique angle of not greater than 45 degrees from the vertical, or may be buried horizontally and perpendicular to the building, in a trench at least 30 in. deep.

11.13.5 Three (3) 10 foot vertical or horizontal chemical enhanced ground systems shall be installed equally spaced around the tower ground ring. The vendor may use XIT Lyncole, Advanced Lightning Technology, Harger Lightning Protection or approved equal.

11.14 Grounding of Metal Objects

The following items must be bonded to the grounding electrode system:

11.14.1 Emergency generator and generator support base.

11.14.2 Fuel tanks and metal fuel pipes, whether above or below ground.

11.14.3 Electric service and telephone service ground systems (if any).

11.14.4 Any other metal object within 6 feet of the grounding electrode system or any grounded object.

11.15 Shelter Building and Tower Ground Ring

11.15.1 Requirement for external ground rings are listed below:

11.15.2 Ground ring conductors shall be 2/0 AWG, bare stranded copper. This requirement is for the shelter building and the tower.

11.15.3 Solid bare tinned, #2 AWG copper conductor shall be used between tower legs and the buried components of the grounding electrode system. The solid conductor shall be covered with 1" plastic electrical grade conduit extending from the connection to the buried ring to within 2" of the tower leg connection point and sealed with flexible compound.

11.15.4 Tower ground ring shall encircle the tower structure at least 2ft from the tower foundation.

11.15.5 Shelter ground ring shall encircle the shelter building at least 3ft from the shelter foundation.

11.15.6 The ends of the conductor shall be joined together to form a ring using an exothermic weld. This may be completed at a ground rod.

11.15.7 Grounding conductors shall be installed in one continuous length without a splice or joint, unless spliced using irreversible high compression-type connectors listed for the purpose or by exothermic welding.

11.15.8 Shelter Building ground rings and tower ground rings shall be bonded together in at least two points using 2/0 AWG bare stranded copper conductor.

11.15.9 Ground rings shall be installed in direct contact with the earth at a depth of 30 in. below the earth's surface whenever possible, or below the frost line, whichever is deeper

11.15.10 8 ft. ground rods shall be connected to the ground ring conductor at 10 ft. to 15 ft. intervals.

11.16 Radial Grounding Conductors

11.16.1 Radial conductors shall meet the following specifications:

11.16.2 The conductors shall radiate away from the building and tower.

11.16.3 The conductors shall be installed at the tower or tower ground ring whenever possible. A minimum of three conductors shall be used.

11.16.4 The conductors shall be installed equally spaced from one another, as much as practical. The conductors shall be bonded directly to the tower ground ring.

11.16.5 The conductors shall be constructed of 2/0 bare stranded copper.

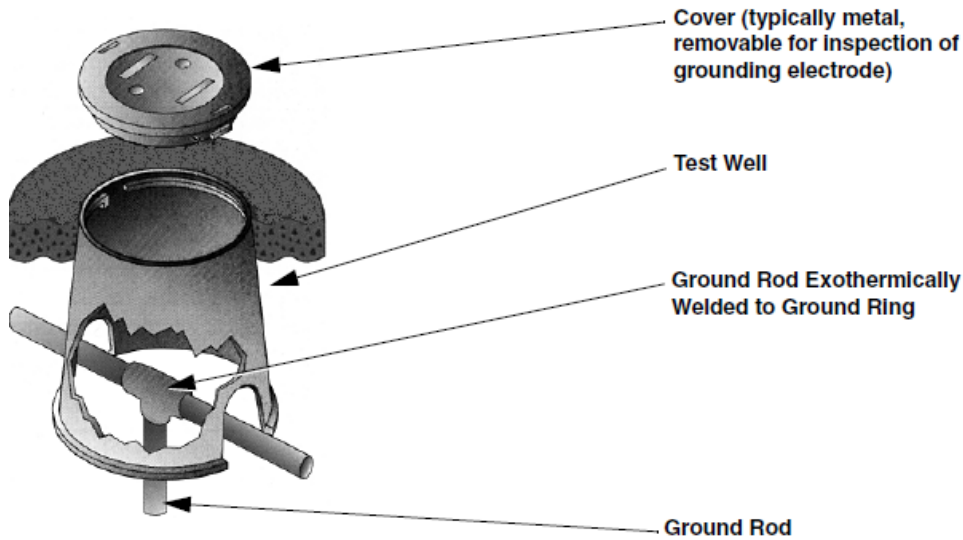
11.16.6 The conductors shall be buried at least 30 in.

11.16.7 The minimum length of each conductor shall be 25 ft.

11.17 Ground Test Wells

11.17.1 Five (5) ground access wells are required for troubleshooting and/or inspecting the grounding electrode system components. Two (2) are to be installed at the junction points where the tower ring joins the shelter ring. One (1) is to be installed at the endpoint of each of the three (3) radials.

11.17.2 Harger GAW910 HDPE ground access well, or approved equal, with a detachable cover is acceptable. The 2/0 ground cable or the top of a ground rod shall be looped high enough to be seen in the ground access well.



11.18 Above Ground Conductors

11.18.1 Above-ground conductors used for bonding individual metallic objects shall be #6 AWG tinned copper conductors.

11.18.2 Above-ground conductors used for bonding multiple metallic objects (used as a ground bus conductor) shall be #2 or larger tinned copper conductors.

11.18.3 Above-ground bonding conductors should be jacketed, whenever practical.

11.19 Bending and Routing Grounding Conductors

11.19.1 Grounding conductors shall be run in a direct manner with no sharp bends or narrow loops. The following requirements apply when installing grounding system conductors.

11.19.2 Grounding conductors shall be run as short, straight, and smoothly as possible, with the fewest possible number of bends and curves and installed in a workmanlike manner.

11.19.3 A minimum bending radius of 8 in. shall be maintained, applicable to grounding conductors of all sizes

11.19.4 A diagonal run is preferable to a bend even though it does not follow the contour or run parallel to the supporting structure.

11.19.5 All bends and curves shall be made toward the ground location (grounding electrode system or ground bar).

11.20 This section blank

11.21 Tower Ground Bus Bars

11.21.1 The purpose of the tower ground bus bars is to provide a convenient termination point on the tower for multiple transmission line (coaxial) grounding conductors. The tower ground bus bars should be an integral part of the tower construction

11.21.2 Tower ground bus bars shall be constructed of tinned copper and shall be at least ¼" x 2" x 14" with fifteen (15) pairs of 7/16" predrilled holes.

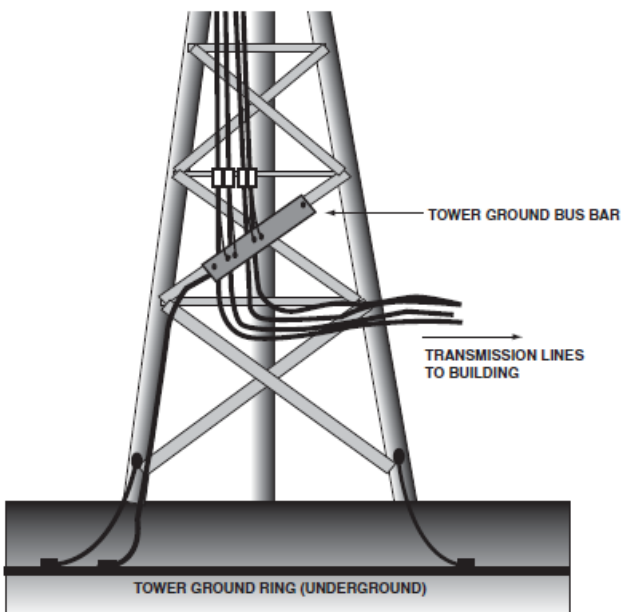
11.21.3 The bottom tower ground bus bar shall be installed below the transmission line ground kits, near the area of the tower at the point where the antenna transmission lines transition from the tower to the shelter.

11.21.4 One additional ground bus bar with screw lug attachment kits shall be included and installed on the tower at appropriate heights for bonding multiple transmission line ground kits to the tower.

11.21.5 The bottom tower ground bus bar shall be connected to the tower grounding electrode system with 2/0 bare, stranded tinned copper conductor using an exothermic weld.

11.21.6 The grounding conductors shall be run as short, straight, and smoothly as possible.

11.21.7 The grounding conductor should be sleeved in 1" plastic electrical grade conduit for protection if desired in order to keep the grounding conductor from making incidental contact with the tower.



11.22 Cable Bridge/Ice Bridge Grounding

11.22.1 Grounding of self-supported cable bridges/ice bridges shall be completed as follows:

11.22.2 Each support post shall bond to the grounding electrode system using #2 bare tinned copper conductor.

11.22.3 Conductor bonding to the grounding electrode system shall be made using exothermic welding or listed irreversible high-compression fittings.

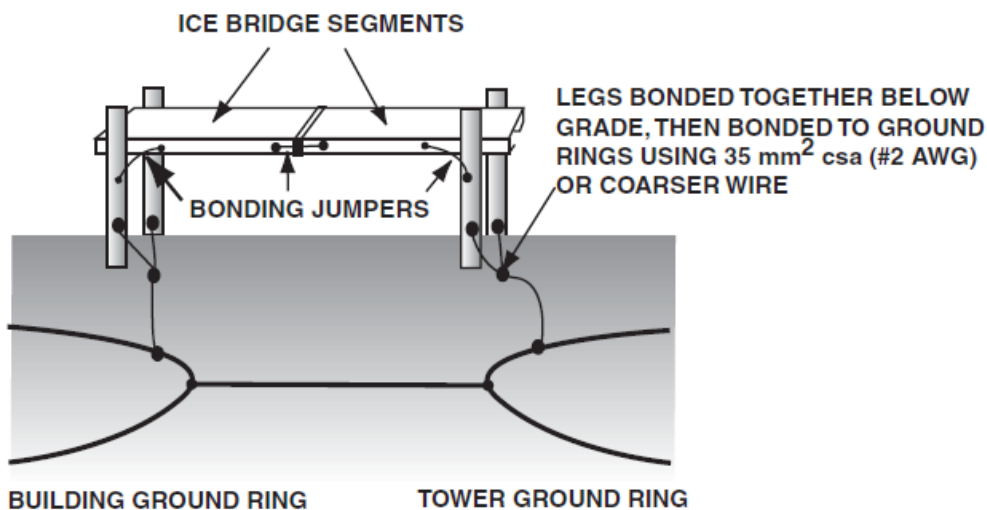
11.22.4 Conductor bonding to the support posts shall be made using exothermic welding.

11.22.5 The cable bridge/ice bridge should bond to each support post using a #6 jacketed copper conductor (bonding jumper).

11.22.6 Conductor bonding to the support post shall be made using exothermic welding.

11.22.7 Conductor bonding to the cable bridge/ice bridge shall be made using exothermic welding or listed two-hole compression lugs and stainless-steel hardware.

11.22.8 If more than one span of cable bridge/ice bridge is used between the tower and building, bonding jumpers should be installed between the sections to help ensure effective bonding. The bonding jumpers shall be #6 copper conductor. The bonding jumpers should use listed two-hole lugs and stainless-steel hardware.



11.23 This section blank

12.0 Communication Shelter

12.1 The FEWPB has constructed a communications shelter (hub building) at the new tower site which includes the electrical distribution system, UPS and generator.

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12.13 Building Grounding

12.13.1 External Ground Bar: one (1) Harger EPK24 entrance panel kit including ground bars, insulators, connecting rods and exterior copper straps to earth ground ring and Harger EPKPPCST vinyl covers for exterior straps. The interior copper bar of the Harger EPK24 shall serve as the PBB.

12.13.2 The external ground bus bar shall be installed at the point where the antenna transmission lines and other communications cables enter the building or shelter.

12.13.3 The external ground bus bar copper straps shall be connected directly to the grounding electrode system using exothermic weld or listed irreversible compression connections.

12.13.4 IPBB ring: one (1) #2 AWG green jacketed stranded copper, split IPBB around the interior perimeter of the shelter and connected to the interior PBB. The two leads of

the IPBB shall be of equal length and attached to the wall using listed standoff connectors no more than two (2) feet apart.

12.13.5 Ground cable ladder, cable ladder joints, dead metal and all metal equipment and fixtures larger than 4" square with #6 AWG green stranded wire and two-hole compression lugs.

12.13.6 Install green #2 AWG stranded copper ground conductor along each cable tray for future equipment rack ground tie points. Attach to PBB with two-hole compression lugs.

12.13.7 Bond all electrical conduit to IPBB (unless compression hub)

12.13.8 Door shall be grounded with jacketed welding cable or equal.

12.13.9 Grounding and bonding must meet or exceed Motorola R56-2017 standards

12.14 This section blank

12.15 This section blank

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13.0 Installation

13.1 The vendor should complete installation of the foundation, buried grounding system and tower as soon as practical after awarding of the bid.

13.2 The vendor shall coordinate the installation dates with the FEWPB.

13.3 The vendor is responsible for the clean-up and disposal of spoils and debris.

13.4 The vendor shall be responsible for any damage done to the facilities as a direct result of the installation of the self-supporting communications tower(s).

13.5 The equipment purchased in this ITB shall be delivered to its proper location and installed by the vendor without additional cost or expense and at the convenience and direction of the FEWPB.

13.6 All work shall comply with the applicable national, state and local codes and regulations.

13.7 The vendor is responsible for securing all required licenses and permits for any work performed in connection with this ITB.

14.0 Documentation

14.1 One complete set of as-built drawings are required. As-built drawings must be submitted in an agreed upon graphic format as delineated in the contract on one (1) USB drive.

14.2 The installation and acceptance of the system shall not be complete until as-built drawings are delivered.

14.3 Provide documentation for installation, operating and maintenance for each component of the system. This documentation will include user manuals, maintenance manuals, parts list, of the equipment necessary for the continued and proper preventative maintenance and repair.

15.0 System Acceptance

15.1 The vendor shall create a written acceptance plan after award of the contract based on the equipment selected and present it to the FEWPB for approval.

The date of commencement of the Work shall be the date in a Notice to Proceed Letter issued by FPB.

The Contract Time shall be measured from the date of commencement.

The Contract is for a term of _____ months with a completion date of _____.

15.2 The FEWPB expects to accept and pay for the foundation, buried grounding system and tower leg attachment points within 30 days of completion of that phase of the contract.

15.3 The FEWPB expects to accept and pay for the tower erection, tower grounding and ice bridge installation within 30 days of completion of that phase of the contract.

15.4 The FEWPB will not accept or certify the equipment until all items on the acceptance test plan are met to the satisfaction of the FEWPB.

15.5 The FEWPB shall not be deemed to have accepted any component or piece of equipment until such time, as said equipment has been installed, tested and is operating in accordance with the specifications contained herein.

15.6 The vendor shall certify in writing to the FEWPB when the system is installed and ready for use.

16.0 Subcontractors

16.1 The vendor shall be responsible for all aspects of the project. The Project Manager shall be available at all times during the course of the implementation.

16.2 The FEWPB reserves the right to reject any subcontractors. If this should occur, the vendor may submit an alternative that is acceptable to the FEWPB. Should a subcontractor fail to provide a reasonable level of service, the vendor must resolve this failure at its expense.

16.3 The vendor shall be responsible for any damage to existing systems or structures during the installation process and shall retain possession and responsibility for all delivered equipment until system acceptance.

17.0 This section blank

18.0 Warranty

18.1 System Warranty periods for all equipment shall begin upon final acceptance of the entire system and shall run concurrently for a period of 12 months.

18.2 Pricing for System Warranty for the initial 12 month period shall be included in the base price.

18.3 A complete listing of all warranties including systems and equipment, detailing what is covered and what is not covered shall be included.

18.4 The vendor shall assume full responsibility for warranty of all components of the equipment. The manufacturer's standard warranty shall be enclosed.

18.5 Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to FPB free and clear of (1) all liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by FPB.

18.6 Contractor warrants to FPB that the Work provided under the Agreement shall be performed in a good and fully workmanlike manner and shall materially conform to the Specifications. FPB's Field Representative shall reasonably determine the quality and acceptability of the Services and Work performed pursuant to the Agreement with reference to the written acceptance plan.

19.0 Vendor References

19.1 Vendors must include in their response a list of at least three organizations, including points of contact (name, address, and telephone number), which can be used as references for installed systems in the State of Kentucky of similar design to the system described in this ITB.

19.2 These organizations will be contacted to determine the quality of work performed and personnel assigned to the project. The results of the references will be provided to the evaluation team.

20.0 Pricing

20.1 Please fill out the pricing table (Attachment A) as your official price. Vendors are encouraged to also provide a more detailed table of your own design showing all costs for hardware, installation, shipping, program direction and services. Please break out costs for each of the above items.

20.2 DO NOT ADD ANY ITEMS TO THE BASE SYSTEM PRICING THAT ARE NOT EXPLICITLY CALLED FOR IN THIS ITB.

20.3 If the addition of extra hardware in the vendor's opinion would significantly add to the reliability or robustness of the proposed system the vendor is required to add the cost of that as a new numbered line item in the options pricing section of Attachment A.

20.4 Prices shall remain valid for at least 90 days after the ITB due date.

20.5 Prices shall not contain sales tax on materials used for this project only. See section on sales tax exemption for a public entity project.

Attachment A

21.0 Formal Bid Pricing Document

21.1 Self Supporting Tower – FEWPB

21.1.1 Complete site package

21.2 Total base price (Lump Sum)



Geotechnical Engineering Report

Frankfort FEWPB Tower Frankfort, Franklin County, Kentucky

June 11, 2021

Terracon Project No. N3215008



Prepared for:
911 Consult, Inc.
Frankfort, Kentucky

Prepared by:
Terracon Consultants, Inc.
Lexington, Kentucky

Environmental



Facilities



Geotechnical



Materials

June 11, 2021



911 Consult, Inc.
306 Hickory Drive
Frankfort, Kentucky 40601

Attn: Mr. Adam Hellard - Superintendent
P: (502) 352-4325
E: ahellard@fewpb.com

Re: Geotechnical Engineering Report
Frankfort FEWPB Tower
96 Tanglewood Dr.
Frankfort, Franklin County, Kentucky
Terracon Project No. N3215008

Dear Mr. Hellard:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon proposal No. N3215008 dated and authorized April 21, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.



Taylor, Ben
Jun 11 2021 4:41 PM

A handwritten signature in cursive script, appearing to read "Joshaghani M".

Mohammad Joshaghani, Ph.D.
Staff Geotechnical Engineer

Benjamin W. Taylor, P.E., P.G.

Principal, Regional Manager

REPORT TOPICS

INTRODUCTION	1
SITE CONDITIONS.....	2
PROJECT DESCRIPTION.....	3
GEOTECHNICAL CHARACTERIZATION	4
GEOTECHNICAL OVERVIEW	5
DEEP FOUNDATIONS	6
GENERAL COMMENTS.....	9
FIGURES.....	10

Note: This report was originally delivered in a web-based format. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
PHOTOGRAPHY LOG
SITE LOCATION AND EXPLORATION PLAN
EXPLORATION RESULTS
SUPPORTING INFORMATION

Geotechnical Engineering Report
Frankfort FEWPB Tower
96 Tanglewood Dr.
Frankfort, Franklin County, Kentucky
Terracon Project No. N3215008
June 11, 2021

INTRODUCTION

This report presents the results of our site characterization and geotechnical engineering services performed for the proposed 165-foot Self-Support Telecommunication Tower to be located at 96 Tanglewood Dr. in Frankfort, Franklin County, Kentucky. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil and rock conditions
- Foundation design and construction
- Groundwater conditions
- Site preparation and earthwork

The geotechnical exploration for this project included the advancement of one boring to a depth of 18½ feet below existing grade.

Map showing the site and boring location is presented by the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at 96 Tanglewood Dr. in Frankfort, Franklin County, Kentucky. Approximate latitude, longitude: 38.184913°, -84.882219° (tower center). See Site Location
Existing Improvements	Satellite dishes are installed on the area with a small power supply building.
Current Ground Cover	Gravel and asphalt pavement with grassed areas.
Existing Topography	Based on review of the publicly available topographic information on Google Earth Pro™, the project site is situated in relatively level area with grades ranging from about elevation 764 to 765 feet above mean sea level (MSL).
Geology	Based on our experience and review of mapping, near-surface soil is classified as Bluegrass-Maury silt loams with low plasticity fine-grained material. Mapping published by the Kentucky Geologic Survey (KGS) indicate subsurface conditions will likely consist of silty to clayey residual soils over limestone and shale bedrock of the Lexington Limestone formation at relatively shallow depths. According to the KGS, the underlying bedrock geology is classified as very high karst potential, with several sinkholes mapped within ½ mile of the project site.

Geotechnical Engineering Report

Frankfort FEWPB Tower ■ Frankfort, Franklin County, Kentucky

June 11, 2021 ■ Terracon Project No. N3215008



PROJECT DESCRIPTION

Our initial understanding of the project was discussed during project planning. Our final understanding of the project conditions is as follows:

Item	Description
Information provided	Description of the site location and specified exploration scope were received via email correspondence from Lee Moore with 911Consults, Inc on February 25, 2021. We were also provided with an example plan 261852-03 Tower Drawing from a similar project for our reference.
Proposed construction	The project includes construction of a new 165 ft self-support tower.
Maximum Loads	The following maximum reaction loads were provided by 911 Consult, Inc.: <ul style="list-style-type: none">■ Vertical: 335 kips■ Shear: 36 kips■ Uplift: 283 kips
Grading	Based on our understanding of the existing site topography, we do not anticipate any grading at this site.

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

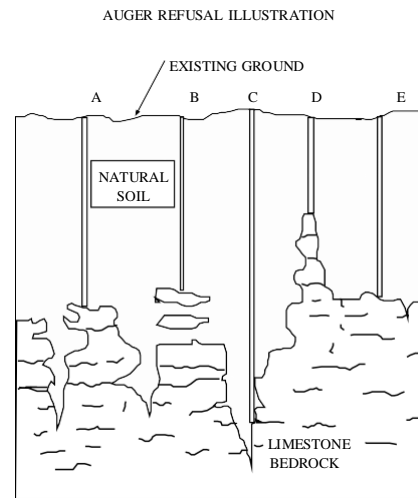
Model Layer	Layer Name	General Description
1	Fill	Crushed stone
2	Clay	Lean Clay (CL), gray and brown, stiff
3	Bedrock	Limestone, gray, close to moderate fracture spacing, laminated bedding, moderately weathered to slightly weathered, medium strong rock

The boreholes were observed while drilling for the presence and level of groundwater. Groundwater was not observed during drilling nor for the short time the boring was allowed to remain open after drilling.

Perched groundwater should be expected at the soil/bedrock interface and may be encountered within fracture zones in the bedrock. Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the boring was performed. Groundwater levels during construction or at other times in the life of the structure may vary. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Auger refusal is defined as the depth below the ground surface at which a test boring can no longer be advanced with the soil drilling technique being used. In an area of limestone bedrock, auger refusal can result on slabs of un-weathered limestone suspended in the residual soil matrix ("floaters"), on rock "pinnacles" rising above the surrounding bedrock surface, in widened joints that may extend well below the surrounding bedrock surface, or on the upper surface of continuous bedrock.

The bedrock at this area is indicated as Tanglewood Limestone Member No. 2 in the mapping published by the Kentucky Geologic Survey (KGS). The weathering of the bedrock and subsequent collapse or erosion of the overburden into these openings results in what is referred to as karst topography. Karst topography is known for producing several obstructions that can cause the augers to refuse above sound bedrock. These obstructions can range from floaters to rock pinnacles as illustrated in Examples A, B, C, and D in the figure. Depth to competent bedrock in areas of karst geology can vary greatly over short distances. Boring was encountered bedrock at a depth of about 3½ ft from the ground surface. The possibility of varying depths to bedrock should be considered when developing the design and construction



THIS FIGURE IS FOR ILLUSTRATIVE PURPOSES ONLY AND DOES NOT NECESSARILY DEPICT THE SPECIFIC BEDROCK CONDITIONS AT THIS SITE

plans for this project.

Figure 1. Auger Refusal Illustration

Rock coring was performed to explore the auger refusal materials. Sample recovery for the rock core ranged from 95% to 100% with rock quality increasing with depth from poor to good based on RQD values ranging from 43% to 86%. Photographs of the rock core samples can be observed in the rock core [Photography Log](#).

GEOTECHNICAL OVERVIEW

The following sections describe pertinent geotechnical considerations identified by the exploration and laboratory testing. Site preparation recommendations, including subgrade improvement, fill placement, and excavations are provided in the [Site Preparation](#) section.

As discussed in the Site Conditions section, the project site is located within an area that reported by the Kentucky Geological Survey (KGS) to have a very high karst potential. Due to the karst potential, deep foundation support is recommended and probe holes below the design foundation elevation of each shaft foundation are recommended confirm conditions and explore for the presence soft soils or voids.

The [General Comments](#) section provides an understanding of the report limitations.

DEEP FOUNDATIONS

Drilled Shaft Design Parameters

Drilled shafts should be designed with a minimum shaft diameter of 30 inches to facilitate clean out and inspection of the bearing surface from the ground. The pier should be socketed a minimum of

1.5 times the shaft diameter below the top the bearing stratum, to mobilize the strength parameters provided. Based on our **Geotechnical Characterization** and the structural loading in the **Project Description** the drilled shaft is recommended to bear in GeoModel layer 3 with a minimum tip depth of 15 feet. The tip elevation and socket should be lengthened as needed to provide sufficient resistance to support the structural loading conditions.

The actual bearing elevation should be determined in the field during construction through inspection by the Geotechnical Engineer. Probe holes will be needed to at least 2 times the shaft diameter to confirm the rock elevation and verify no voids, clay layers, or unsuitable bearing conditions at each foundation location.

Geotechnical parameters for axial design of drilled shaft foundations are provided below. The values presented for allowable skin friction includes a factor of safety of 2 and allowable end bearing includes a factor of safety of 3.

Geomodel Layer	Approximate Depth (feet)	Allowable Skin Friction (psf)	Allowable End Bearing Capacity (psf)
2	2 to 3½	--	--
3	3½ to 15	7000	9,000

Geotechnical parameters for lateral design of drilled shaft foundations are provided below. The above indicated cohesion, lateral subgrade modulus and strain values have no factors of safety. The cohesion, lateral subgrade modulus and strain values given in the above table are based on our boring, published values and our past experience with similar soil and rock types. These values should, therefore, be considered approximate.

Geotechnical Engineering Report

Frankfort FEWPB Tower ■ Frankfort, Franklin County, Kentucky

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Geomodel Layer	LPile Model	Approximate Depth (feet)	Undrained Shear Strength, Su (psf)	Uniaxial Compressive Strength, Qu (psi) / RQD (%)	Unit Weight (pcf)	Strain ϵ_{50} / krm	Lateral Subgrade Modulus, k (pci)
2	Stiff Clay w/o water	2 – 3½	1,500	---	120	Default	Default
3	Strong Rock	3½ – 15	---	4,000 RQD _{avg} 50	135	0.00001	3,000

Drilled Shaft Construction Considerations

Adequate performance of the drilled shaft foundations will be highly dependent on the contractor's installation techniques used to construct the foundation elements.

Groundwater could be encountered during the drilling for the drilled pier. If groundwater seepage is encountered, water should be removed from each pier hole prior to concrete placement. Care should be taken so that the sides and bottom of the excavations are not disturbed during construction.

Based on compressive strength and rock quality data, we expect that advancement of piers to minimum embedment in rock could be achieved by a rock auger equipped with self-rotating cutter bits or by rock coring. However, advancement method may vary between contractors depending on experience and their evaluation of penetration rates for the site conditions. Difficult drilling conditions may be encountered due to hard, karst limestone. The contractor should be prepared to penetrate bedrock with competent limestone.

Due to the karst features encountered at our boring location, the bottom of the excavation should be inspected carefully by the Geotechnical Engineer for voids, clay layers, or any otherwise unsuitable bearing conditions that could affect the deep foundations.

- Use of probe holes and identification of cavities and seams along the sides and beneath the base is an essential part of the construction and inspection process. The presence of sound rock for a depth of at least 2 shaft diameters below the bottom of the rock socket should be verified by probing, as illustrated by the figure on the following page.
- Contractor should advance a test hole with an air track drill through the bedrock bearing surface to a depth of at least two times the shaft diameter to check for discontinuities in the bedrock that may require additional rock removal.
- The number of test holes at each pier location would be determined by the Geotechnical Engineer based on the field test results.
- Significant discontinuous rock layers may require additional rock removal as directed by the engineer's representative.
- Prior to installation of the reinforcing steel cage, the base of each pier should be sounded to check for voids or clay seams in the underlying bedrock. This could be done by dropping the drill rig Kelly bar onto the exposed bedrock surface at selected locations.
- Visual evaluation of the exposed bearing surface should be performed by the Geotechnical Engineer to confirm that the base is free from loose material, soil, water or other unsuitable materials. Visual inspection to determine the suitability of the shaft bottom may be conducted using a flashlight or reflected light with a mirror from the ground surface.

Geotechnical Engineering Report

Frankfort FEWPB Tower ■ Frankfort, Franklin County, Kentucky

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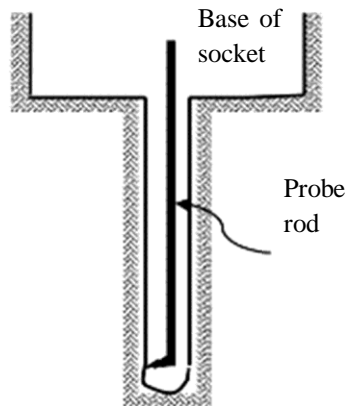


Figure 2. Rock probing (Brown 1990)

The bottom of the shaft should be free of loose soil or debris prior to reinforcing steel and concrete placement. We recommend that the specifications state that reinforcing steel and pier concrete be placed the same day as the shaft is drilled. No completed shaft excavation should be allowed to remain open overnight. It is suitable, however, for the contractor to excavate a portion of the drilled shaft and then complete the shaft excavation the next day.

If pier concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Free-fall concrete placement in piers will only be acceptable if provisions are taken to avoid striking the concrete on the sides of the hole or reinforcing steel. The use of a bottom-dump hopper or tremie discharging near the bottom of the hole where concrete segregation will be minimized, is recommended. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

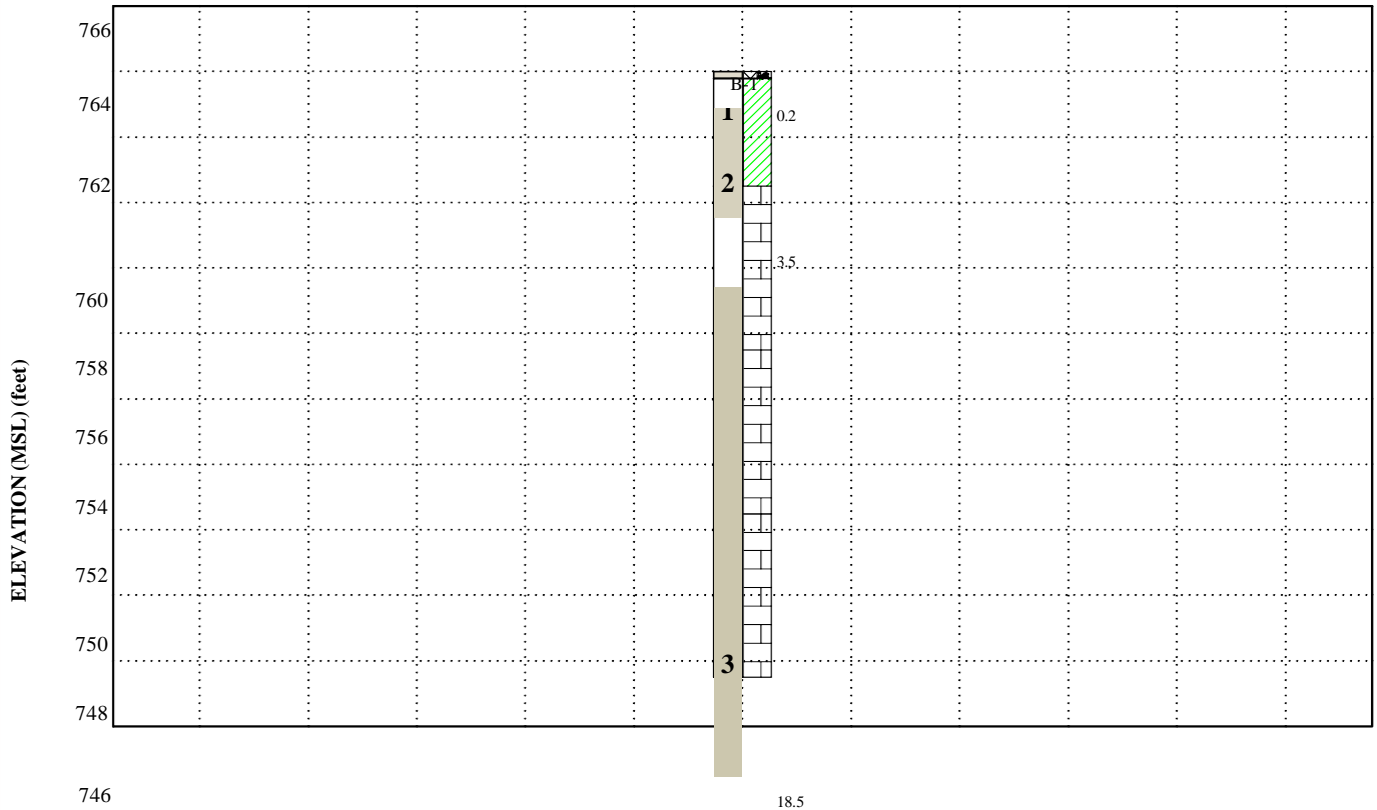
FIGURES

Contents:

GeoModel

GEOMODEL

Frankfort Telecommunications Tower ■ Frankfort, KY
 Terracon Project No. N3215008



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Fill	crushed stone
2	Clay	Lean Clay (CL), gray and brown, stiff
3	Bedrock	Limestone, gray, close to moderate fracture spacing, laminated bedding, moderately weathered to slightly weathered, medium strong rock



LEGEND

Fill
 Lean Clay
 Limestone

NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.

Numbers adjacent to soil column indicate depth below ground surface.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Exploration Depth (feet)	Location
1	18½	center of tower

Boring Layout and Elevations: Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±20 feet) and approximate elevations were obtained by interpolation from the publicly available Google Earth database. If elevations and a more precise boring layout are desired, we recommend as-drilled locations of the borings be surveyed.

Subsurface Exploration Procedures: We advanced the boring with a track-mounted drill rig using continuous hollow stem flight augers. One sample was obtained between 1.5 and 3 feet, prior to encountering auger refusal. In the split-barrel sampling procedure, a standard 2-inch outerdiameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammerfalling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling.

Upon encountering refusal-to-drilling conditions, rock coring (using NQ/NX rock core barrel) was performed for a total length of 15 feet, within 3 runs. Recovery percentage and Rock Quality Designation (RQD) were determined by the field personnel. For safety purposes, the boring was backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring log. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by the Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil and rock strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D7012 Standard Test Methods for Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures

The laboratory testing program often included examination of soil samples by an engineer. Based on the material's texture and plasticity, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Rock classification was conducted using locally accepted practices for engineering purposes; petrographic analysis may reveal other rock types. Rock core samples typically provide an improved specimen for this classification. Boring log rock classification was determined using the Description of Rock Properties.

PHOTOGRAPHY LOG



Photo 1. Site condition at before drilling



Photo 2. West view of the proposed location for the tower



Photo 3. Rock Core at boring B-1 for the depth from 3.5 to 13.5 feet



Photo 4. Rock Core at boring B-1 for the depth from 13.5 to 18.5 feet

SITE LOCATION AND EXPLORATION PLANS

Contents:

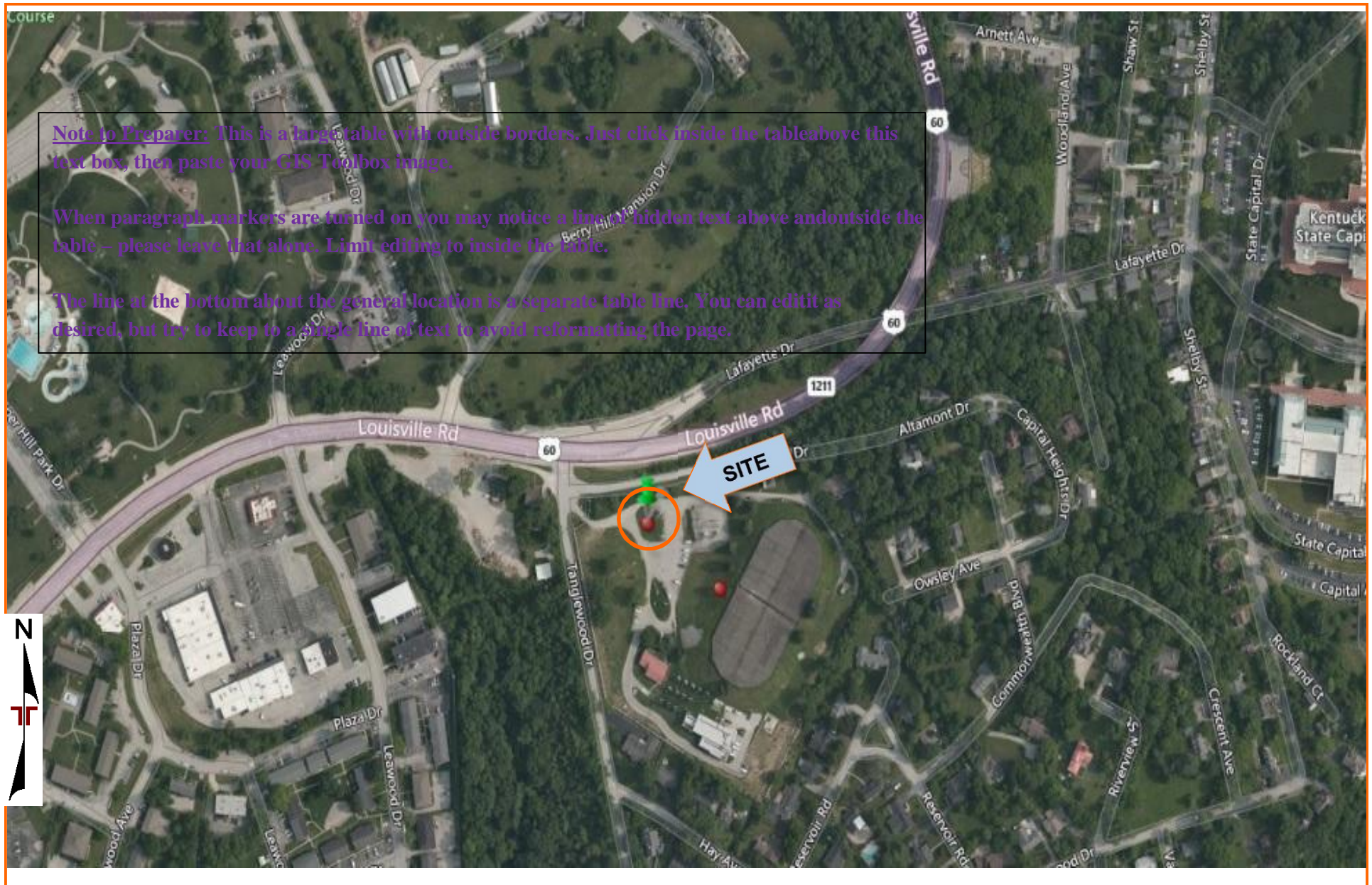
Site Location Plan (2)
Karst Potential Map
Exploration Plan

Note: All attachments are one page unless noted above.

SITE LOCATION

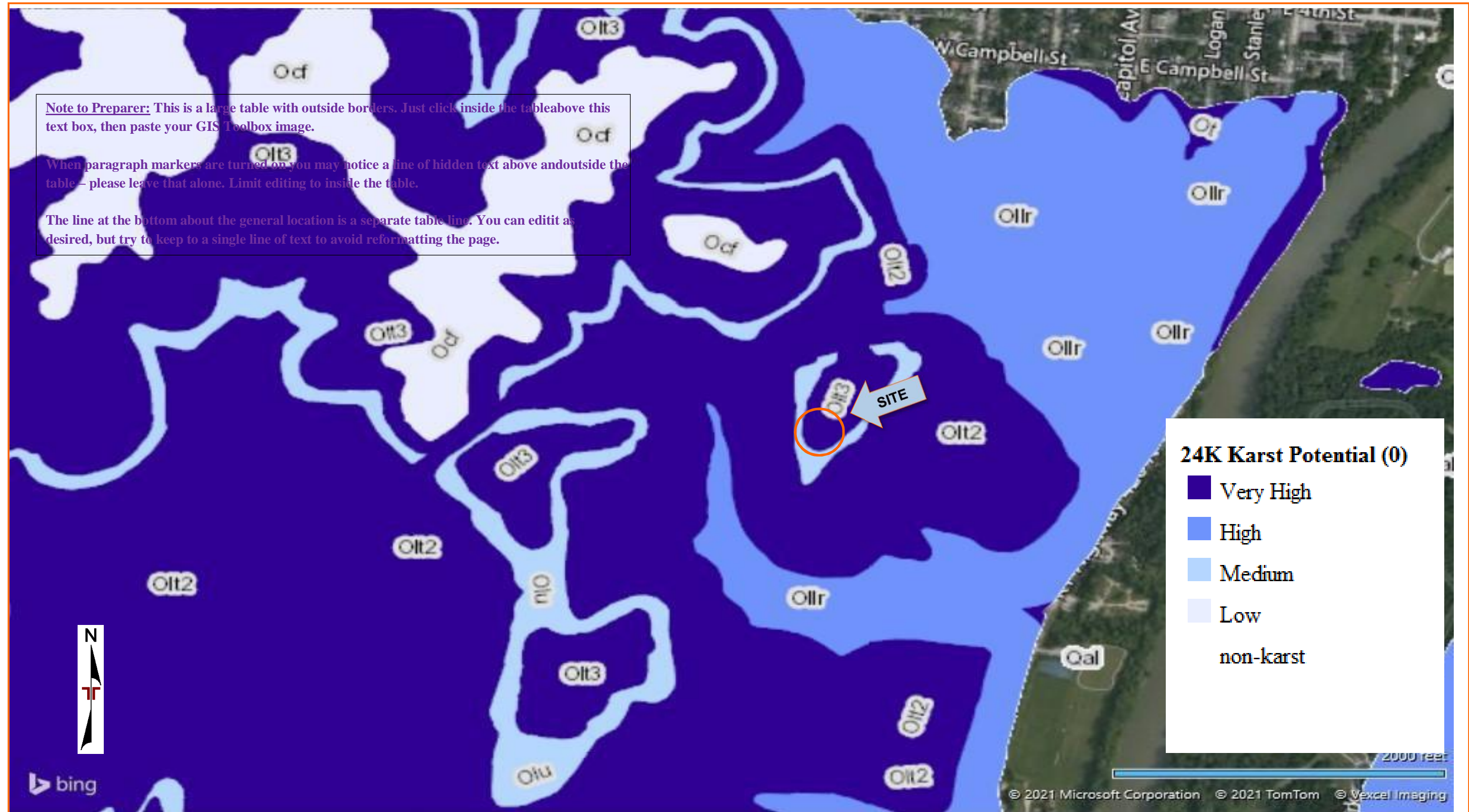
Frankfort FEWPB Tower ■ Frankfort, Franklin County, Kentucky

June 11, 2021 ■ Terracon Project No. N3215008



Karst Potential Map

Frankfort FEWPB Tower ■ Frankfort, Franklin County, Kentucky
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Note to Preparer: This is a large table with outside borders. Just click inside the table above this text box, then paste your GIS Toolbox image.

When paragraph markers are turned on you may notice a line of hidden text above and outside the table – please leave that alone. Limit editing to inside the table.

The line at the bottom about the general location is a separate table line. You can edit it as desired, but try to keep to a single line of text to avoid reformatting the page.



EXPLORATION RESULTS

Contents:

Boring Logs (B-1)

EER Test Data

Note: All attachments are one page unless noted above.

BORING LOG NO. B-1

PROJECT: Frankfort Telecommunications Tower

CLIENT: Frankfort Plant Board (FPB)
Frankfort, KY

SITE: 96 Tanglewood Dr.
Frankfort, KY

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 38.1849° Longitude: -84.8822° Surface Elev.: 764 (Ft.) ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	RQD (%)	Uniaxial Compressive Strength (psi)	LABORATORY HP (tsf)	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)
		DEPTH	764									
2		0.2 FILL - CRUSHED STONE LEAN CLAY (CL) , with silt, gray and brown, stiff	764									
		3.5	760.5			6	2-6-13 N=19			1.5 (HP)	15.4	
		LIMESTONE , gray, close fracture spacing, laminated bedding, moderately weathered, medium strong	5			57		43	4375		0	136
		8.5	755.5									
3		LIMESTONE , gray, close fracture spacing, laminated bedding, moderately weathered, medium strong	10			58		68	4780		0	165
		13.5	750.5									
		LIMESTONE , gray, moderate spacing, laminated bedding, unweathered, medium strong	15			60		100				
		18.5	745.5									
		Boring Terminated at 18.5 Feet										

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: 4" SFA	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any). See Supporting Information for explanation of symbols and abbreviations. Elevation is based on topographic information on Google Earth Pro	Notes:
Abandonment Method: Boring backfilled with auger cuttings upon completion.		
WATER LEVEL OBSERVATIONS		Boring Started: 05-05-2021 Boring Completed: 05-05-2021 Drill Rig: CME 550 Driller: D. Anderson Project No.: N3215008

LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL N3215008 FRANKFORT TELECOMGPI TERRACON_DATATEMPLATE.GDT 6/1/21

ELECTRICAL EARTH RESISTIVITY TEST DATA

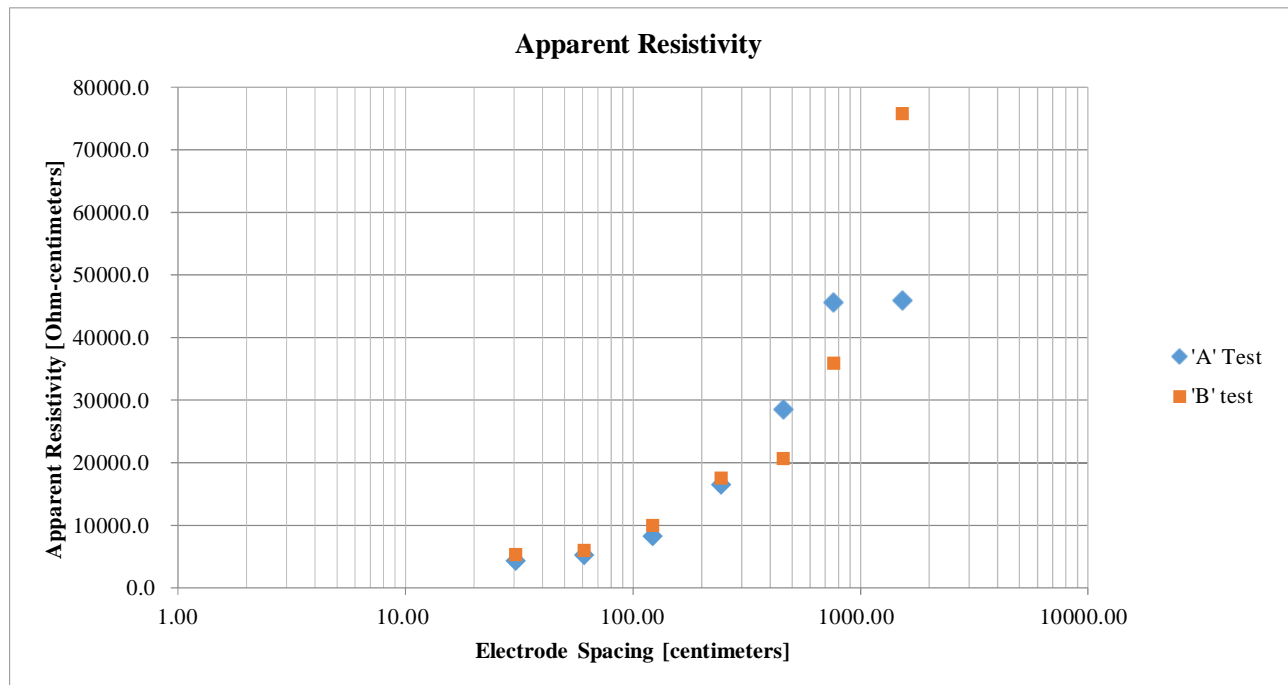
Test Line at B-1 offset (125 ft southwest) with approximate center poin: 38.184687°, -84.882549°

Project	Project Frankfort Tower Proposal	Weather	Sunny
Location	Location <u>Frankfort, KY</u>	Surface Soil	Lean Clay
Project #	Project # <u>N3215008 Test</u>	Instrument	AEMC Model 6471
Date	Test Date <u>April 30, 2021</u>	Tested By	Mohammad Joshaghani

Electrode Spacing "a"		Electrode Depth "b"		"A" Test (Extended E-W)		"B" Test (Extended N-S)	
[feet]	[centimeters]	[feet]	[centimeters]	Measured Resistance "R" [Ohms]	Apparent Resistivity "ρ" [Ohm-cm]	Measured Resistance "R" [Ohms]	Apparent Resistivity "ρ" [Ohm-cm]
1	30.48	0.5	15.24	17.10	4309.6	21.20	5342.9
2	60.96	0.5	15.24	12.50	5265.0	14.30	6023.2
4	121.92	0.5	15.24	10.50	8258.2	12.70	9988.4
8	243.84	0.5	15.24	10.70	16504.8	11.40	17584.5
15	457.20	1	30.48	9.850	28514.4	7.150	20698.3
25	762.00	1	30.48	9.510	45659.0	7.480	35912.7
50	1524.00	1	30.48	4.790	45899.1	7.910	75795.8

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4raR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$



Terracon

SUPPORTING INFORMATION

Contents:

General Notes
Unified Soil Classification System
Description of Rock Properties

Note: All attachments are one page unless noted above.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	Cu ≥ 4 and 1 ≥ 3 ^E	GW	Well-graded gravel ^F	
			Cu < 4 and/or [Cc <1 or Cc >3.0] ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Cu ≥ 6 and 1 ≥ 3 ^E	SW	Well-graded sand ^I	
			Cu < 6 and/or [Cc <1 or Cc >3.0] ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots on or above "A" line	CL	Lean clay ^{K, L, M}	
			PI ≤ 7 or plots below "A" line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}	
			PI plots below "A" line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW -SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \text{ Cu} = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

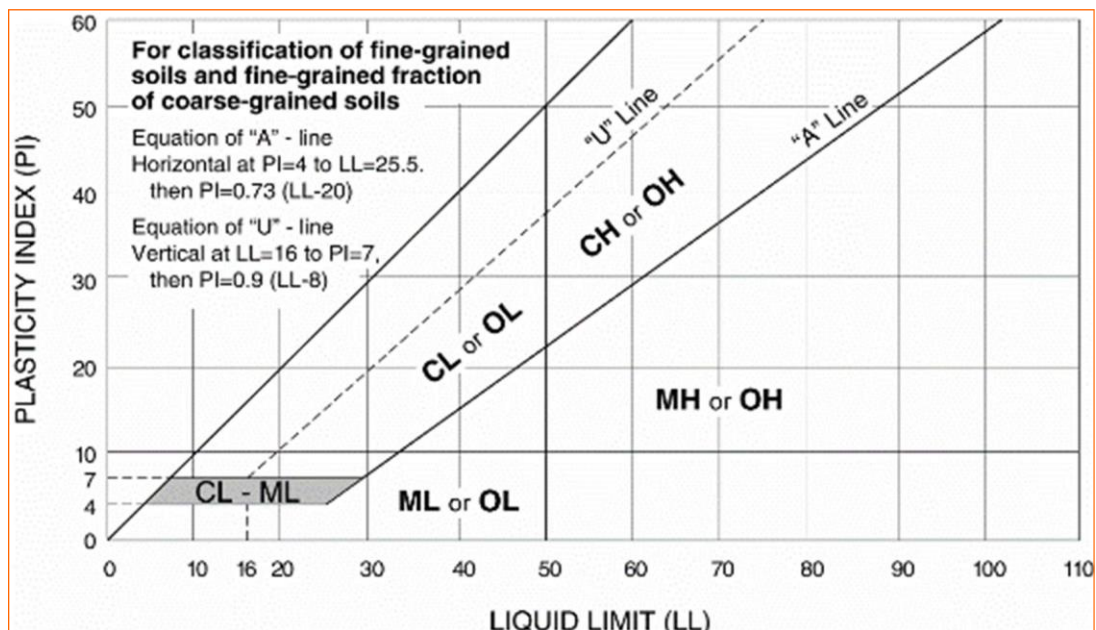
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N PI ≥ 4 and plots on or above "A" line.

^O PI ≤ 4 or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer if crystalline.
Very slight	Rock generally fresh, joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints stained, and discoloration extends into rock up to 1 in. Joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitoid rocks, most feldspars are dull and discolored; some show clayey. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.

Moderately severe	All rock except quartz discolored or stained. In granitoid rocks, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strongsoil. In granitoid rocks, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil". Rock "fabric" no discernible or discernible only in small, scattered locations. Quartz may be present as dikes or stringers.

HARDNESS (for engineering description of rock – not to be confused with Moh's scale for minerals)

Very hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of geologist's pick.
Hard	Can be scratched with knife or pick only with difficulty. Hard blow of hammer required to detach hand specimen.
Moderately hard	Can be scratched with knife or pick. Gouges or grooves to ¼ in. deep can be excavated by hard blow of point of a geologist's pick. Hand specimens can be detached by moderate blow.
Medium	Can be grooved or gouged 1/16 in. deep by firm pressure on knife or pick point. Can be excavated in small chipsto pieces about 1-in. maximum size by hard blows of the point of a geologist's pick.
Soft	Can be gouged or grooved readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small thin pieces can be broken by finger pressure.
Very soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces 1-in. or more in thickness can be broken with finger pressure. Can be scratched readily by fingernail.

Joint, Bedding, and Foliation Spacing in Rock ¹

Spacing	Joints	Bedding/Foliation
Less than 2 in.	Very close	Very thin
2 in. – 1 ft.	Close	Thin
1 ft. – 3 ft.	Moderately close	Medium
3 ft. – 10 ft.	Wide	Thick
More than 10 ft.	Very wide	Very thick

1. Spacing refers to the distance normal to the planes, of the described feature, which are parallel to each other or nearly so.

Rock Quality Designator (RQD) ¹		Joint Openness Descriptors	
RQD, as a percentage	Diagnostic description	Openness	Descriptor
Exceeding 90	Excellent	No Visible Separation	Tight
90 – 75	Good	Less than 1/32 in.	Slightly Open
75 – 50	Fair	1/32 to 1/8 in.	Moderately Open
50 – 25	Poor	1/8 to 3/8 in.	Open
Less than 25	Very poor	3/8 in. to 0.1 ft.	Moderately Wide
		Greater than 0.1 ft.	Wide

1. RQD (given as a percentage) = length of core in pieces 4 inches and longer / length of run

References: American Society of Civil Engineers. Manuals and Reports on Engineering Practice - No. 56. Subsurface Investigation for Design and Construction of Foundations of Buildings. New York: American Society of Civil Engineers, 1976. U.S. Department of the Interior, Bureau of Reclamation, Engineering Geology Field Manual.

EQUAL EMPLOYMENT OPPORTUNITY COMPLIANCE CERTIFICATE

A. Has your company filed the required Employer Information Report, EEO-1 (Standard Form 100) with the Secretary of Labor's Joint Reporting Committee for the prior period ending March 31?

YES

NO

If your answer to Question A above is "NO", check the following appropriate reasons for not filing:

1. Employ less than one hundred people company-wide.
2. Have specific exemption from Secretary of Labor as provided in Section 20 of Executive Order 11246, as amended.

Within Thirty (30) days after receipt of any order from the **Frankfort Electric and Water Plant Board** and prior to each March 31 thereafter, during the performance of work under said order, the undersigned firm agrees to file Standard Form 100, entitled "Equal Employment Opportunity Information Report EEO-1" in accordance with instructions contained therein, unless such firm has either filed such report within twelve months preceding the date of the award or is not otherwise required by law or regulations to file such a report.

B. In consideration of the undersigned being placed in the **Frankfort Electric and Water Plant Board's** "Supplier Document" for the year ending March 31 next, the undersigned certifies that he does not and will not maintain or provide for his employees any segregated facilities at any of his establishments and that he does not and will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The undersigned agrees that a breach of this certification is a violation of the Equal Opportunity Clause in any subcontract, contract, purchase order, or agreement that the undersigned may receive from the **Frankfort Electric and Water Plant Board**.

As used in this certification, the term "Segregated facilities" means any waiting room, work areas, rest room, and washrooms, restaurants and other eating areas, time clocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated on the basis of race, creed, color or national origin, because of habit, local custom or otherwise.

The undersigned further agrees that he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause; that he will retain such certification in his files and that he will forward the following notice to his proposed subcontractors (except when the proposed subcontractors have submitted identical certification for specific time periods).

**"NOTICE TO PROSPECTIVE SUBCONTRACTORS OF REQUIREMENT
FOR CERTIFICATION OF NONSEGREGATED FACILITIES"**

"A certification of Nonsegregated Facilities, as required by the May 9, 1967 order on Elimination of Segregated Facilities, by the Secretary of Labor (32 Fed. Reg. 7439, May 19, 1967) must be submitted prior to the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity clause. The certification for all subcontractors during a period (i.e., quarterly, semi-annually, or annually).

(Note: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.)"

C. Do you have at each of your facilities a current written Affirmative Action Compliance Program as required by Title 41 of the Code of Federal Regulations (CFR) 60-1.40; and current written Affirmative Action Programs for disabled veteran, veterans of the Vietnam Era and Handicapped workers as required by CFR 60-250.4 and CFR 60-741.4?

YES

NO

If "NO" within 120 days after receipt of any order resulting from attached quotation, the undersigned firm agrees to develop and maintain written Affirmative Action Compliance Programs as required. (Current law requires the contractor to develop a written Affirmative Action Compliance Programs in those cases where the contractor has received prime contract or subcontracts for \$50,000 or more and employs fifty (50) or more people).

CONTRACTOR (SELLER/SUPPLIER): _____

MAILING ADDRESS / PHONE: _____

Authorized Representative's
NAME(PRINTORTYPE): _____

Authorized Representative TITLE: _____

Dated Signature of Authorized Representative: _____

**NOTICE TO PROSPECTIVE CONTRACTORS OF REQUIREMENT OF
GENERAL SAFETY PROGRAM**

The Frankfort Plant Board requires that all contractors operate in compliance with standards set forth by federal, state, and local regulatory agencies, including but not limited to the Occupational Safety and Health Administration, Environmental Protection Agency and Department of Transportation. To comply with the regulations set forth by these agencies it is necessary for each contractor to operate under an established safety program pertaining to the contractor's specific line of business.

The Frankfort Plant Board requires that all contractors operate in compliance with standards set forth by federal, state, and local regulatory agencies, including but not limited to the Occupational Safety and Health Administration, Environmental Protection Agency and Department of Transportation. To comply with the regulations set forth by these agencies it is necessary for each contractor to operate under an established safety program pertaining to the contractor's specific line of business

Does your organization operate under an established safety program that is in compliance with all applicable federal, state and local regulations?

YES NO

CONTRACTOR (SELLER/SUPPLIER): _____

MAILING ADDRESS / PHONE: _____

Authorized Representative's
NAME (PRINT OR TYPE): _____

Authorized Representative TITLE: _____

Dated Signature of Authorized Representative:

DRUG AND ALCOHOL TESTING COMPLIANCE CERTIFICATE

Questions concerning the Drug & Alcohol Policies may be addressed verbally to Kim Watson, Safety Officer at (502) 352-4454 and/or Dianne Schneider, Personnel Officer at (502) 352-4366 or in writing to the Safety Officer and/or the Personnel Officer at PO Box 308, Frankfort KY 40602.

PLEASE SIGN BELOW TO INDICATE: 1) Contractor is in compliance with any applicable local, state or federal laws concerning mandatory Drug and Alcohol Programs; and 2) As a term of any contract for services to be performed on behalf of the Frankfort Electric and Water Plant Board, the Contractor agrees to comply with any drug testing that may be required by federal, state or local law.

Contractor _____

Mailing Address / Phone Number _____

Name of Authorized Representative (Type or Print) _____

Title of Authorized Representative _____

Dated Signature of Authorized Representative _____