**CALL NO. 301**

**CONTRACT ID. 211326**

**FAYETTE COUNTY**

**FED/STATE PROJECT NUMBER FD04 034 0004 004-006**

**DESCRIPTION NEW CIRCLE ROAD (KY 4)**

**WORK TYPE SOUND BARRIER WALL**

**PRIMARY COMPLETION DATE 8/15/2022**

**LETTING DATE: July 23,2021**

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 am EASTERN DAYLIGHT TIME July 23,2021. Bids will be publicly announced at 10:00 am EASTERN DAYLIGHT TIME.

**PLANS AVAILABLE FOR THIS PROJECT.**

**REQUIRED BID PROPOSAL GUARANTY:** Not less than 5% of the total bid.

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# PART I

# SCOPE OF WORK

# ADMINISTRATIVE DISTRICT - 07

**CONTRACT ID - 211326**

**FD04 034 0004 004-006**

**COUNTY - FAYETTE**

**PCN - DE03400042126**
**FD04 034 0004 004-006**

NEW CIRCLE ROAD (KY 4) (MP 4.80) CONSTRUCT SOUND BARRIER WALL ON EAST SIDE OF INTERCHANGE RAMP CONNECTING WESTBOUND US 60 TO NORTHBOUND KY 4 AND ALONG KY 4 (MP 5.2), A DISTANCE OF 0.48 MILES.SOUND BARRIER WALL SYP NO. 07-80154.00.

GEOGRAPHIC COORDINATES LATITUDE 38:02:48.00 LONGITUDE 84:33:45.00

**COMPLETION DATE(S):**

COMPLETED BY 08/15/2022 APPLIES TO ENTIRE CONTRACT

# CONTRACT NOTES

## PROPOSAL ADDENDA

All addenda to this proposal must be applied when calculating bid and certified in the bid packet submitted to the Kentucky Department of Highways. Failure to use the correct and most recent addenda may result in the bid being rejected.

## BID SUBMITTAL

Bidder must use the Department's electronic bidding software. The Bidder must download the bid file located on the Bid Express website (www.bidx.com) to prepare a bid packet for submission to the Department. The bidder must submit electronically using Bid Express.

## JOINT VENTURE BIDDING

Joint venture bidding is permissible. All companies in the joint venture must be prequalified in one of the work types in the Qualifications for Bidders for the project. The bidders must get a vendor ID for the joint venture from the Division of Construction Procurement and register the joint venture as a bidder on the project. Also, the joint venture must obtain a digital ID from Bid Express to submit a bid. A joint bid bond of 5% may be submitted for both companies or each company may submit a separate bond of 5%.

## UNDERGROUND FACILITY DAMAGE PROTECTION

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. When prescribed in said directives, the contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom shall be contacted through their individual Protection Notification Center. Non-compliance with these directives can result in the enforcement of penalties.

## REGISTRATION WITH THE SECRETARY OF STATE BY A FOREIGN ENTITY

Pursuant to KRS 176.085(1)(b), an agency, department, office, or political subdivision of the Commonwealth of Kentucky shall not award a state contract to a person that is a foreign entity required by KRS 14A.9-010 to obtain a certificate of authority to transact business in the Commonwealth ("certificate") from the Secretary of State under KRS 14A.9-030 unless the person produces the certificate within fourteen (14) days of the bid or proposal opening. If the foreign entity is not required to obtain a certificate as provided in KRS 14A.9-010, the foreign entity should identify the applicable exception. Foreign entity is defined within KRS 14A.1-070.

**For all foreign entities required to obtain a certificate of authority to transact business in the Commonwealth, if a copy of the certificate is not received by the contracting agency within the time frame identified above, the foreign entity's solicitation response shall be deemed non-responsive or the awarded contract shall be cancelled.**

Businesses can register with the Secretary of State at https://secure.kentucky.gov/sos/ftbr/welcome.aspx .

## SPECIAL NOTE FOR PROJECT QUESTIONS DURING ADVERTISEMENT

Questions about projects during the advertisement should be submitted in writing to the Division of Construction Procurement. This may be done by fax (502) 564-7299 or email to kytc.projectquestions@ky.gov. The Department will attempt to answer all submitted questions. The Department reserves the right not to answer if the question is not pertinent or does not aid in clarifying the project intent.

The deadline for posting answers will be 3:00 pm Eastern Daylight Time, the day preceding the Letting. Questions may be submitted until this deadline with the understanding that the later a question is submitted, the less likely an answer will be able to be provided.

The questions and answers will be posted for each Letting under the heading "Questions & Answers" on the Construction Procurement website (www.transportation.ky.gov/contract). The answers provided shall be considered part of this Special Note and, in case of a discrepancy, will govern over all other bidding documents.

## HARDWOOD REMOVAL RESTRICTIONS

The US Department of Agriculture has imposed a quarantine in Kentucky and several surrounding states, to prevent the spread of an invasive insect, the emerald ash borer. Hardwood cut in conjunction with the project may not be removed from the state. Chipping or burning on site is the preferred method of disposal.

## INSTRUCTIONS FOR EXCESS MATERIAL SITES AND BORROW SITES

Identification of excess material sites and borrow sites shall be the responsibility of the Contractor. The Contractor shall be responsible for compliance with all applicable state and federal laws and may wish to consult with the US Fish and Wildlife Service to seek protection under Section 10 of the Endangered Species Act for these activities.

## ACCESS TO RECORDS

The contractor, as defined in KRS 45A.030 (9) agrees that the contracting agency, the Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, shall have access to any books, documents, papers, records, or other evidence, which are directly pertinent to this contract for the purpose of financial audit or program review. Records and other prequalification information confidentially

disclosed as part of the bid process shall not be deemed as directly pertinent to the contract and shall be exempt from disclosure as provided in KRS 61.878(1)(c). The contractor also recognizes that any books, documents, papers, records, or other evidence, received during a financial audit or program review shall be subject to the Kentucky Open Records Act, KRS 61.870 to 61.884.

In the event of a dispute between the contractor and the contracting agency, Attorney General, or the Auditor of Public Accounts over documents that are eligible for production and review, the Finance and Administration Cabinet shall review the dispute and issue a determination, in accordance with Secretary's Order 11-004.

# SPECIAL NOTE FOR RECIPROCAL PREFERENCE

## RECIPROCAL PREFERENCE TO BE GIVEN BY PUBLIC AGENCIES TO RESIDENT BIDDERS

By reference, KRS 45A.490 to 45A.494 are incorporated herein and in compliance regarding the bidders residency. Bidders who want to claim resident bidder status should complete the Affidavit for Claiming Resident Bidder Status along with their bid in the electronic bidding software. Submittal of the Affidavit should be done along the bid in Bid Express.

April 30, 2018

**NATIONAL HIGHWAY**

Be advised this project is on the NATIONAL HIGHWAY SYSTEM.

FAYETTE COUNTY
KY-4 @ US 60 SOUND BARRIER WALL
From MP 4.8 to MP 5.2
**Item No. 7-80154.00**
**Project No. FD04 1100 034 0004 004-006**

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# SOUND BARRIER WALL PROJECT DESCRIPTION

## Project No. FD04 1100 034 0004 004-006

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The purpose of this project is to construct a sound barrier wall on the east side of the interchange ramp connecting westbound US 60 to northbound KY-4 and along KY-4 (MP 4.8 to MP 5.2) as shown on the plan set. The project includes the following items:

- Installation of a precast concrete sound barrier wall which includes the design of the sound barrier wall and coring and design of the foundation for the wall;
- Maintaining and controlling traffic; and
- Other miscellaneous items defined in the plans, notes, and estimated bid item quantities.

# GENERAL NOTES

**Project No. FD04 1100 034 0004 004-006**

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## EXISTING STORM DRAINAGE FACILITIES AND UNDERGROUND UTILITIES:

The Contractor shall use all possible care in his operations to avoid damaging existing pipes and any underground existing utilities. He shall be responsible for any damages to the above-mentioned items and shall repair or restore at his own expense any items damaged as the result of his operations.

The existing storm drainage facilities and underground utilities shown on the plans are based on record drawings provided by the respective agencies. It is the responsibility of the contractor to verify the accuracy (both location and elevation) of the facilities prior to fabrication of the sound wall panels due to the potential impact with the proposed drilled shafts. This work is incidental to "Site Preparation".

## OVERHEAD UTILITIES:

The minimum vertical clearance of existing overhead utilities should be 18 feet on state roads and 24 feet when crossing interstate or other limited access highway roadways and ramps. Clearance must also adhere to the requirements of the National Electric Safety Code, American Standards Institute, and Institute of Electrical and Electronic Engineers, Inc. Any questions concerning working around the existing facilities in the area can be addressed at the preconstruction meeting.

## UTILITIES (HAZARDOUS OR FLAMMABLE MATERIAL):

The Contractor is advised to exercise caution in his operations in areas of gas line or other lines carrying hazardous material.

## CONSTRUCTION MATERIAL DISPOSAL:

All material that is required to be removed shall be disposed of off the Right-of-Way at sites acquired by the Contractor and approved by the Engineer, at no additional cost to the department, per section 204.03.08 of current KYTC Standard Specifications.

## EXISTING SIGNS:

It is the Contractor's responsibility to "remove and re-install signs" as needed for construction. This work includes removing and installing signs, adjusting the height, etc. as directed by the Engineer.

## AVOIDANCE OF UNDERGROUND TRAFFIC DEVICES:

It is the Contractor's responsibility to coordinate with Central Office traffic through the Engineer when working near or affecting underground traffic control devices located within the project limits. Locations of existing traffic devices may not be completely reflected on the plans and should be addressed before beginning construction. The Contractor shall contact the KYTC District 7 Traffic Office ten business days prior to beginning work to mark the existing roadway lighting conduits. The Contractor shall be responsible for any damages to the above-mentioned items and shall repair or restore at their own expense any items damaged as a result of his operations.

## BEFORE YOU DIG:

THE CONTRACTOR IS INSTRUCTED TO CALL 1-800-752-6007 TO REACH KY 811, THE ONE-CALL SYSTEM FOR INFORMATION ON THE LOCATION OF EXISTING UNDERGROUND UTILITIES. THE CALL IS TO BE PLACED A MINIMUM OF TWO (2) AND NO MORE THAN TEN (10) BUSINESS DAYS PRIOR TO EXCAVATION. THE CONTRACTOR SHOULD BE AWARE THAT OWNERS OF UNDERGROUND FACILITIES ARE NOT REQUIRED TO BE MEMBERS OF THE KY 811 ONE-CALL BEFORE-U-DIG (BUD) SERVICE. THE CONTRACTOR MUST COORDINATE EXCAVATION WITH THE UTILITY OWNERS, INCLUDING THOSE WHO DO NOT SUBSCRIBE TO KY 811. IT MAY BE NECESSARY FOR THE CONTRACTOR TO CONTACT THE COUNTY COURT CLERK TO DETERMINE WHAT UTILITY COMPANIES HAVE FACILITIES IN THE AREA.

## SPECIAL NOTES FOR SOUND BARRIER WALL CONSTRUCTION

## Project No. FD04 1100 034 0004 004-006

**THIS PROJECT IS A FULLY CONTROLLED ACCESS HIGHWAY**

### GENERAL

All work shall be performed in accordance with the Department's Standard Specifications, current Standard Drawings, and the Manual on Uniform Traffic Control Devices (MUTCD), latest edition adopted by the Department, except as specified in these notes or elsewhere in this proposal. Section references are to the Standard Specifications.

### SITE PREPARATION

The contractor shall be responsible for all site preparation, including, but not limited to, clearing and grubbing; incidental excavation, grading, backfilling, embankment, cleaning existing ditch, grading existing ditch to drain; saw cutting trees, stump grinding and herbicide treatment, tree trimming, tree removal; removal of obstructions or any other items; disposal of materials, waste and debris; temporary and permanent erosion control; restoration, final dressing, and seeding and protection. The Department has not determined the area of clearing and grubbing. In the area identified on the plans as the Highway Beautification Tract, the Contractor shall do the minimal amount of tree trimming and/or removal, only that which is necessary for installation of the sound barrier wall.

Construct silt traps and temporary silt fence and clean as directed by the Engineer. KYTC has not determined the disturbed area and it is the responsibility of the Contractor to make this determination and file a Kentucky Pollutant Discharge Elimination System (KPDES) Electronic Notice of Intent (eNOI) if necessary.

Perform all site preparation only as approved or directed by the Engineer. All work described above or identified in the plan set as incidental to site preparation will not be measured or paid for but shall be incidental to the lump sum bid for Site Preparation.

### ON-SITE INSPECTION

Each Contractor submitting a bid for this work shall make a thorough inspection of the site prior to submitting his bid and shall thoroughly familiarize himself with existing conditions so that the work can be expeditiously performed after a contract is awarded. Submission of a bid will be considered evidence of this inspection having been made. Any claims resulting from site conditions will not be honored by the Department.

## RIGHT-OF-WAY LIMITS

The Department has not established the exact limits of right-of-way. Limit activities to obvious Right-of-Way and work areas, if any, secured by the Department through consent and release of the adjacent property owners. Be responsible for all encroachments onto private lands.

## PROPERTY DAMAGE AND RESTORATION

The Contractor shall be responsible for all damage to public and/or private property resulting from the work. All disturbed features shall be restored in like kind materials and designed at no additional cost to the Department.

## SOUND BARRIER WALLS

See "**Special Notes for Sound Barrier Walls"** and the Plans.

## MAINTAINING AND CONTROLLING TRAFFIC

See **"Traffic Management General Notes"** in the Roadway Plan Set.

# SPECIAL NOTES FOR SOUND BARRIER WALLS

## Project No. FD04 1100 034 0004 004-006

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## I. DESCRIPTION

All work shall be performed in accordance with the Department's latest Standards and Supplemental Specifications and applicable Special Provisions and Standard and Sepia Drawings, except as specified in these notes or elsewhere in this proposal. Section references are to the Standard Specifications. This work shall consist of design of the sound barrier wall, foundation, and connections, construction plans for the foundation, shop drawing preparation, and construction of precast concrete sound barrier walls, including construction of the drilled shaft foundations, in reasonably close conformity with the lines and grades shown on the contract plans and the Contractor's approved plans.

All references to AASHTO are to the AASHTO LRFD Bridge Design Specifications for Highway Bridges, Current Edition with Interims.

## II. DESIGN

### A. General

Furnish plans for sound barrier walls and foundations designed by a Registered Professional engineer licensed to practice in the Commonwealth of Kentucky. Design according to the AASHTO LRFD Bridge Design Specifications, and the Contract plans and documents.

The Contractor's design shall comply with all restrictions imposed by the site conditions and the proposal notes and plan sheets such as drainage, accommodation of existing and proposed utilities, limitations on dimensions or sound barrier wall location, fire hydrant access, and other conditions noted or found in the field. The top and bottom of the sound barrier wall elevation throughout shall be as shown on the contract plans.

### B. Site Conditions

Be advised that Section 102.07 of the Specifications applies to this project. It shall be distinctly understood that any references in the contract plans and other contract documents to rock, rock disintegration zone, earth, or any other subsurface material whether in numbers, words, letters, or lines is solely for the Department's information. The Bidder draws his own conclusions as to the field conditions to be encountered.

Tops of drilled shafts are to be a minimum of 6 inches below finished grade.

## C. Utilities

Take into consideration existing and proposed utilities and the Department's electrical service for interchange lighting in the vicinity of the sound barrier walls when developing sound barrier wall details. Show on the Contractor's plans and shop drawings additional work or materials necessary to construct the sound barrier wall without disturbing the utilities. The Contractor shall contact the KYTC District 5 Traffic Office ten business days prior to beginning work to mark the existing roadway lighting conduits. Repair or replace features damaged during construction in like kind materials and design at no additional cost to the Department.

## D. Contractor Submittals

Submit design calculations and plans to the Engineer for review within thirty calendar days of the “Notice to Begin Work”. Submit adequate documentation of proprietary designs and/or products to the Engineer for review.

Obtain sufficient subsurface information in order to design the drilled shaft foundations for axial and lateral loading conditions. Show field measured top of rock elevations, as appropriate, on the Contractor’s plans.

Submit electronic files in PDF format of calculations and plans for the sound barrier wall to the Engineer for approval. Design calculations shall include the design for each component of the wall and the wall as a unit. Include the design for the horizontal connection between panels. Include the design of the connection to the existing barrier wall where shown on the plans. Include drilled shaft foundation design for axial and lateral loading. Show on the plans the drilled shaft foundations. One set of design calculations and plans, with any corrections noted will be returned to the Contractor. Each time corrections are made, three copies of the revised calculation sheets and/or five copies of the revised plan sheets shall be submitted.

The Department will review the design calculations and plans for general conformance with AASHTO, this Special Note, and the Contract Documents. The design calculations, plans, details and dimensions may not be completely checked by the Department. The Contractor shall be responsible for the accuracy of his design calculations and for compatibility with the contract plans. The Department’s review will not relieve the Contractor of responsibility for the accuracy and completeness of the design calculations and plans.

Upon final approval by the Department, furnish electronic files in PDF format of the Contractor's approved plans to the Engineer. The Department will provide copies of the approved plans to the Contractor.

Do not produce shop drawings before the Department's approval of the design calculations and Contractor's plans is completed. The Contractor's wall design engineer providing the design calculations and plans shall be responsible for shop drawing review. The Contractor's wall design engineer shall provide the Engineer electronic files in PDF format for the wall and provide the Department with a statement of assurance that the shop drawings are accurate and that they satisfy the project requirements. Each sheet of the shop drawings shall be dated, sealed, and signed by the wall design engineer providing the Contractor's design for the wall. Place the Drawing Number on the lower right-hand side of all shop drawings.

Do not order materials or begin fabrication or construction before the Department's review of the shop drawings is completed. The Contractor may request permission from the Engineer to begin foundation construction at his own risk. Written permission from the engineer is required.

After acceptance by the Department, submit requests for changes to the design calculations, Contractor's approved plans and shop drawings to the Engineer. Obtain written acceptance from the Engineer before incorporating any of the requested changes into the work.

Allow thirty working days for the Department's review of each submission of the design calculations, Contractor's plans, and shop drawings for the sound barrier wall. The thirty-day period begins when the design calculations, Contractor's plans, or shop drawings are received by the Engineer. Additional time required by the Department to review re-submissions shall not be cause for extending the specified completion date. Provide additional re-submissions as requested at no additional cost to the Department and with no extension of the specified completion date.

## III. SOUND BARRIER WALLS

### Precast Concrete Walls

Where shown on the plans, design a free standing sound barrier wall finished on one side. The maximum precast panel length shall be 40 feet. Design all sound barrier walls for the same appearance and materials. Design drilled shafts for foundations; other type foundation designs will not be accepted.

Precast Concrete panels may be pilaster (post), and panel design or connected panels.

Precast concrete panels, pilasters, and other precast elements shall comply with Section 605 of the Standard Specifications. Precast concrete shall be Class D with a minimum 28-day compressive strength of 5000 p.s.i. All materials and reinforcement shall conform to the Department's Standard Specifications.

Precast panels, pilasters, and other precast elements may be prestressed. Prestress fabrication shall be in accordance with Section 605 of the Standard Specifications. Prestressing tendons may be either bar or strand. Prestressing bars shall conform to ASTM A722. 'High Strength Steel Bars for Prestressed Concrete'. Prestressing strands shall be seven wire strands conforming to ASTM A416, 'Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete'.

Use drilled shafts as foundation. The Contractor's design should be in accordance to the Special Note for Drilled Shafts (11C) of the Standard Specifications. The Contractor's plans shall indicate whether or not permanent casings will be required. Drilled Shaft Common, Drilled Shaft Solid Rock, Rock Sounding, and Rock Coring will be incidental to the Sound Barrier Wall and will not be measured for separate payment.

Use preformed joint filler complying with AASHTO M153 for Types I, II, or III or AASHTO M213.

Provide positive means of alignment between panels. Use tongue and groove joints with a minimum protrusion of 1”.

Seal all joints between panels and between pilasters and panels with silicone sealer to prevent sound leaks. Obtain the Engineer’s approval of the sealant before use. See notes for finish requirements below.

Step elevation changes at the top of the sound barrier wall except for end panels. Construct the top of sound barrier level between steps. Make steps only at the pilasters. Construct the top of the sound barrier wall at the elevation of the top of the sound barrier shown on the contract plans. The top of the pilaster elevation should match the elevation of the highest adjacent panel.

Construct reinforced concrete pilasters. Cast using metal forms. Construct pilasters that protrude a maximum of twelve inches from the front face of the precast panels. Connect pilasters to drilled shaft foundations above the finish grade. Use bolted galvanized steel for the connections; the Engineer will not allow or permit field welding.

Obtain the Engineer’s approval of joint materials and details before use.

Finish Requirements:

Precast Panels – Provide an architectural formed finish representing an ashlar stone form lined surface on both sides of the wall as approved by the Resident Engineer.

Pilasters - Pilasters shall be concrete and shall be cast using metal forms.

Color – All concrete surfaces of the precast panels and pilasters shall be stained as approved by the Resident Engineer, using outdoor grade coloring agents applied according to the manufacturer's instructions. Provide a uniform color throughout the entire length of the sound barrier wall.

Joints – Horizontal joints are to be filled with silicone sealer and stained to match the color of the wall as approved by the Resident Engineer.

Provide two samples of the precast concrete panels, a minimum of four feet by eight feet, cast using same form liners as proposed for production for the Department's approval. Retain one sample at the casting yard for a standard of comparison for the production panels. Deliver the second sample to the project site. Casting and delivering the samples to the job site will not be measured for separate payment, but shall be incidental to Sound Barrier Wall.

## IV. MATERIALS APPROVAL

All materials shall be sampled and tested in accordance with the Department's Sampling Manual and the materials shall be available for sampling a sufficient time in advance of the use of the materials to allow for the necessary time for testing. Unless otherwise specified in these Notes, obtain acceptance of materials from the Engineer before use.

## V. CONSTRUCTION

Perform site preparation necessary to construct the sound barrier wall in accordance with the Standard Specifications, contract plans, Contractor's approved plans and notes in the proposal.

Construct sound barrier walls in accordance with the contract plans, the Contractor's approved plans, and the approved shop drawings. Construct vertical and horizontal joints so that the sound barrier wall is structurally sound and with no sound leaks. Construct the face of the completed sound barrier wall without deviation from the vertical of more than ½ inch in ten feet and with horizontal alignment conforming to the neat line shown on the contract plans.

Alternate drilled shaft foundation designs are permitted if solid rock is encountered above the solid rock line shown on the Contractor's approved plans; however, contact the Engineer before revising the drilled shaft foundations. Revised calculations and Contractor's plans will be required. Obtain the Engineer's acceptance of revised drilled shaft foundation designs before constructing. Construct the tops of drilled shaft foundations a minimum of six inches below finish grade on both sides of the sound barrier wall. There will be no deduction in area to be measured for payment when drilled shaft foundations protrude into the sound barrier bottom pay limit.

Revising the drilled shaft foundation designs shall not be cause for an extension in contract time or change the contract price.

Transport, store, handle, and erect precast units in accordance with Section 605 of the Standard Specifications.

Protect all masonry materials from the weather from the time of manufacture until they are in the finished sound barrier walls.

Construction of the ditches shown on the plans will not be measured for payment but shall be incidental to Site Preparation.

After constructing the wall, clean all sound barrier wall surfaces. Clean from the top of the wall to twelve inches below finished grade on both sides. Use a cleaner selected by the Contractor and approved by the Engineer.

## VI. MEASUREMENT

### SOUND BARRIER WALL

**Sound Barrier Walls** will be measured in square feet of surface area in a vertical plane between the vertical and horizontal limits, top of wall elevations, and lateral limits shown on the Contractor's approved plans or approved changes; however, tops of footings may be above the minimum depth of burial with no reduction in area to be measured.

Any area of the sound barrier wall outside the approved vertical and horizontal plan limits as shown on the approved plans or changes approved or directed by the Engineer will not be measured for payment. Approved adjustments in the area will be measured in square feet and the final quantity will be increased or decreased as applicable.

The Department will not measure caps, copings, joint sealants, void fill material, weep holes, connectors, trim, surface finish, concrete stain, cleaning, sample panels, and incidental items that are a normal part of the sound barrier wall construction, but shall be incidental to Sound Barrier Wall.

**FOUNDATION PREPARATION**

Contrary to Section 603.04.03, **Foundation Preparation** will be measured as lump sum. Structure Excavation Common, Structure Excavation Solid Rock, Structure Excavation Unclassified, Foundation Undercut, Drilled Shaft Common, Drilled Shaft Solid Rock, Rock Sounding, and Rock Coring for removal of unsuitable foundation materials will not be measured for separate payment but shall be incidental to **Foundation Preparation or Site Preparation**.

**SITE PREPARATION**

See the Special Notes for Sound Barrier Wall Construction on page 5.

## VII. PAYMENT

Payment at the contract unit price per square foot shall be full complete compensation for all labor, materials, equipment, and incidentals to design and construction of the sound barrier walls.

| CODE | PAY ITEM | PAY UNIT |
|---|---|---|
| 21590EN | Sound Barrier Wall | Square Feet |
| 08003 | Foundation Preparation | Lump Sum |
| 20257NC | Site Preparation | Lump Sum |

## SPECIAL NOTE FOR LIQUIDATED DAMAGES

## Project No. FD04 1100 034 0004 004-006

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Liquidated Damages in the amount of $25,000 will be assessed for each hour or part of an hour that a temporary lane and/or shoulder closure remains in place during periods prohibited by the Traffic Management Plan. All liquidated damages will be applied accumulatively.

All other applicable portions of KYTC Standard Specification Section 108 shall apply.

# PROJECT COMPLETION DATE

## Project No. FD04 1100 034 0004 004-006

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The specified completion date for this project is **August 15, 2022.** See "**Special Note for Liquidated Damages".**

# STANDARD DRAWINGS

## Project No. FD04 1100 034 0004 004-006

| | |
|---|---|
| RBI-001-12 | TYPICAL GUARDRAIL INSTALLATIONS |
| RBI-002-07 | TYPICAL GUARDRAIL INSTALLATIONS |
| RBI-003-09 | TYPICAL INSTALLATION FOR GUARDRAIL END TREATMENT TYPE 2A |
| RBI-004-06 | INSTALLATION OF GUARDRAIL END TREATMENT TY 1 |
| RBR-001-13 | STEEL BEAM GUARDRAIL (W-BEAM) |
| RBR-005-11 | GUARDRAIL COMPONENTS |
| RBR-010-06 | GUARDRAIL TERMINAL SECTIONS |
| RBR-015-06 | STEEL GUARDRAIL POSTS |
| RBR-020-07 | GUARDRAIL END TREATMENT TYPE 1 |
| RBR-025-06 | GUARDRAIL END TREATMENT TYPE 2A |
| RBR-055-01 | DELINEATORS FOR GUARDRAIL |
| RDD-040-05 | CHANNEL LINING CLASS II AND III |
| RDX-210-03 | TEMPORARY SILT FENCE |
| RDX-225-01 | SILT TRAP TYPE B |
| TTC-135-02 | SHOULDER CLOSURE |
| TTD-120-03 | DOUBLE FINES ZONE SIGNS |

KENTUCKY TRANSPORTATION CABINET
Department of Highways
**DIVISION OF RIGHT OF WAY & UTILITIES**

TC 62-226
Rev. 01/2016
Page 1 of 1

# RIGHT OF WAY CERTIFICATION

| ☒ Original | ☐ Re-Certification | RIGHT OF WAY CERTIFICATION | |
|---|---|---|---|
| **ITEM #** | **COUNTY** | **PROJECT # (STATE)** | **PROJECT # (FEDERAL)** |
| 7-80154.00 | Fayette | FD04 034 0004 004-006 | N/A |
| **PROJECT DESCRIPTION** | | | |
| Fayette County KY-4 from MP 4.8 to MP 5.2 | | | |

☒ **No Additional Right of Way Required**

Construction will be within the limits of the existing right of way. The right of way was acquired in accordance to FHWA regulations under the Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, as amended. No additional right of way or relocation assistance were required for this project.

☐ **Condition # 1 (Additional Right of Way Required and Cleared)**

All necessary right of way, including control of access rights when applicable, have been acquired including legal and physical possession. Trial or appeal of cases may be pending in court but legal possession has been obtained. There may be some improvements remaining on the right-of-way, but all occupants have vacated the lands and improvements, and KYTC has physical possession and the rights to remove, salvage, or demolish all improvements and enter on all land. Just Compensation has been paid or deposited with the court. All relocations have been relocated to decent, safe, and sanitary housing or that KYTC has made available to displaced persons adequate replacement housing in accordance with the provisions of the current FHWA directive.

☐ **Condition # 2 (Additional Right of Way Required with Exception)**

The right of way has not been fully acquired, the right to occupy and to use all rights-of-way required for the proper execution of the project has been acquired. Some parcels may be pending in court and on other parcels full legal possession has not been obtained, but right of entry has been obtained, the occupants of all lands and improvements have vacated, and KYTC has physical possession and right to remove, salvage, or demolish all improvements. Just Compensation has been paid or deposited with the court for most parcels. Just Compensation for all pending parcels will be paid or deposited with the court prior to AWARD of construction contract

☐ **Condition # 3 (Additional Right of Way Required with Exception)**

The acquisition or right of occupancy and use of a few remaining parcels are not complete and/or some parcels still have occupants. All remaining occupants have had replacement housing made available to them in accordance with 49 CFR 24.204. KYTC is hereby requesting authorization to advertise this project for bids and to proceed with bid letting even though the necessary right of way will not be fully acquired, and/or some occupants will not be relocated, and/or the just compensation will not be paid or deposited with the court for some parcels until after bid letting. KYTC will fully meet all the requirements outlined in 23 CFR 635.309(c)(3) and 49 CFR 24.102(j) and will expedite completion of all acquisitions, relocations, and full payments after bid letting and prior to AWARD of the construction contract or force account construction.

| Total Number of Parcels on Project | 0 | EXCEPTION (S) Parcel # | ANTICIPATED DATE OF POSSESSION WITH EXPLANATION |
|---|---|---|---|
| **Number of Parcels That Have Been Acquired** | | | |
| Signed Deed | 0 | | |
| Condemnation | 0 | | |
| Signed ROE | 0 | | |

**Notes/ Comments (Use Additional Sheet if necessary)**

| LPA RW Project Manager | | Right of Way Supervisor | |
|---|---|---|---|
| Printed Name | | Printed Name | Cecil Smith |
| Signature | | Signature | Cecil Smith 2021.06.11 10:16:02 -04'00' |
| Date | | Date | 6/11/2021 |
| **Right of Way Director** | | **FHWA** | |
| Printed Name | | Printed Name | |
| Signature | 2021.06.11 10:38:59 -04'00' | Signature | |
| Date | | Date | |

# UTILITIES AND RAIL CERTIFICATION NOTE

**Fayette County**
**FD04 034 0004 004-006**
**Mile point: 4.8 TO 5.2**
**Sound Wall KY-4**

**7-80154.00**

## PROJECT NOTES ON UTILITIES

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

The contractor will be responsible for contacting all utility facility owners on the subject project to coordinate his activities. The contractor will coordinate his activities to minimize and, where possible, avoid conflicts with utility facilities. Due to the nature of the work proposed, it is unlikely to conflict with the existing utilities beyond minor facility adjustments. Where conflicts with utility facilities are unavoidable, the contractor will coordinate any necessary relocation work with the facility owner and Resident Engineer. The Kentucky Transportation Cabinet maintains the right to remove or alter portions of this contract if a utility conflict occurs. The utility facilities as noted in the previous section(s) have been determined using data garnered by varied means and with varying degrees of accuracy: from the facility owners, a result of S.U.E., field inspections, and/or reviews of record drawings. The facilities defined may not be inclusive of all utilities in the project scope and are not Level A quality, unless specified as such. It is the contractor's responsibility to verify all utilities and their respective locations before excavating.

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. The contractor is instructed to contact KY 811 for the location of existing underground utilities. Contact shall be made a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY 811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom are to be contacted through their individual Protection Notification Center. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area. Non-compliance with these directives can result in the enforcement of penalties.

# UTILITIES AND RAIL CERTIFICATION NOTE

**Fayette County**
**FD04 034 0004 004-006**
**Mile point: 4.8 TO 5.2**
**Sound Wall KY-4**

**7-80154.00**

**NOTE: DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS**

Kentucky Utilities

Kentucky American Water Company

Windstream Kentucky East

Spectrum

Columbia Gas of Kentucky

Lexington Fayette Urban County Government

AT&T KY

AT&T Legacy

**THE FOLLOWING FACILITY OWNERS ARE RELOCATING/ADJUSTING THEIR FACILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION**

Not Applicable

**THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE OWNER OR THEIR SUBCONTRACTOR AND IS TO BE COORDINATED WITH THE ROAD CONTRACT**

Not Applicable

**THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT**

# UTILITIES AND RAIL CERTIFICATION NOTE

**Fayette County**
**FD04 034 0004 004-006**
**Mile point: 4.8 TO 5.2**
**Sound Wall KY-4**

**7-80154.00**

Not Applicable

**RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED**

☒ **No Rail Involvement** ☐ **Rail Involved** ☐ **Rail Adjacent**

# UTILITIES AND RAIL CERTIFICATION NOTE

**Fayette County**
**FD04 034 0004 004-006**
**Mile point: 4.8 TO 5.2**
**Sound Wall KY-4**

**7-80154.00**

## AREA FACILITY OWNER CONTACT LIST

| Facility Owner | Address | Contact Name | Phone | Email |
|---|---|---|---|---|
| Kentucky Utilities | | Caroline Justice | 502 627 3708 | |
| KAWC | | Krista Citron | 859 268 6352 | |
| Windstream | | Steve Johnson | 859 867 6209 | |
| Spectrum | | Kelly Oram | 859 519 3434 | |
| Columbia Gas | | Bryan Slone | 859 288 0253 | |
| LFUCG | | Bob Bayert | 859 258 3410 | |
| AT&T KY | | Frank Ambrose | 502 867 8240 | |
| AT&T Legacy | | Mike Diederich | 216 750 0135 | |



Form Revised 6/24/16

**M E M O R A N D U M**

**S-008-2021**

cc: J. VanZee
C. VanZee
R. Sprague (D7)
McGaha (D7)
K. Stewart
A. Ulrich
J. Samples (D7)
B. Tse (QK4)

**TO:** Michael Carpenter, P.E.
Director, Division of Structural Design

**FROM:** Geotechnical Branch

**BY:** Robert McDonald, P.E.
Geotechnical Branch, Structure Foundation Section

**DATE:** May 13th, 2021

**SUBJECT:** **Fayette County**
**FD04 1100 034 0004 004-006 01 D**
**Mars #: 12740 01 D**
**KY-4 (New Circle Rd.)**
**Noise wall at NW#1 Sta. 100+00 to 115+30, Rt side of Rd**
**Item #: 7-80154.00**
**Geotechnical Engineering Structure Foundation Report**

## 1.0 Location and Description

The geotechnical investigation for this structure has been completed. The DGN file for the subsurface data sheet has been made available on ProjectWise and through email for use in development of structure plans. The drilling for the project was performed by a contracted drill crew, utilizing the KYTC Geotechnical Branch's statewide contracts.

This geotechnical engineering structural foundation report addresses the geotechnical issues/conditions for the proposed design and construction of a sound barrier along the eastern side of the New Circle Rd. on ramp from west bound US-60. This wall will be approximately 1530 feet long. This noise barrier wall will be the first of 3 consecutive noise barriers towards the northward direction. The proposed noise barrier wall location is from Lat: 38.046918° Long: -84.562489° to Lat: 38.049774°, Long: -84.562607°.

## 2.0 Site Geologic Conditions

The structure is located in the Lexington West (#600) Geologic Quadrangle. The geologic mapping indicates that the bedrock at this site is consists of Lexington Limestone.

## 3.0 Field Investigation

A total of seventeen (17) bore holes were drilled at this structure's location. Five (5) of the drilled borings were sample and core holes and twelve (12) were mechanical rockline soundings. The drill crew delivered the rock core and soil samples to the KYTC Geotechnical Branch in Frankfort, where a geologist logged the rock core and the soils were tested in the Branch's soils laboratory.

## 4.0 Laboratory Testing & Subsurface Conditions

The laboratory soil testing was completed by the Geotechnical Branch. The soil samples obtained from the borings were determined to consist primarily of inorganic low-plasticity and high-plasticity clays and silts. The soil samples were designated as CL, CH, ML, and MH using the Unified Soil Classification System.

Depths to refusal varied from 5.1 ft to 17.2 ft. Rock cores obtained for this location revealed

**S-008-2021**
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 13th, 2021**

light-gray to gray, fine to medium-grained, crystalline, fossil fragmented, limestone with shale laminations & partings. The RQD values for the rock cores ranged from 72% to 100% and core recoveries ranged from 93% to 100%. The variations in auger refusal elevations ranged from 931.8 ft to 961.2 ft.

## 5.0 ENGINEERING ANALYSIS

Drilled shafts are proposed for the noise barrier wall foundations. The shafts will be founded into bedrock. The Idealized Soil and Bedrock Profile Sheet and the Drilled Shaft Axial Tables are attached. Because of the structure type and pre-existing site conditions embankment stability and settlement analyses were not required.

Use **Drilled Shafts**. Table 1 contains relevant elevations needed to both complete the design and determine plan quantities for the drilled shafts. Some of the "Estimated Bottom of Permanent Casing" and "Highest Allowable Shaft Tip" elevations are due to rockline variations.

Drilled shafts were evaluated for axial loading, and the attached tables provide the resulting capacities and resistances for the Load & Resistance Factor Design (LRFD) design method.

**Table 1**
**Estimated Drilled Shaft Elevations**

| Station Range | Elevations (ft.) * | | |
|---|---|---|---|
| | Est. Top of Shaft | Est. Top of Rock Socket | Highest** Allowable Shaft Tip |
| 100+00 to 101+00 | 950.5 | 931.0 | 929.0 |
| 101+00 to 103+80 | 953.0 | 940.5 | 938.5 |
| 103+80 to 105+00 | 953.0 | 945.5 | 943.5 |
| 105+00 to 106+10 | 954.5 | 946.0 | 944.0 |
| 106+10 to 107+00 | 957.5 | 949.0 | 947.0 |
| 107+00 to 108+00 | 961.5 | 952.0 | 950.0 |
| 108+00 to 112+00 | 969.5 | 956.0 | 954.0 |
| 112+00 to 113+00 | 970.0 | 953.5 | 951.5 |
| 113+00 to 114+00 | 967.0 | 948.0 | 946.0 |
| 114+00 to 115+30 | 966.0 | 946.0 | 944.0 |

* Elevations for all shafts will be verified after construction-phase drilling has been performed. The final shaft tip elevations and quantities may be adjusted based on the actual conditions encountered in the field.

** The Shaft tip shall extend a minimum of two feet below the estimated base of weathered rock

**S-008-2021**
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 13th, 2021**

## 6.0 RECOMMENDATIONS

6.1 Drilled shafts with the highest recommended tip embedded a minimum of 2 feet into sound bedrock. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

6.2 Perform lateral load analyses using the geotechnical parameters provided in the attached Idealized Soil and Bedrock Profile. These parameters may be used to perform analyses using LPILE Plus. Some of the parameters may not be required to be input, depending on the version of the program being used.

6.3 At the designers discretion the overburden soils may be utilized for lateral support however a minimum rock embedment depth of 2' is required.

6.4 Evaluate the allowable axial capacities using the attached Drilled Shaft Axial Capacity Tables.

6.5 Permanent casing is not required. The contractor may elect to use temporary casing in deeper soil areas. Temporary casing may be omitted if the contractor can demonstrate the ability to maintain an open excavation without collapse of the side walls, fall back of material into the excavation, or fall back into and contamination of freshly placed concrete.

6.6 Require a 6-inch minimum rebar cover in the rock sockets.

6.7 For Load & Resistance Factor Design (LRFD), evaluate the **total factored axial resistances** using the attached Drilled Shaft Axial Capacity Table considering the capacity developed in the uncased rock sockets. The allowable capacities must equal or exceed the factored loads at the strength limit state. The highest allowable shaft tip elevations are provided in Table 1. Highest allowable shaft tip elevations for larger diameter shafts are indicated on corresponding attached Drilled Shaft Axial Capacity Table. Longer uncased sockets may be required to satisfy axial or lateral load design criteria.

6.8 Use the elevations in Table 1 to determine plan quantities as follows:

- Drilled Shaft - *-inch (Common) Top of Shaft to Top of Rock Socket
- Drilled Shaft - **-inch (Solid Rock) Top of Rock Socket to Shaft Tip

*Insert diameter 6 inches larger than shaft diameter chosen
**Shaft diameter chosen

6.9 Minimal evidence of karst features were found in the core samples obtained during drilling. However, the project is located in a site considered to be karst intense. If solution features are encountered during construction there is a potential to encounter unsound bedrock or for concrete loss during pouring. The contractor should be prepared to address these complications. Remedies could include: extended shaft lengths, extended casing, and pouring of lean concrete and re-drilling for structural concrete after setup.

6.10 The top 5 feet of the soils shall be neglected for lateral support or axial resistance of the drilled shafts.

6.11 Noise Walls should not be subjected to differential earth loading. Reinforced panels may shift or crack and the entire wall could potentially have an overturning failure if it is subjected to earth loads. Special pane and foundation designs are required in order to

safely construct a hybrid Retaining/Noise Wall. In walls constructed in newly placed fill areas it should not be assumed that construction will be phased in a manner to avoid imposing earth loads. The walls should either be designed to withstand the maximum potential earth load or construction phasing must be specified to prevent differential loading conditions. Wall design loads should be determined using Soil Type 3 of Exhibit 413 in the Division of Structural Design Guidance Manual.

## 7.0 PLAN NOTES

7.1 Permanent casing is not required. The contractor may elect to use temporary casing in deeper soil areas. Temporary casing may be omitted if the contractor can demonstrate the ability to maintain an open excavation without collapse of the side walls, fall back of material into the excavation, or fall back into and contamination of freshly placed concrete.

7.2 Except as permitted by special design Noise Walls shall not be subjected to differential earth loading. Temporary or permanent soil loads placed on the sound barrier walls are only permitted as noted in the sound barrier wall plans.

7.3 Due to variability in the rockline the potential for field adjustment in shaft lengths shall be addressed in the following manner:

Bedrock Supported Shafts:

For shafts supported in bedrock and bedrock is below the anticipated tip elevation the contractor must extend the shaft to bedrock in order to provide the required socket length unless the wall design consultant considers and approves the corresponding reduction in axial and lateral capacity.

7.4 The drilled shafts shall be constructed in accordance with the Special Note for Drilled Shafts, current edition, except that subsurface exploration borings in accordance with Section 3.5 of the Special Note is not required.

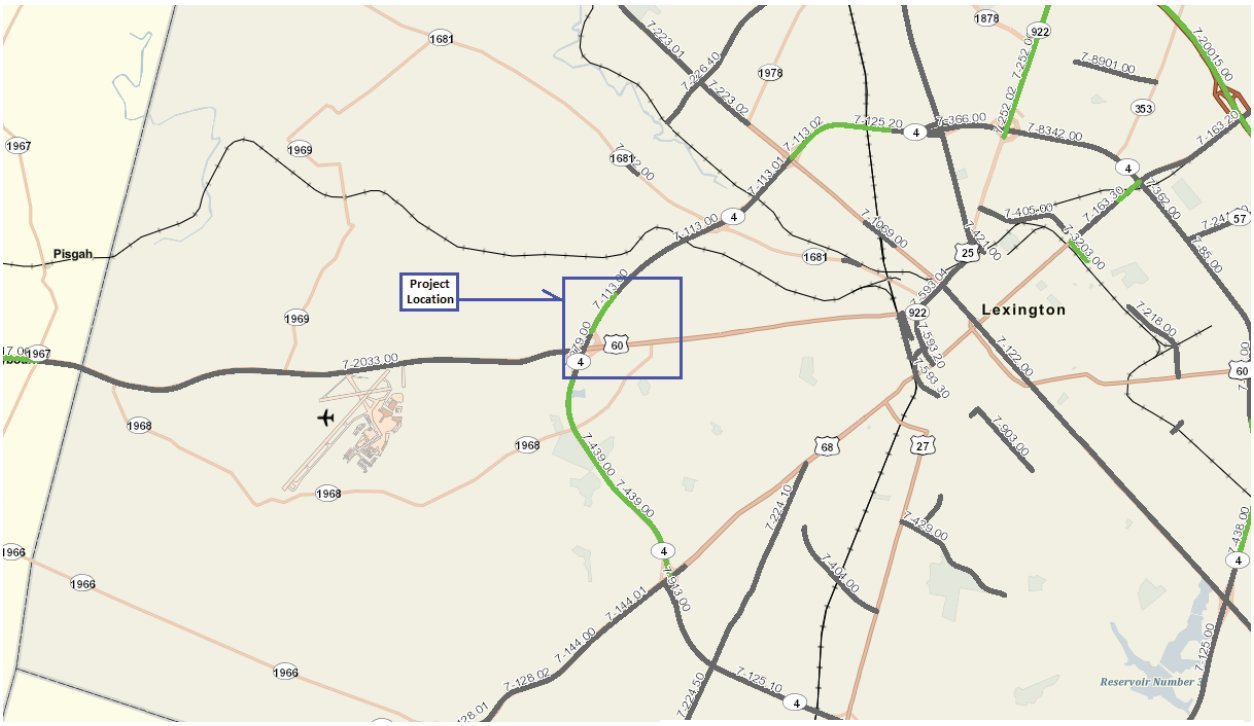
The designer should feel free to contact the Geotechnical Branch at 502-564-2374 for further recommendations or if any questions arise pertaining to this project.

**Attachments:**

- **Project Location Map**
- **Subsurface Data Sheets**
- **Idealized Soil and Bedrock Profile Sheets**
- **Drilled Shaft Axial Resistance Tables**
- **Coordinate Data Sheet**

**S-008-2021**
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 13th, 2021**

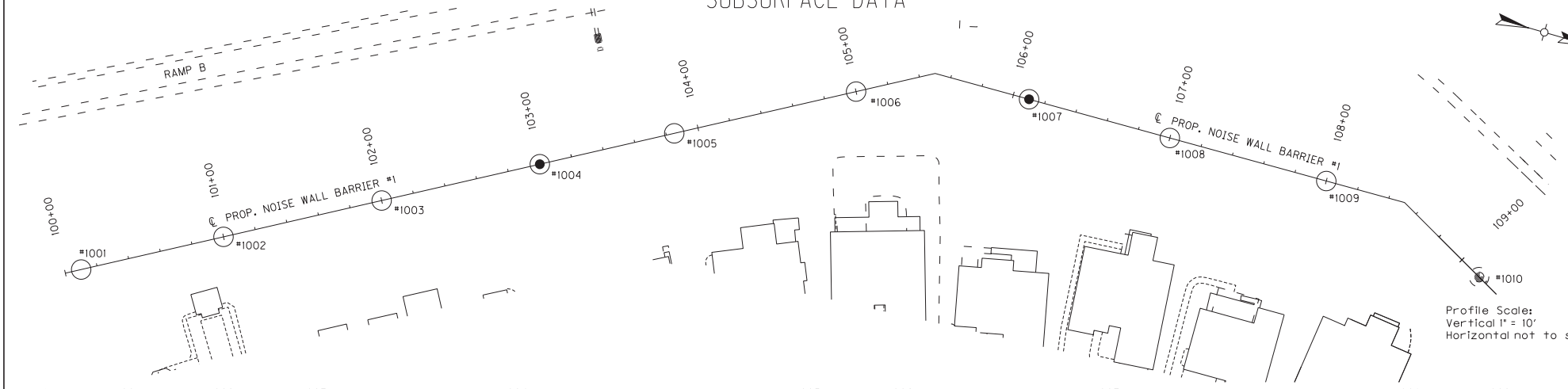
## Project Location Map:




**(Design and construct sound barrier walls on the northbound side of KY-4 (New Circle Rd.) from MP 4.8 to 5.2 in Lexington, KY.)**

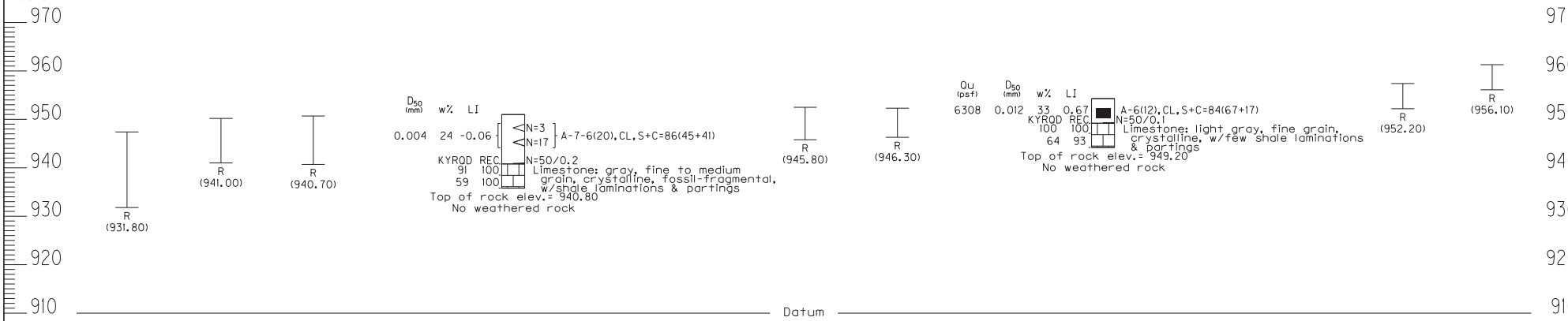
# SUBSURFACE DATA

Plan Scale 1" = 50'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

| Hole No. | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 |
|---|---|---|---|---|---|---|---|---|---|
| Station | 100+10.00 | 101+00.00 | 102+00.00 | 103+00.00 | 103+85.00 | 105+00.00 | 106+10.00 | 107+00.00 | 108+00.00 |
| Offset | ℄ | ℄ | ℄ | ℄ | ℄ | ℄ | ℄ | ℄ | ℄ |
| Elev. (NAVD 88 datum) | 947.40 | 950.20 | 950.70 | 951.00 | 952.50 | 952.30 | 954.30 | 957.40 | 961.30 |

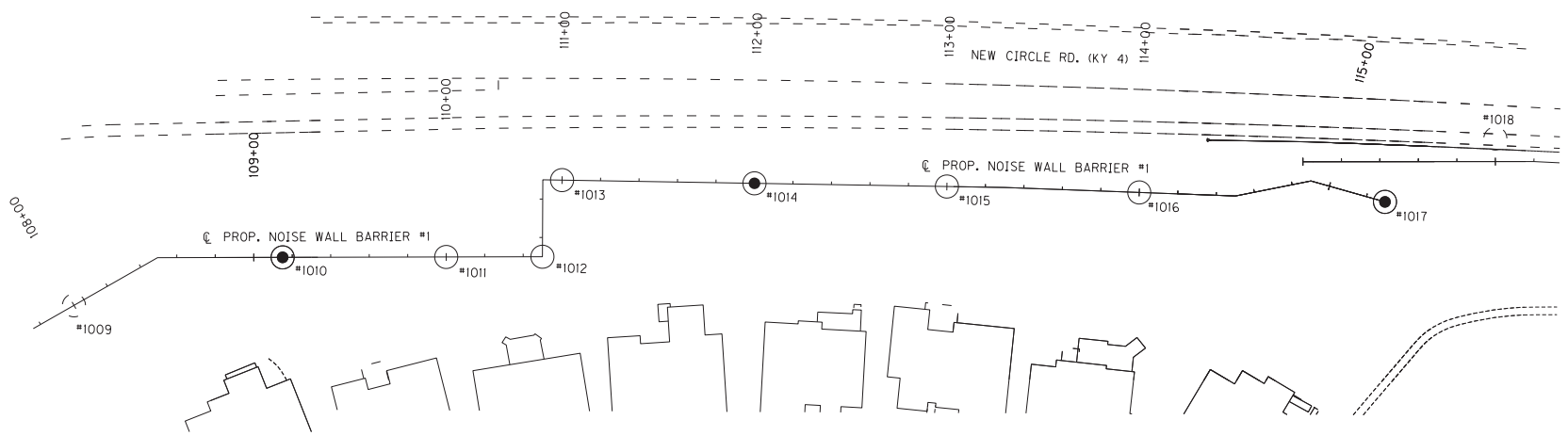



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY<br>Division of Structural Design<br>Geotechnical Branch | DATE: 29-APRIL-2021<br>DESIGNED BY:<br>DETAILED BY: E. BAILEY | CHECKED BY<br><br>R. McDONALD | CROSSING<br>Noise Wall @ Sta. 100+00 – 115+30 | ROUTE<br>KY 4 | ITEM NO.<br>7–80154.00<br>SHEET NO. | COUNTY OF<br>FAYETTE<br>DRAWING NUMBER<br>S–008–2021 |

MicroStation v10.15.0.74 USER: $$$$USER$$$$ DATE PLOTTED: $$$$DATE$$$$ FILE NAME: $$$$design$files$specification$$$$

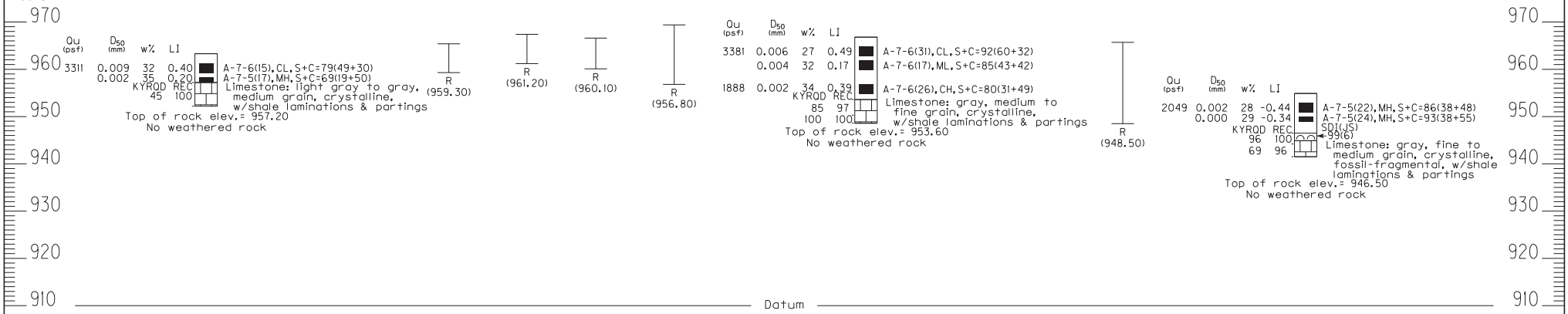
# SUBSURFACE DATA

Plan Scale 1" = 100'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

| Hole No. | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 |
|---|---|---|---|---|---|---|---|---|
| Station | 109+15.00 | 110+00.00 | 110+50.00 | 111+00.00 | 112+00.00 | 113+00.00 | 114+00.00 | 115+30.00 |
| Offset | ℄ | ℄ | ℄ | ℄ | 5.00 ft. Rt. | 5.00 ft. Rt. | ℄ | ℄ |
| Elev. (NAVD 88 datum) | 963.30 | 965.40 | 967.40 | 966.60 | 969.40 | 966.80 | 965.70 | 954.90 |




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY<br>Division of Structural Design<br>Geotechnical Branch | DATE: 29-APRIL-2021 | CHECKED BY | CROSSING<br>**Noise Wall @ Sta. 100+00 – 115+30** | ROUTE<br>**KY 4** | ITEM NO.<br>**7–80154.00** | COUNTY OF<br>**FAYETTE** |
| | | | | DESIGNED BY: | | | | SHEET NO. | DRAWING NUMBER<br>**S–008–2021** |
| | | | | DETAILED BY: E. BAILEY | R. McDONALD | | | | |

MicroStation v10.15.0.74 USER: $$$$USER$$$$ DATE PLOTTED: $$$$DATE$$$$ FILE NAME: $$$$design$file$specification$$$$

# IDEALIZED SOIL AND BEDROCK PROFILE

**Fayette Co., Item #: 7-80154.00, S-009-2021**
**Noise Barrier Wall #1, KY-4 (New Circle Rd.)**
**Sta. 100+00 to 115+30, Rt. Side of Rd.**

**RDM 5/5/2021**

**Approximate Elev. (ft)****

* — **Top of Shaft**

---

**Overburden** — **Stiff Clay without Free Water (Reese)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 125 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.072 |
| $Y_e$ (lb/ft$^3$) = 125 | Cohesive Strength, | $C_u$ (psi) = 10.4 |
| $C_u$ (psf) = 1500 | Soil Strain Parameter, | $\varepsilon_{50}$ = 0.007 |
| | Soil Modulus Parameter, | K (lb/in$^3$) = 500 |

**Water Table Depth = 4 ft**

* ▼

---

**Overburden** — **Stiff Clay with Free Water (Reese)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 125 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.036 |
| $Y_e$ (lb/ft$^3$) = 62.6 | Cohesive Strength, | $C_u$ (psi) = 6.9 |
| $C_u$ (psf) = 1000 | Soil Strain Parameter, | $\varepsilon_{50}$ = 0.007 |
| | Soil Modulus Parameter, | K (lb/in$^3$) = 500 |

* — **Top of Rock Socket**

---

**Limestone** — **Strong Rock (Vuggy Limestone)**
(Applied for Vertical Support)

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 150 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.087 |
| $q_u$ (psi) = 4000 | Elastic Modulus | $E_r$ (psi) = 400,000 |
| $q_{eb}$ (ksf) = 68 | Uniaxial Compressive Strength | $q_u$ (lb/in$^2$) = 4000 |
| $f_s$ (ksf) = 30 | Cohesive Strength | $c_u$ (psi) = 2000 |

*

---

**Shaft Tip**

* **Elevations vary and are provided in the body of the report.**

** **For design: At each shaft location apply actual elevations using Table 1, subsurface data sheets, and available cross section information.**

| **ADDITIONAL DATA FOR GEOTECHNICAL CALCULATIONS ONLY:** | |
|---|---|
| **min $f'_c$ (psi) =** | **3500** |
| **$p_a$ (psi) =** | **14.7** |

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 1.5 feet**
**Rock Socket Diameter = 18 inches** **RDM 5/7/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 141 | 120 | 71 | 60 | 131 | 57 |
| >>> | 2.0 | 30.0 | 68 | 283 | 120 | 141 | 60 | 201 | 113 |
| | 3.0 | 30.0 | 68 | 424 | 120 | 212 | 60 | 272 | 170 |
| | 4.0 | 30.0 | 68 | 565 | 120 | 283 | 60 | 343 | 226 |
| | 5.0 | 30.0 | 68 | 707 | 120 | 353 | 60 | 414 | 283 |
| | 6.0 | 30.0 | 68 | 848 | 120 | 424 | 60 | 484 | 339 |
| | 7.0 | 30.0 | 68 | 990 | 120 | 495 | 60 | 555 | 396 |
| | 8.0 | 30.0 | 68 | 1131 | 120 | 565 | 60 | 626 | 452 |
| | 9.0 | 30.0 | 68 | 1272 | 120 | 636 | 60 | 696 | 509 |
| | 10.0 | 30.0 | 68 | 1414 | 120 | 707 | 60 | 767 | 565 |
| | 11.0 | 30.0 | 68 | 1555 | 120 | 778 | 60 | 838 | 622 |
| | 12.0 | 30.0 | 68 | 1696 | 120 | 848 | 60 | 908 | 679 |
| | 13.0 | 30.0 | 68 | 1838 | 120 | 919 | 60 | 979 | 735 |
| | 14.0 | 30.0 | 68 | 1979 | 120 | 990 | 60 | 1050 | 792 |
| | 15.0 | 30.0 | 68 | 2121 | 120 | 1060 | 60 | 1120 | 848 |
| | 16.0 | 30.0 | 68 | 2262 | 120 | 1131 | 60 | 1191 | 905 |
| | 17.0 | 30.0 | 68 | 2403 | 120 | 1202 | 60 | 1262 | 961 |
| | 18.0 | 30.0 | 68 | 2545 | 120 | 1272 | 60 | 1332 | 1018 |
| | 19.0 | 30.0 | 68 | 2686 | 120 | 1343 | 60 | 1403 | 1074 |
| | 20.0 | 30.0 | 68 | 2827 | 120 | 1414 | 60 | 1474 | 1131 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

>>> = Min. Socket Length

D (ft.) = 1.5

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 2.0 feet**
**Rock Socket Diameter = 24 inches** **RDM 5/7/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 188 | 214 | 94 | 107 | 201 | 75 |
| >>> | 2.0 | 30.0 | 68 | 377 | 214 | 188 | 107 | 295 | 151 |
| | 3.0 | 30.0 | 68 | 565 | 214 | 283 | 107 | 390 | 226 |
| | 4.0 | 30.0 | 68 | 754 | 214 | 377 | 107 | 484 | 302 |
| | 5.0 | 30.0 | 68 | 942 | 214 | 471 | 107 | 578 | 377 |
| | 6.0 | 30.0 | 68 | 1131 | 214 | 565 | 107 | 672 | 452 |
| | 7.0 | 30.0 | 68 | 1319 | 214 | 660 | 107 | 767 | 528 |
| | 8.0 | 30.0 | 68 | 1508 | 214 | 754 | 107 | 861 | 603 |
| | 9.0 | 30.0 | 68 | 1696 | 214 | 848 | 107 | 955 | 679 |
| | 10.0 | 30.0 | 68 | 1885 | 214 | 942 | 107 | 1049 | 754 |
| | 11.0 | 30.0 | 68 | 2073 | 214 | 1037 | 107 | 1144 | 829 |
| | 12.0 | 30.0 | 68 | 2262 | 214 | 1131 | 107 | 1238 | 905 |
| | 13.0 | 30.0 | 68 | 2450 | 214 | 1225 | 107 | 1332 | 980 |
| | 14.0 | 30.0 | 68 | 2639 | 214 | 1319 | 107 | 1426 | 1056 |
| | 15.0 | 30.0 | 68 | 2827 | 214 | 1414 | 107 | 1521 | 1131 |
| | 16.0 | 30.0 | 68 | 3016 | 214 | 1508 | 107 | 1615 | 1206 |
| | 17.0 | 30.0 | 68 | 3204 | 214 | 1602 | 107 | 1709 | 1282 |
| | 18.0 | 30.0 | 68 | 3393 | 214 | 1696 | 107 | 1803 | 1357 |
| | 19.0 | 30.0 | 68 | 3581 | 214 | 1791 | 107 | 1898 | 1433 |
| | 20.0 | 30.0 | 68 | 3770 | 214 | 1885 | 107 | 1992 | 1508 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

>>> = Min. Socket Length

D (ft.) = 2.0

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 2.5 feet**
**Rock Socket Diameter = 30 inches** **RDM 5/7/21**

| Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | |
| 1.0 | 30.0 | 68 | 236 | 334 | 118 | 167 | 285 | 94 |
| >>> 2.0 | 30.0 | 68 | 471 | 334 | 236 | 167 | 403 | 188 |
| 3.0 | 30.0 | 68 | 707 | 334 | 353 | 167 | 520 | 283 |
| 4.0 | 30.0 | 68 | 942 | 334 | 471 | 167 | 638 | 377 |
| 5.0 | 30.0 | 68 | 1178 | 334 | 589 | 167 | 756 | 471 |
| 6.0 | 30.0 | 68 | 1414 | 334 | 707 | 167 | 874 | 565 |
| 7.0 | 30.0 | 68 | 1649 | 334 | 825 | 167 | 992 | 660 |
| 8.0 | 30.0 | 68 | 1885 | 334 | 942 | 167 | 1109 | 754 |
| 9.0 | 30.0 | 68 | 2121 | 334 | 1060 | 167 | 1227 | 848 |
| 10.0 | 30.0 | 68 | 2356 | 334 | 1178 | 167 | 1345 | 942 |
| 11.0 | 30.0 | 68 | 2592 | 334 | 1296 | 167 | 1463 | 1037 |
| 12.0 | 30.0 | 68 | 2827 | 334 | 1414 | 167 | 1581 | 1131 |
| 13.0 | 30.0 | 68 | 3063 | 334 | 1532 | 167 | 1698 | 1225 |
| 14.0 | 30.0 | 68 | 3299 | 334 | 1649 | 167 | 1816 | 1319 |
| 15.0 | 30.0 | 68 | 3534 | 334 | 1767 | 167 | 1934 | 1414 |
| 16.0 | 30.0 | 68 | 3770 | 334 | 1885 | 167 | 2052 | 1508 |
| 17.0 | 30.0 | 68 | 4006 | 334 | 2003 | 167 | 2170 | 1602 |
| 18.0 | 30.0 | 68 | 4241 | 334 | 2121 | 167 | 2287 | 1696 |
| 19.0 | 30.0 | 68 | 4477 | 334 | 2238 | 167 | 2405 | 1791 |
| 20.0 | 30.0 | 68 | 4712 | 334 | 2356 | 167 | 2523 | 1885 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 2.5 |

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 3.0 feet**
**Rock Socket Diameter = 36 inches** **RDM 5/7/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 283 | 481 | 141 | 240 | 382 | 113 |
| >>> | 2.0 | 30.0 | 68 | 565 | 481 | 283 | 240 | 523 | 226 |
| | 3.0 | 30.0 | 68 | 848 | 481 | 424 | 240 | 664 | 339 |
| | 4.0 | 30.0 | 68 | 1131 | 481 | 565 | 240 | 806 | 452 |
| | 5.0 | 30.0 | 68 | 1414 | 481 | 707 | 240 | 947 | 565 |
| | 6.0 | 30.0 | 68 | 1696 | 481 | 848 | 240 | 1089 | 679 |
| | 7.0 | 30.0 | 68 | 1979 | 481 | 990 | 240 | 1230 | 792 |
| | 8.0 | 30.0 | 68 | 2262 | 481 | 1131 | 240 | 1371 | 905 |
| | 9.0 | 30.0 | 68 | 2545 | 481 | 1272 | 240 | 1513 | 1018 |
| | 10.0 | 30.0 | 68 | 2827 | 481 | 1414 | 240 | 1654 | 1131 |
| | 11.0 | 30.0 | 68 | 3110 | 481 | 1555 | 240 | 1795 | 1244 |
| | 12.0 | 30.0 | 68 | 3393 | 481 | 1696 | 240 | 1937 | 1357 |
| | 13.0 | 30.0 | 68 | 3676 | 481 | 1838 | 240 | 2078 | 1470 |
| | 14.0 | 30.0 | 68 | 3958 | 481 | 1979 | 240 | 2220 | 1583 |
| | 15.0 | 30.0 | 68 | 4241 | 481 | 2121 | 240 | 2361 | 1696 |
| | 16.0 | 30.0 | 68 | 4524 | 481 | 2262 | 240 | 2502 | 1810 |
| | 17.0 | 30.0 | 68 | 4807 | 481 | 2403 | 240 | 2644 | 1923 |
| | 18.0 | 30.0 | 68 | 5089 | 481 | 2545 | 240 | 2785 | 2036 |
| | 19.0 | 30.0 | 68 | 5372 | 481 | 2686 | 240 | 2926 | 2149 |
| | 20.0 | 30.0 | 68 | 5655 | 481 | 2827 | 240 | 3068 | 2262 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 3.0 |

########
EV0000
Kentucky Transportation Cabinet
Version 8.30.004
Query: COORDINATE DATA FILE
Project: n:\geotech\gint\projects\s-008-2021.gpj Library: n:\geotech\gint\libraries\kytc library version 5.1.g

| ID | Latitude | Longitude | Hole | Station | Offset | Elevation | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 38.0466 | -84.5624 | 1001 | 10010 | 0 | 947.38 | |
| 2 | 38.04684 | -84.5626 | 1002 | 10100 | 0 | 950.21 | |
| 3 | 38.04709 | -84.5627 | 1003 | 10200 | 0 | 950.66 | |
| 4 | 38.04733 | -84.5629 | 1004 | 10300 | 0 | 951.01 | |
| 5 | 38.04757 | -84.5631 | 1005 | 10385 | 0 | 952.47 | |
| 6 | | | 1006 | 10500 | 0 | 952.3 | |
| 7 | 38.04807 | -84.5633 | 1007 | 10600 | 0 | 954.27 | |
| 8 | 38.04834 | -84.5633 | 1008 | 10700 | 0 | 957.35 | |
| 9 | 38.04862 | -84.5633 | 1009 | 10800 | 0 | 961.3 | |
| 10 | 38.04888 | -84.5632 | 1010 | 10915 | 0 | 963.26 | |
| 11 | 38.04911 | -84.5631 | 1011 | 11000 | 0 | 965.44 | |
| 12 | 38.04923 | -84.563 | 1012 | 11050 | 0 | 967.41 | |
| 13 | 38.04931 | -84.5631 | 1013 | 11100 | 0 | 966.57 | |
| 14 | 38.04955 | -84.5629 | 1014 | 11200 | 5 | 969.4 | |
| 15 | 38.04978 | -84.5627 | 1015 | 11300 | 5 | 966.75 | |
| 16 | 38.05002 | -84.5625 | 1016 | 11400 | 0 | 965.72 | |
| 17 | 38.05032 | -84.5623 | 1017 | 11530 | 0 | 954.85 | |

**M E M O R A N D U M**

**S-009-2021**

cc: J. VanZee
C. VanZee
R. Sprague (D7)
McGaha (D7)
K. Stewart
A. Ulrich
J. Samples (D7)
B. Tse (QK4)

**TO:** Michael Carpenter, P.E.
Director, Division of Structural Design

**FROM:** Geotechnical Branch

**BY:** Robert McDonald, P.E.
Geotechnical Branch, Structure Foundation Section

**DATE:** May 13th, 2021

**SUBJECT:** **Fayette County**
**FD04 1100 034 0004 004-006 01 D**
**Mars #: 12740 01 D**
**KY-4 (New Circle Rd.)**
**Noise wall at NW#2 Sta. 200+00 to 202+80, Rt side of Rd**
**Item #: 7-80154.00**
**Geotechnical Engineering Structure Foundation Report**

## 1.0 Location and Description

The geotechnical investigation for this structure has been completed. The DGN file for the subsurface data sheet has been made available on ProjectWise and through email for use in development of structure plans. The drilling for the project was performed by a contracted drill crew, utilizing the KYTC Geotechnical Branch's statewide contracts.

This geotechnical engineering structural foundation report addresses the geotechnical issues/conditions for the proposed design and construction of a sound barrier along the eastern side of the New Circle Rd. on ramp from west bound US-60. This wall will be approximately 1530 feet long. This noise barrier wall will be the second of 3 consecutive noise barriers towards the northeastward direction. The proposed noise barrier wall location is from Lat: 38.049774° Long: -84.562607° to Lat: 38.049767°, Long: -84.562446°.

## 2.0 Site Geologic Conditions

The structure is located in the Lexington West (#600) Geologic Quadrangle. The geologic mapping indicates that the bedrock at this site consists of Lexington Limestone.

## 3.0 Field Investigation

A total of two (2) bore holes were drilled at this structure's location. One (1) of the drilled borings was a sample and core hole and one (1) was a mechanical rockline sounding. The drill crew delivered the rock core and soil samples to the KYTC Geotechnical Branch in Frankfort, where a geologist logged the rock core and the soils were tested in the Branch's soils laboratory.

## 4.0 Laboratory Testing & Subsurface Conditions

The laboratory soil testing was completed by the Geotechnical Branch. The soil samples obtained from the borings were determined to consist primarily of inorganic low-plasticity and high-plasticity clays and high-plasticity silts. The soil samples were designated as CL, CH, and MH using the Unified Soil Classification System.

Depths to refusal varied from 8.4 ft to 21.9 ft. Rock cores obtained for this location revealed gray, fine to medium-grained, crystalline, limestone with shale laminations & partings. The RQD

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value for the rock cores ranged from 69% to 96% and core recovery ranged from 96% to 100%. The variations in auger refusal elevations ranged from 938.1 ft to 946.5 ft.

## 5.0 ENGINEERING ANALYSIS

Drilled shafts are proposed for the noise barrier wall foundations. The Idealized Soil and Bedrock Profile Sheet and the Drilled Shaft Axial Tables are attached. Because of the structure type and pre-existing site conditions embankment stability and settlement analyses were not required.

For drilled shafts socketed into bedrock, Table 1 contains relevant elevations needed to both complete the design and determine plan quantities for the drilled shafts. Some of the "Estimated Bottom of Permanent Casing" and "Highest Allowable Shaft Tip" elevations are due to rockline variations.

Drilled shafts in bedrock were evaluated for axial loading, and the attached tables provide the resulting capacities and resistances for the Load & Resistance Factor Design (LRFD) design method.

**Table 1**
**Estimated Drilled Shaft Elevations**

| Station Range | Elevations (ft.) * | | |
|---|---|---|---|
| | Est. Top of Shaft | Est. Top of Rock Socket | Highest** Allowable Shaft Tip |
| 200+00 to 201+00 | 960.5 | 939.5 | 937.5 |
| 201+00 to 202+00 | 960.5 | 937.5 | 935.5 |
| 202+00 to 202+80 | 960.5 | 937.5 | 935.5 |

* Elevations for all shafts will be verified after construction-phase drilling has been performed. The final shaft tip elevations and quantities may be adjusted based on the actual conditions encountered in the field.

** The Shaft tip shall extend a minimum of two feet below the estimated base of weathered rock

For soil supported drilled shafts, Use drilled shafts with a minimum socket length of 15 feet or minimum tip embedment of 2 feet in sound bedrock. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements. For shafts not anticipated to tip into bedrock allowable axial capacities may be evaluated using the Table 2 below. Otherwise, evaluate the allowable axial capacities using the attached Drilled Shaft Axial Resistance Tables provided at the end of the report. Axial capacities obtained through soil may not be combined with capacities through bedrock. Refer to Recommendation 6.1 and Plan Note 7.3 below for a discussion of variability in the rockline and its impact on shaft design and construction.

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Table 2
Summary of Capacities in Soil for 15' Drilled Shafts Plus Incremental Nominal Side Resistance per Additional Foot of Embedment

| Shaft Diameter | End Bearing | Side Resistance | End Bearing Factored | Side Resistance Factored | Uplift Resistance Factored | Additional Factored Side Resistance Per Foot of Additional Embedment | |
|---|---|---|---|---|---|---|---|
| | | | | | | Side | Uplift |
| (ft) | (kips) | (kips) | (kips) | (kips) | (kips) | (kips) | (kips) |
| 1.5 | 31.81 | 51.84 | 12.72 | 23.33 | 18.14 | 2.33 | 1.81 |
| 2 | 56.55 | 69.12 | 22.62 | 31.10 | 24.19 | 3.11 | 2.42 |
| 2.5 | 88.36 | 86.39 | 35.34 | 38.88 | 30.24 | 3.89 | 3.02 |
| 3 | 127.23 | 103.67 | 50.89 | 46.65 | 36.29 | 4.67 | 3.63 |

Calculation Notes:
Top 5 (feet) of soil are neglected. Capacities through soil must be neglected if rock socket is utilized
Resistance Factors: Side = 0.45; End = 0.40; Uplift = 0.35

## 6.0 RECOMMENDATIONS

6.1 The rockline along portions of the proposed wall was found to be variable. It is possible that interpolated rock depths during design may not be encountered in the field. The potential for an unexpectedly high or low rockline should be addressed in the wall plans. The designer may choose to establish minimum embedment depths for lateral support. Criteria for axial capacity can be addressed in the plans based on the following:

Bedrock Supported Shafts:

If the shaft is to be supported in bedrock and bedrock is below the anticipated tip elevation the contractor must extend the shaft to bedrock in order to provide the required socket length unless the wall design consultant considers and approves the corresponding reduction in axial and lateral capacity.

Soil Supported Shafts:

If the shaft is to be supported in soil and bedrock is encountered above the anticipated tip elevation, the contractor shall provide a 2 foot rock socket. In these cases the design axial capacities of the shafts can be conservatively assumed to be met. Lateral support conditions should still be verified and approved by the wall design consultant.

6.2 Perform lateral load analyses using the geotechnical parameters provided in the attached Idealized Soil and Bedrock Profile. These parameters may be used to perform analyses using LPILE Plus or similar software. Some of the parameters may not be required to be input, depending on the version of the program being used.

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**Item #: 7-80154.00**
**May 13th, 2021**

6.3 At the designers discretion the overburden soils may be utilized for lateral support; however, for shafts embedded less than 15 feet a minimum rock embedment/socket depth of 2' is required for axial support.

6.4 The top 5 feet of the soils shall be neglected for lateral support or axial resistance of the drilled shafts.

6.5 Noise Walls should not be subjected to differential earth loading. Reinforced panels may shift or crack and the entire wall could potentially have an overturning failure if it is subjected to earth loads. Special pane and foundation designs are required in order to safely construct a hybrid Retaining/Noise Wall. In walls constructed in newly placed fill areas it should not be assumed that construction will be phased in a manner to avoid imposing earth loads. The walls should either be designed to withstand the maximum potential earth load or construction phasing must be specified to prevent differential loading conditions. Wall design loads should be determined using Soil Type 3 of Exhibit 413 in the Division of Structural Design Guidance Manual.

**For Drilled Shafts Socketed into Bedrock:**

6.6 Drilled shafts with the highest recommended tip embedded a minimum of 2 feet into sound bedrock. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

6.7 Evaluate the allowable axial capacities using the attached Drilled Shaft Axial Capacity Tables.

6.8 Require a 6-inch minimum rebar cover in the rock sockets.

6.9 For Load & Resistance Factor Design (LRFD), evaluate the **total factored axial resistances** using the attached Drilled Shaft Axial Capacity Table considering the capacity developed in the uncased rock sockets. The allowable capacities must equal or exceed the factored loads at the strength limit state. The highest allowable shaft tip elevations are provided in Table 1. Highest allowable shaft tip elevations for larger diameter shafts are indicated on corresponding attached Drilled Shaft Axial Capacity Table. Longer uncased sockets may be required to satisfy axial or lateral load design criteria.

6.10 Use the elevations in Table 1 to determine plan quantities as follows:

- Drilled Shaft - *-inch (Common) Top of Shaft to Top of Rock Socket
- Drilled Shaft - **-inch (Solid Rock) Top of Rock Socket to Shaft Tip

*Insert diameter 6 inches larger than shaft diameter chosen
**Shaft diameter chosen

6.11 Minimal evidence of karst features were found in the core samples obtained during drilling. However, the project is located in a site considered to be karst intense. If solution features are encountered during construction there is a potential to encounter unsound bedrock or for concrete loss during pouring. The contractor should be prepared to address these complications. Remedies could include: extended shaft lengths, extended casing, and pouring of lean concrete and re-drilling for structural concrete after setup.

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**Fayette Co., KY-4**
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**May 13th, 2021**

## 7.0 PLAN NOTES

7.1 Permanent casing is not required. The contractor may elect to use temporary casing in deeper soil areas. Temporary casing may be omitted if the contractor can demonstrate the ability to maintain an open excavation without collapse of the side walls, fall back of material into the excavation, or fall back into and contamination of freshly placed concrete.

7.2 Except as permitted by special design Noise Walls shall not be subjected to differential earth loading. Temporary or permanent soil loads placed on the sound barrier walls are only permitted as noted in the sound barrier wall plans.

7.3 Due to variability in the rockline the potential for field adjustment in shaft lengths shall be addressed in the following manner:

Bedrock Supported Shafts:

If the shaft is to be supported in bedrock and bedrock is below the anticipated tip elevation the contractor must extend the shaft to bedrock in order to provide the required socket length unless the wall design consultant considers and approves the corresponding reduction in axial and lateral capacity.

Soil Supported Shafts:

If the shaft is to be supported in soil and bedrock is encountered above the anticipated tip elevation, the contractor shall provide a 2 foot rock socket. In these cases the design axial capacities of the shafts can be conservatively assumed to be met. Lateral support conditions should still be verified and approved by the wall design consultant.

7.4 The drilled shafts shall be constructed in accordance with the Special Note for Drilled Shafts, current edition, except that subsurface exploration borings in accordance with Section 3.5 of the Special Note is not required.

The designer should feel free to contact the Geotechnical Branch at 502-564-2374 for further recommendations or if any questions arise pertaining to this project.

**Attachments:**

- **Project Location Map**
- **Subsurface Data Sheets**
- **Idealized Soil and Bedrock Profile Sheets**
- **Drilled Shaft Axial Resistance Tables**
- **Coordinate Data Sheet**

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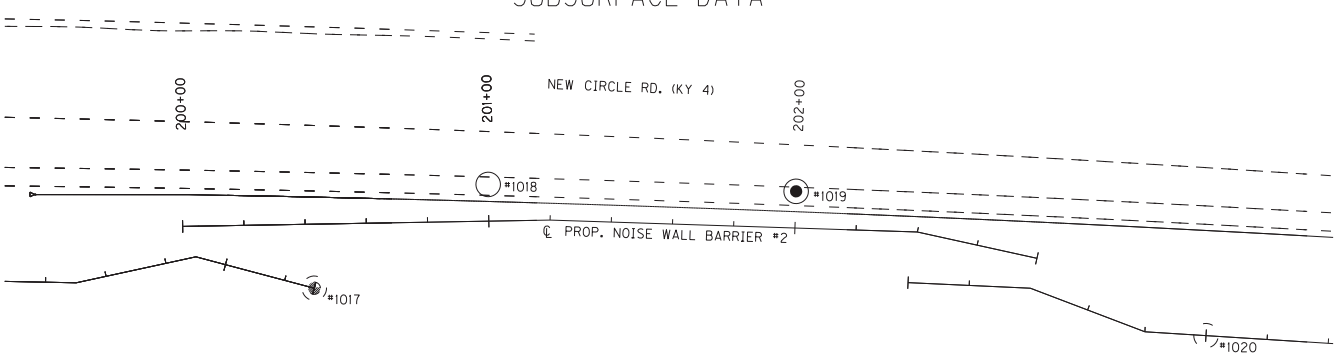
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 13th, 2021**

## Project Location Map:

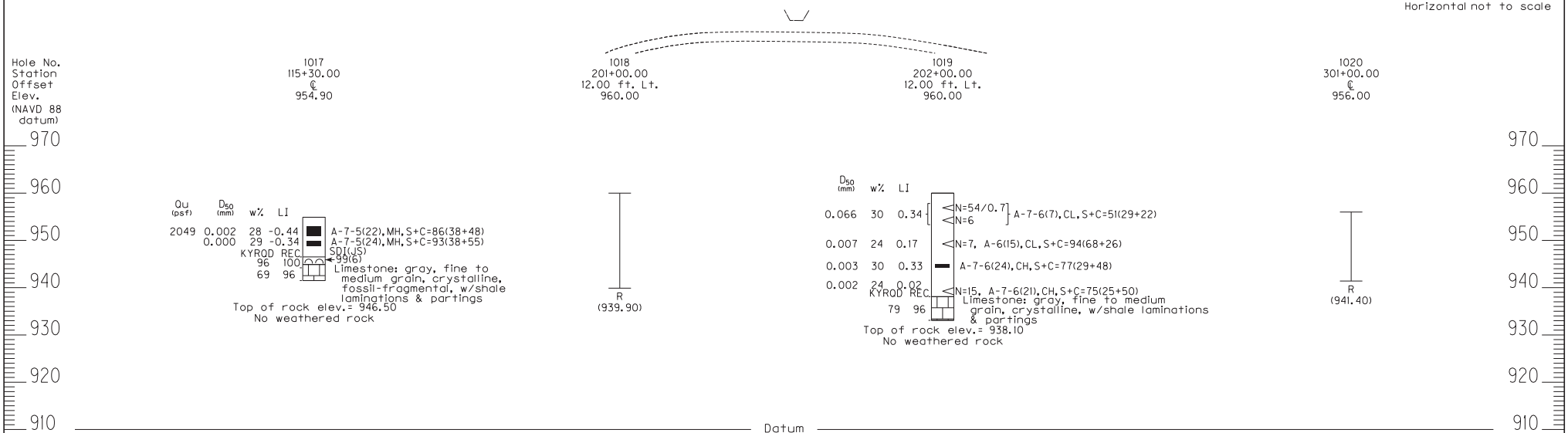

**(Design and construct sound barrier walls on the northbound side of KY-4 (New Circle Rd.) from MP 4.8 to 5.2 in Lexington, KY.)**

# SUBSURFACE DATA

Plan Scale 1" = 20'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY<br>Division of Structural Design<br>Geotechnical Branch | DATE: 29-APRIL-2021<br>DESIGNED BY:<br>DETAILED BY: E. BAILEY | CHECKED BY<br><br>R. McDONALD | CROSSING<br>Noise Wall @ Sta. 200+00 – 202+80 | ROUTE<br>KY 4 | ITEM NO.<br>7–80154.00<br>SHEET NO. | COUNTY OF<br>FAYETTE<br>DRAWING NUMBER<br>S–009–2021 |

MicroStation v10.15.0.74 USER: $$$$USER$$$$ DATE PLOTTED: $$$$DATE$$$$ FILE NAME: $$$$designs\files\specification$$$$

# IDEALIZED SOIL AND BEDROCK PROFILE

**Fayette Co., Item #: 7-80154.00, S-009-2021**
**Noise Barrier Wall #2, KY-4 (New Circle Rd.)**
**Sta. 200+00 to 202+80, Rt. Side of Rd.**

**RDM 5/11/2021**

**Approximate Elev. (ft)****

* — **Top of Shaft**

**Overburden** — **Stiff Clay without Free Water (Reese)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 125 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.072 |
| $Y_e$ (lb/ft$^3$) = 125 | Cohesive Strength, | $C_u$ (psi) = 6.9 |
| $C_u$ (psf) = 1000 | Soil Strain Parameter, | $\varepsilon_{50}$ = 0.007 |
| | Soil Modulus Parameter, | K (lb/in$^3$) = 500 |

**Water Table Depth = 4 ft**

* — ▼

**Overburden** — **Stiff Clay with Free Water (Reese)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 125 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.036 |
| $Y_e$ (lb/ft$^3$) = 62.6 | Cohesive Strength, | $C_u$ (psi) = 6.9 |
| $C_u$ (psf) = 1000 | Soil Strain Parameter, | $\varepsilon_{50}$ = 0.007 |
| | Soil Modulus Parameter, | K (lb/in$^3$) = 500 |

* — **Top of Rock Socket**

**Limestone** (Applied for Vertical Support) — **Strong Rock (Vuggy Limestone)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 150 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.087 |
| $q_u$ (psi) = 4000 | Elastic Modulus | $E_r$ (psi) = 400,000 |
| $q_{eb}$ (ksf) = 68 | Uniaxial Compressive Strength | $q_u$ (lb/in$^2$) = 4000 |
| $f_s$ (ksf) = 30 | Cohesive Strength | $c_u$ (psi) = 2000 |

* — **Shaft Tip**

* **Elevations vary and are provided in the body of the report.**

** **For design: At each shaft location apply actual elevations using Table 1, subsurface data sheets, and available cross section information.**

**ADDITIONAL DATA FOR GEOTECHNICAL CALCULATIONS ONLY:**
**min $f'_c$ (psi) = 3500**
**$p_a$ (psi) = 14.7**

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 1.5 feet**
**Rock Socket Diameter = 18 inches** **RDM 5/7/21**

| Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | |
| 1.0 | 30.0 | 68 | 141 | 120 | 71 | 60 | 131 | 57 |
| >>> 2.0 | 30.0 | 68 | 283 | 120 | 141 | 60 | 201 | 113 |
| 3.0 | 30.0 | 68 | 424 | 120 | 212 | 60 | 272 | 170 |
| 4.0 | 30.0 | 68 | 565 | 120 | 283 | 60 | 343 | 226 |
| 5.0 | 30.0 | 68 | 707 | 120 | 353 | 60 | 414 | 283 |
| 6.0 | 30.0 | 68 | 848 | 120 | 424 | 60 | 484 | 339 |
| 7.0 | 30.0 | 68 | 990 | 120 | 495 | 60 | 555 | 396 |
| 8.0 | 30.0 | 68 | 1131 | 120 | 565 | 60 | 626 | 452 |
| 9.0 | 30.0 | 68 | 1272 | 120 | 636 | 60 | 696 | 509 |
| 10.0 | 30.0 | 68 | 1414 | 120 | 707 | 60 | 767 | 565 |
| 11.0 | 30.0 | 68 | 1555 | 120 | 778 | 60 | 838 | 622 |
| 12.0 | 30.0 | 68 | 1696 | 120 | 848 | 60 | 908 | 679 |
| 13.0 | 30.0 | 68 | 1838 | 120 | 919 | 60 | 979 | 735 |
| 14.0 | 30.0 | 68 | 1979 | 120 | 990 | 60 | 1050 | 792 |
| 15.0 | 30.0 | 68 | 2121 | 120 | 1060 | 60 | 1120 | 848 |
| 16.0 | 30.0 | 68 | 2262 | 120 | 1131 | 60 | 1191 | 905 |
| 17.0 | 30.0 | 68 | 2403 | 120 | 1202 | 60 | 1262 | 961 |
| 18.0 | 30.0 | 68 | 2545 | 120 | 1272 | 60 | 1332 | 1018 |
| 19.0 | 30.0 | 68 | 2686 | 120 | 1343 | 60 | 1403 | 1074 |
| 20.0 | 30.0 | 68 | 2827 | 120 | 1414 | 60 | 1474 | 1131 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | Resistance Factor, $\phi$ | | 0.50 | 0.50 | | 0.40 |

>>> = Min. Socket Length

D (ft.) = 1.5

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 2.0 feet**
**Rock Socket Diameter = 24 inches** **RDM 5/7/21**

| Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | |
| 1.0 | 30.0 | 68 | 188 | 214 | 94 | 107 | 201 | 75 |
| >>> 2.0 | 30.0 | 68 | 377 | 214 | 188 | 107 | 295 | 151 |
| 3.0 | 30.0 | 68 | 565 | 214 | 283 | 107 | 390 | 226 |
| 4.0 | 30.0 | 68 | 754 | 214 | 377 | 107 | 484 | 302 |
| 5.0 | 30.0 | 68 | 942 | 214 | 471 | 107 | 578 | 377 |
| 6.0 | 30.0 | 68 | 1131 | 214 | 565 | 107 | 672 | 452 |
| 7.0 | 30.0 | 68 | 1319 | 214 | 660 | 107 | 767 | 528 |
| 8.0 | 30.0 | 68 | 1508 | 214 | 754 | 107 | 861 | 603 |
| 9.0 | 30.0 | 68 | 1696 | 214 | 848 | 107 | 955 | 679 |
| 10.0 | 30.0 | 68 | 1885 | 214 | 942 | 107 | 1049 | 754 |
| 11.0 | 30.0 | 68 | 2073 | 214 | 1037 | 107 | 1144 | 829 |
| 12.0 | 30.0 | 68 | 2262 | 214 | 1131 | 107 | 1238 | 905 |
| 13.0 | 30.0 | 68 | 2450 | 214 | 1225 | 107 | 1332 | 980 |
| 14.0 | 30.0 | 68 | 2639 | 214 | 1319 | 107 | 1426 | 1056 |
| 15.0 | 30.0 | 68 | 2827 | 214 | 1414 | 107 | 1521 | 1131 |
| 16.0 | 30.0 | 68 | 3016 | 214 | 1508 | 107 | 1615 | 1206 |
| 17.0 | 30.0 | 68 | 3204 | 214 | 1602 | 107 | 1709 | 1282 |
| 18.0 | 30.0 | 68 | 3393 | 214 | 1696 | 107 | 1803 | 1357 |
| 19.0 | 30.0 | 68 | 3581 | 214 | 1791 | 107 | 1898 | 1433 |
| 20.0 | 30.0 | 68 | 3770 | 214 | 1885 | 107 | 1992 | 1508 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 2.0 |

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 2.5 feet**
**Rock Socket Diameter = 30 inches** **RDM 5/7/21**

| Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | |
| 1.0 | 30.0 | 68 | 236 | 334 | 118 | 167 | 285 | 94 |
| >>> 2.0 | 30.0 | 68 | 471 | 334 | 236 | 167 | 403 | 188 |
| 3.0 | 30.0 | 68 | 707 | 334 | 353 | 167 | 520 | 283 |
| 4.0 | 30.0 | 68 | 942 | 334 | 471 | 167 | 638 | 377 |
| 5.0 | 30.0 | 68 | 1178 | 334 | 589 | 167 | 756 | 471 |
| 6.0 | 30.0 | 68 | 1414 | 334 | 707 | 167 | 874 | 565 |
| 7.0 | 30.0 | 68 | 1649 | 334 | 825 | 167 | 992 | 660 |
| 8.0 | 30.0 | 68 | 1885 | 334 | 942 | 167 | 1109 | 754 |
| 9.0 | 30.0 | 68 | 2121 | 334 | 1060 | 167 | 1227 | 848 |
| 10.0 | 30.0 | 68 | 2356 | 334 | 1178 | 167 | 1345 | 942 |
| 11.0 | 30.0 | 68 | 2592 | 334 | 1296 | 167 | 1463 | 1037 |
| 12.0 | 30.0 | 68 | 2827 | 334 | 1414 | 167 | 1581 | 1131 |
| 13.0 | 30.0 | 68 | 3063 | 334 | 1532 | 167 | 1698 | 1225 |
| 14.0 | 30.0 | 68 | 3299 | 334 | 1649 | 167 | 1816 | 1319 |
| 15.0 | 30.0 | 68 | 3534 | 334 | 1767 | 167 | 1934 | 1414 |
| 16.0 | 30.0 | 68 | 3770 | 334 | 1885 | 167 | 2052 | 1508 |
| 17.0 | 30.0 | 68 | 4006 | 334 | 2003 | 167 | 2170 | 1602 |
| 18.0 | 30.0 | 68 | 4241 | 334 | 2121 | 167 | 2287 | 1696 |
| 19.0 | 30.0 | 68 | 4477 | 334 | 2238 | 167 | 2405 | 1791 |
| 20.0 | 30.0 | 68 | 4712 | 334 | 2356 | 167 | 2523 | 1885 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

**>>> = Min. Socket Length**

**D (ft.) = 2.5**

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-008-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 3.0 feet**
**Rock Socket Diameter = 36 inches** **RDM 5/7/21**

| Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|
| 0.0 | | | | | | | | |
| 1.0 | 30.0 | 68 | 283 | 481 | 141 | 240 | 382 | 113 |
| >>> 2.0 | 30.0 | 68 | 565 | 481 | 283 | 240 | 523 | 226 |
| 3.0 | 30.0 | 68 | 848 | 481 | 424 | 240 | 664 | 339 |
| 4.0 | 30.0 | 68 | 1131 | 481 | 565 | 240 | 806 | 452 |
| 5.0 | 30.0 | 68 | 1414 | 481 | 707 | 240 | 947 | 565 |
| 6.0 | 30.0 | 68 | 1696 | 481 | 848 | 240 | 1089 | 679 |
| 7.0 | 30.0 | 68 | 1979 | 481 | 990 | 240 | 1230 | 792 |
| 8.0 | 30.0 | 68 | 2262 | 481 | 1131 | 240 | 1371 | 905 |
| 9.0 | 30.0 | 68 | 2545 | 481 | 1272 | 240 | 1513 | 1018 |
| 10.0 | 30.0 | 68 | 2827 | 481 | 1414 | 240 | 1654 | 1131 |
| 11.0 | 30.0 | 68 | 3110 | 481 | 1555 | 240 | 1795 | 1244 |
| 12.0 | 30.0 | 68 | 3393 | 481 | 1696 | 240 | 1937 | 1357 |
| 13.0 | 30.0 | 68 | 3676 | 481 | 1838 | 240 | 2078 | 1470 |
| 14.0 | 30.0 | 68 | 3958 | 481 | 1979 | 240 | 2220 | 1583 |
| 15.0 | 30.0 | 68 | 4241 | 481 | 2121 | 240 | 2361 | 1696 |
| 16.0 | 30.0 | 68 | 4524 | 481 | 2262 | 240 | 2502 | 1810 |
| 17.0 | 30.0 | 68 | 4807 | 481 | 2403 | 240 | 2644 | 1923 |
| 18.0 | 30.0 | 68 | 5089 | 481 | 2545 | 240 | 2785 | 2036 |
| 19.0 | 30.0 | 68 | 5372 | 481 | 2686 | 240 | 2926 | 2149 |
| 20.0 | 30.0 | 68 | 5655 | 481 | 2827 | 240 | 3068 | 2262 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

| | |
|---|---|
| >>> = Min. Socket Length | D (ft.) = 3.0 |

########
EV0000
Kentucky Transportation Cabinet
Version 8.30.004
Query: COORDINATE DATA FILE
Project: n:\geotech\gint\projects\s-009-2021.gpj Library: n:\geotech\gint\libraries\kytc library version 5.1.g

| ID | Latitude | Longitude | Hole | Station | Offset | Elevation | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 38.05048 | -84.5623 | 1018 | 20100 | -12 | 960 | |
| 2 | 38.05072 | -84.5621 | 1019 | 20200 | -12 | 960 | |

**M E M O R A N D U M**

**S-010-2021**

cc: J. VanZee
C. VanZee
R. Sprague (D7)
McGaha (D7)
K. Stewart
A. Ulrich
J. Samples (D7)
B. Tse (QK4)

**TO:** Michael Carpenter, P.E.
Director, Division of Structural Design

**FROM:** Geotechnical Branch

**BY:** Robert McDonald, P.E.
Geotechnical Branch, Structure Foundation Section

**DATE:** May 17th, 2021

**SUBJECT:** **Fayette County**
**FD04 1100 034 0004 004-006 01 D**
**Mars #: 12740 01 D**
**KY-4 (New Circle Rd.)**
**Noise wall at NW#3 Sta. 300+00 to 307+20, Rt side of Rd**
**Item #: 7-80154.00**
**Geotechnical Engineering Structure Foundation Report**

## 1.0 Location and Description

The geotechnical investigation for this structure has been completed. The DGN file for the subsurface data sheet has been made available on ProjectWise and through email for use in development of structure plans. The drilling for the project was performed by a contracted drill crew, utilizing the KYTC Geotechnical Branch's statewide contracts.

This geotechnical engineering structural foundation report addresses the geotechnical issues/conditions for the proposed design and construction of a sound barrier along the eastern side of the New Circle Rd. on ramp from west bound US-60. This wall will be approximately 720 feet long. This noise barrier wall will be the 3rd of 3 consecutive noise barriers towards the northeastward direction. The proposed noise barrier wall location is from Lat: 38.0499767° Long: -84.562446° to Lat: 38.050679°, Long: -84.561695°.

## 2.0 Site Geologic Conditions

The structure is located in the Lexington West (#600) Geologic Quadrangle. The geologic mapping indicates that the bedrock at this site consists of Lexington Limestone.

## 3.0 Field Investigation

A total of eleven (11) bore holes were drilled at this structure's location. Three (3) of these were recently acquired for the proposed structure and eight (8) were historic borings taken for an adjacent retaining wall and a corresponding roadway widening project (S-026-2013 & R-002-2013 respectively). Three (3) of the drilled borings were sample and core holes and eight (8) were mechanical rockline soundings. The drill crew delivered the recent rock core and soil samples to the KYTC Geotechnical Branch in Frankfort, where a geologist logged the rock core and the soils were tested in the Branch's soils laboratory.

## 4.0 Laboratory Testing & Subsurface Conditions

The laboratory soil testing was completed by the Geotechnical Branch. The soil samples obtained from the borings were determined to consist primarily of inorganic low-plasticity clays and silts and high-plasticity silts. The soil samples were designated as CL, ML, and MH using the Unified Soil Classification System.

**S-010-2021**
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 17th, 2021**

Depths to refusal varied from 10.9 ft to 21.9 ft. Rock cores obtained for this location revealed gray to dark-gray, fine to medium-grained, crystalline, fossil fragmented, calcareous, nodular, limestone with shale laminations & partings. The RQD values for the rock cores ranged from 0% to 100% and core recoveries ranged from 94% to 100%. The variations in auger refusal elevations ranged from 931.8 ft to 956.5 ft.

## 5.0 ENGINEERING ANALYSIS

Drilled shafts are proposed for the noise barrier wall foundations. The shafts will be founded into bedrock. The Idealized Soil and Bedrock Profile Sheet and the Drilled Shaft Axial Tables are attached. Because of the structure type and pre-existing site conditions embankment stability and settlement analyses were not required.

Use **Drilled Shafts**. Table 1 contains relevant elevations needed to both complete the design and determine plan quantities for the drilled shafts. Some of the "Estimated Bottom of Permanent Casing" and "Highest Allowable Shaft Tip" elevations are due to rockline variations.

Drilled shafts were evaluated for axial loading, and the attached tables provide the resulting capacities and resistances for the Load & Resistance Factor Design (LRFD) design method.

**Table 1**
**Estimated Drilled Shaft Elevations**

| Station Range | Elevations (ft.) * | | |
|---|---|---|---|
| | Est. Top of Shaft | Est. Top of Rock Socket | Highest** Allowable Shaft Tip |
| 300+00 to 301+00 | 960.0 | 937.5 | 935.5 |
| 301+00 to 302+00 | 960.5 | 941.0 | 939.0 |
| 302+00 to 303+20 | 968.5 | 949.5 | 947.5 |
| 303+20 to 304+00 | 971.0 | 951.5 | 949.5 |
| 304+00 to 307+20 | 973.5 | 952.0 | 946.0 *** |

* Elevations for all shafts will be verified after construction-phase drilling has been performed. The final shaft tip elevations and quantities may be adjusted based on the actual conditions encountered in the field.

** The Shaft tip shall extend a minimum of two feet below the estimated base of weathered rock

***Shaft tips shall be extended a minimum of two shaft diameters below the base of weathered rock from NW#3 Sta. 304+00 to 307+20. The Highest Allowable Shaft Tip for this range assumes a shaft diameter of 3.0 ft.

**S-010-2021**
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 17th, 2021**

## 6.0 RECOMMENDATIONS

6.1 Drilled shafts from NW#3 Sta. 300+00 to 304+00 shall be designed with the highest recommended tip embedded a minimum of 2 feet into sound bedrock. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

6.2 Drilled shafts from NW#3 Sta. 304+00 to 307+20 shall be designed with the highest recommended tip embedded a minimum of **2 times the diameter of the shaft** into sound bedrock. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

6.3 Perform lateral load analyses using the geotechnical parameters provided in the attached Idealized Soil and Bedrock Profile. These parameters may be used to perform analyses using LPILE Plus. Some of the parameters may not be required to be input, depending on the version of the program being used.

6.4 At the designers discretion the overburden soils may be utilized for lateral support however a minimum rock embedment depth of 2'or 2 times the shaft diameter is required as recommended in 6.1 and 6.2.

6.5 Evaluate the allowable axial capacities using the attached Drilled Shaft Axial Capacity Tables.

6.6 Permanent casing is not required. The contractor may elect to use temporary casing in deeper soil areas. Temporary casing may be omitted if the contractor can demonstrate the ability to maintain an open excavation without collapse of the side walls, fall back of material into the excavation, or fall back into and contamination of freshly placed concrete.

6.7 Require a 6-inch minimum rebar cover in the rock sockets.

6.8 For Load & Resistance Factor Design (LRFD), evaluate the **total factored axial resistances** using the attached Drilled Shaft Axial Capacity Table considering the capacity developed in the uncased rock sockets. The allowable capacities must equal or exceed the factored loads at the strength limit state. The highest allowable shaft tip elevations are provided in Table 1. Highest allowable shaft tip elevations for larger diameter shafts are indicated on corresponding attached Drilled Shaft Axial Capacity Table. Longer uncased sockets may be required to satisfy axial or lateral load design criteria.

6.9 Use the elevations in Table 1 to determine plan quantities as follows:

- Drilled Shaft - *-inch (Common) Top of Shaft to Top of Rock Socket
- Drilled Shaft - **-inch (Solid Rock) Top of Rock Socket to Shaft Tip

*Insert diameter 6 inches larger than shaft diameter chosen
**Shaft diameter chosen

6.10 Minimal evidence of karst features were found in the core samples obtained during drilling. However, the project is located in a site considered to be karst intense. If solution features are encountered during construction there is a potential to encounter unsound bedrock or for concrete loss during pouring. The contractor should be prepared to address these complications. Remedies could include: extended shaft lengths, extended casing, and pouring of lean concrete and re-drilling for structural concrete after setup.

6.11 The top 5 feet of the soils shall be neglected for lateral support or axial resistance of the drilled shafts.

6.12 Noise Walls should not be subjected to differential earth loading. Reinforced panels may shift or crack and the entire wall could potentially have an overturning failure if it is subjected to earth loads. Special pane and foundation designs are required in order to safely construct a hybrid Retaining/Noise Wall. In walls constructed in newly placed fill areas it should not be assumed that construction will be phased in a manner to avoid imposing earth loads. The walls should either be designed to withstand the maximum potential earth load or construction phasing must be specified to prevent differential loading conditions. Wall design loads should be determined using Soil Type 3 of Exhibit 413 in the Division of Structural Design Guidance Manual.

6.13 The designer shall verify that the existing adjacent retaining wall can resist at acceptable factors any additional loadings induced by the proposed noise wall.

## 7.0 PLAN NOTES

7.1 Permanent casing is not required. The contractor may elect to use temporary casing in deeper soil areas. Temporary casing may be omitted if the contractor can demonstrate the ability to maintain an open excavation without collapse of the side walls, fall back of material into the excavation, or fall back into and contamination of freshly placed concrete.

7.2 Except as permitted by special design Noise Walls shall not be subjected to differential earth loading. Temporary or permanent soil loads placed on the sound barrier walls are only permitted as noted in the sound barrier wall plans.

7.3 Due to variability in the rockline the potential for field adjustment in shaft lengths shall be addressed in the following manner:

Bedrock Supported Shafts:

For shafts supported in bedrock and bedrock is below the anticipated tip elevation the contractor must extend the shaft to bedrock in order to provide the required socket length unless the wall design consultant considers and approves the corresponding reduction in axial and lateral capacity.

7.4 The drilled shafts shall be constructed in accordance with the Special Note for Drilled Shafts, current edition, except that subsurface exploration borings in accordance with Section 3.5 of the Special Note is not required.

7.5 Drilled shafts from NW#3 Sta. 304+00 to 307+20 shall be designed with the highest recommended tip embedded a minimum of **2 times the diameter of the shaft** into sound bedrock. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

The designer should feel free to contact the Geotechnical Branch at 502-564-2374 for further recommendations or if any questions arise pertaining to this project.

**S-010-2021**
**Fayette Co., KY-4**
**Item #: 7-80154.00**
**May 17th, 2021**

## Project Location Map:

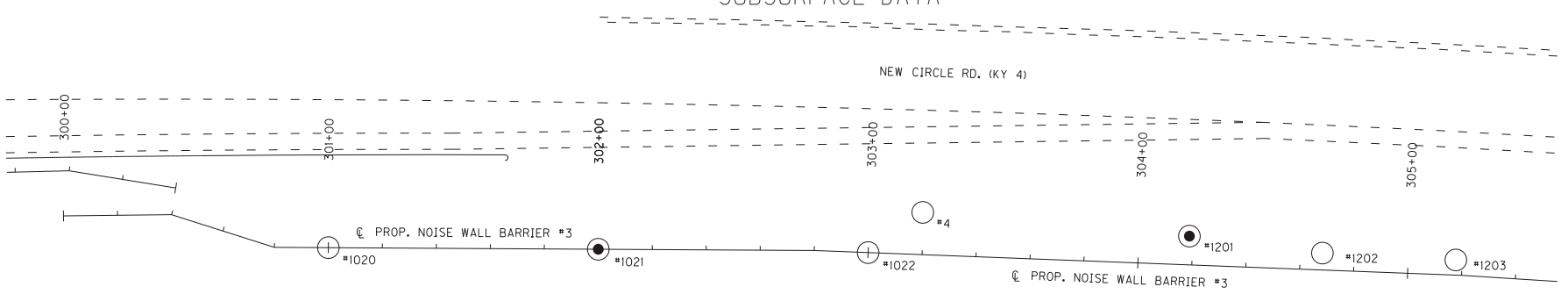

**(Design and construct sound barrier walls on the northbound side of KY-4 (New Circle Rd.) from MP 4.8 to 5.2 in Lexington, KY.)**

## Attachments:

- **Subsurface Data Sheets**
- **Idealized Soil and Bedrock Profile Sheets**
- **Drilled Shaft Axial Resistance Tables**
- **Coordinate Data Sheet**

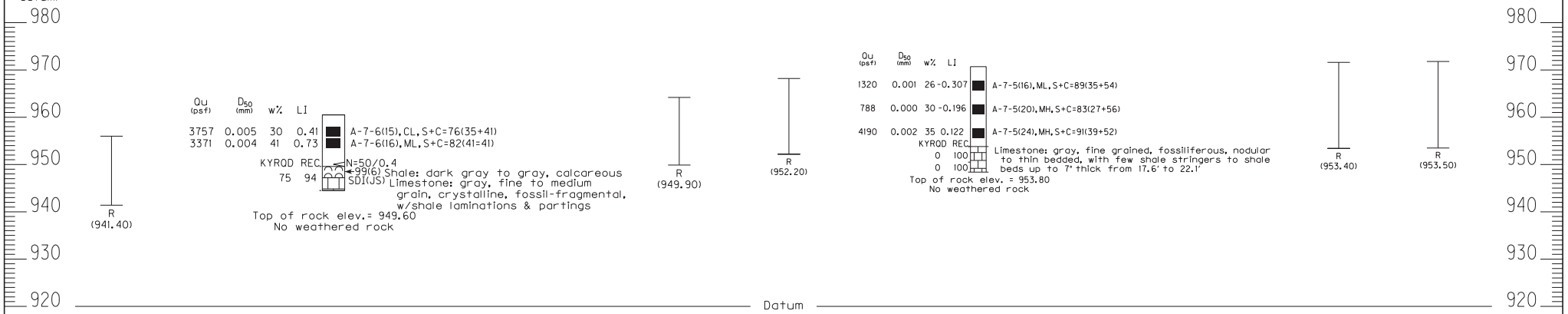
# SUBSURFACE DATA

Plan Scale 1" = 50'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

| Hole No. | 1020 | 1021 | 1022 | 4 | 1201 | 1202 | 1203 |
|---|---|---|---|---|---|---|---|
| Station | 301+00.00 | 302+00.00 | 303+00.00 | 303+19.64 | 304+18.70 | 304+68.18 | 305+17.67 |
| Offset | ℄ | ℄ | ℄ | 15.64 ft. Lt. | 10.65 ft. Lt. | 6.26 ft. Lt. | 5.62 ft. Lt. |
| Elev. (NAVD 88 datum) | 956.00 | 960.50 | 964.20 | 968.20 | 970.70 | 971.60 | 971.80 |

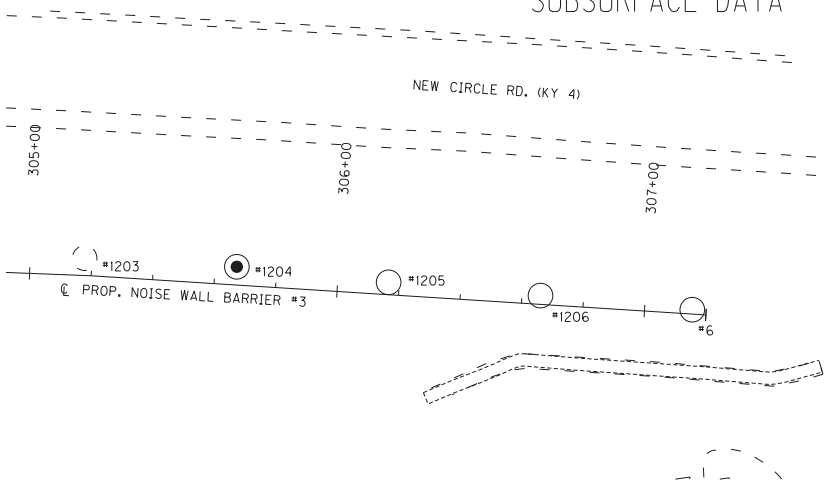



| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY: Division of Structural Design<br>Geotechnical Branch | DATE: 29-APRIL-2021 | CHECKED BY | CROSSING: Noise Wall @ Sta. 300+00 – 307+20 | ROUTE: KY 4 | ITEM NO.: 7-80154.00 | COUNTY OF: FAYETTE |
|---|---|---|---|---|---|---|---|---|---|
| | | | | DESIGNED BY: | | | | SHEET NO. | DRAWING NUMBER: S-010-2021 |
| | | | | DETAILED BY: E. BAILEY | R. McDONALD | | | | |

MicroStation v10.15.0.74 USER: $$$$USER$$$$ DATE PLOTTED: $$$$DATE$$$$ FILE NAME: $$$$designsfile$$specification$$$$

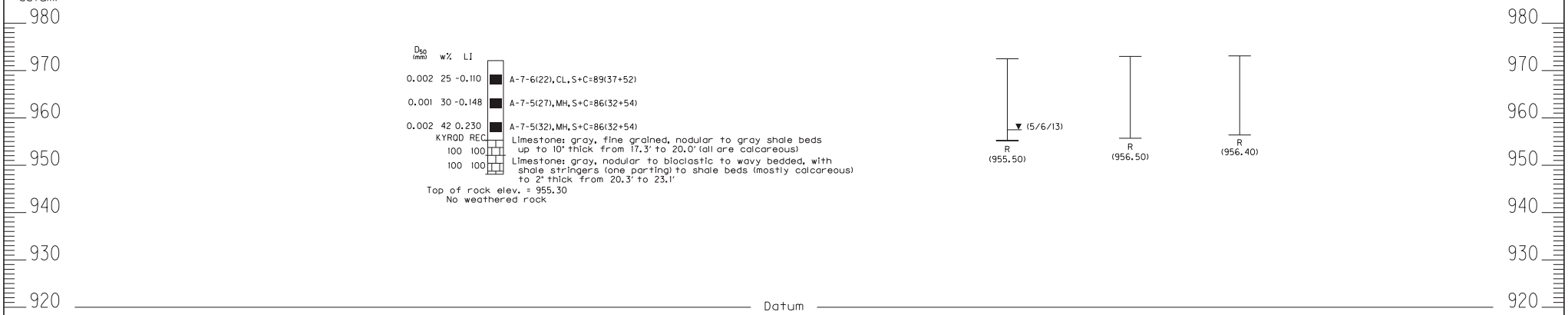
# SUBSURFACE DATA

Plan Scale 1" = 50'




Profile Scale:
Vertical 1" = 10'
Horizontal not to scale

| Hole No. | 1204 | 1205 | 1206 | 6 |
|---|---|---|---|---|
| Station | 305+67.03 | 306+16.53 | 306+66.00 | 307+15.47 |
| Offset | 5.91 ft. Lt. | 4.00 ft. Lt. | 2.84 ft. Lt. | 1.42 ft. Lt. |
| Elev. (NAVD 88 datum) | 972.10 | 972.80 | 973.00 | 973.10 |




| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| COMMONWEALTH OF KENTUCKY<br>DEPARTMENT OF HIGHWAYS | REVISION | DATE | PREPARED BY<br>Division of Structural Design<br>Geotechnical Branch | DATE: 29-APRIL-2021 | CHECKED BY | CROSSING<br>Noise Wall @ Sta. 300+00 – 307+20 | ROUTE<br>KY 4 | ITEM NO.<br>7–80154.00 | COUNTY OF<br>FAYETTE |
| | | | | DESIGNED BY: | | | | SHEET NO. | DRAWING NUMBER<br>S–010–2021 |
| | | | | DETAILED BY: E. BAILEY | R. McDONALD | | | | |

# IDEALIZED SOIL AND BEDROCK PROFILE

**Fayette Co., Item #: 7-80154.00, S-009-2021**
**Noise Barrier Wall #3, KY-4 (New Circle Rd.)**
**Sta. 300+00 to 307+20, Rt. Side of Rd.**

**RDM 5/17/2021**

**Approximate Elev. (ft)****

* — Top of Shaft

**Overburden** — **Stiff Clay without Free Water (Reese)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 125 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.072 |
| $Y_e$ (lb/ft$^3$) = 125 | Cohesive Strength, | $C_u$ (psi) = 5.2 |
| $C_u$ (psf) = 750 | Soil Strain Parameter, | $\varepsilon_{50}$ = 0.007 |
| | Soil Modulus Parameter, | K (lb/in$^3$) = 500 |

**Water Table Depth = 4 ft**

* — ▼

**Overburden** — **Stiff Clay with Free Water (Reese)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 125 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.036 |
| $Y_e$ (lb/ft$^3$) = 62.6 | Cohesive Strength, | $C_u$ (psi) = 5.2 |
| $C_u$ (psf) = 750 | Soil Strain Parameter, | $\varepsilon_{50}$ = 0.007 |
| | Soil Modulus Parameter, | K (lb/in$^3$) = 500 |

* — Top of Rock Socket

**Limestone** (Applied for Vertical Support) — **Strong Rock (Vuggy Limestone)**

| | | |
|---|---|---|
| $Y_t$ (lb/ft$^3$) = 150 | Effective Unit Weight, | $Y_e$ (lb/in$^3$) = 0.087 |
| $q_u$ (psi) = 4000 | Elastic Modulus | $E_r$ (psi) = 400,000 |
| $q_{eb}$ (ksf) = 68 | Uniaxial Compressive Strength | $q_u$ (lb/in$^2$) = 4000 |
| $f_s$ (ksf) = 30 | Cohesive Strength | $c_u$ (psi) = 2000 |

* — Shaft Tip

* Elevations vary and are provided in the body of the report.

** For design: At each shaft location apply actual elevations using Table 1, subsurface data sheets, and available cross section information.

**ADDITIONAL DATA FOR GEOTECHNICAL CALCULATIONS ONLY:**
min $f'_c$ (psi) = 3500
$p_a$ (psi) = 14.7

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-010-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 1.5 feet**
**Rock Socket Diameter = 18 inches** **RDM 5/17/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 141 | 120 | 71 | 60 | 131 | 57 |
| >>> | 2.0 | 30.0 | 68 | 283 | 120 | 141 | 60 | 201 | 113 |
| *** | 3.0 | 30.0 | 68 | 424 | 120 | 212 | 60 | 272 | 170 |
| | 4.0 | 30.0 | 68 | 565 | 120 | 283 | 60 | 343 | 226 |
| | 5.0 | 30.0 | 68 | 707 | 120 | 353 | 60 | 414 | 283 |
| | 6.0 | 30.0 | 68 | 848 | 120 | 424 | 60 | 484 | 339 |
| | 7.0 | 30.0 | 68 | 990 | 120 | 495 | 60 | 555 | 396 |
| | 8.0 | 30.0 | 68 | 1131 | 120 | 565 | 60 | 626 | 452 |
| | 9.0 | 30.0 | 68 | 1272 | 120 | 636 | 60 | 696 | 509 |
| | 10.0 | 30.0 | 68 | 1414 | 120 | 707 | 60 | 767 | 565 |
| | 11.0 | 30.0 | 68 | 1555 | 120 | 778 | 60 | 838 | 622 |
| | 12.0 | 30.0 | 68 | 1696 | 120 | 848 | 60 | 908 | 679 |
| | 13.0 | 30.0 | 68 | 1838 | 120 | 919 | 60 | 979 | 735 |
| | 14.0 | 30.0 | 68 | 1979 | 120 | 990 | 60 | 1050 | 792 |
| | 15.0 | 30.0 | 68 | 2121 | 120 | 1060 | 60 | 1120 | 848 |
| | 16.0 | 30.0 | 68 | 2262 | 120 | 1131 | 60 | 1191 | 905 |
| | 17.0 | 30.0 | 68 | 2403 | 120 | 1202 | 60 | 1262 | 961 |
| | 18.0 | 30.0 | 68 | 2545 | 120 | 1272 | 60 | 1332 | 1018 |
| | 19.0 | 30.0 | 68 | 2686 | 120 | 1343 | 60 | 1403 | 1074 |
| | 20.0 | 30.0 | 68 | 2827 | 120 | 1414 | 60 | 1474 | 1131 |
| | | | | | | | | | |
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| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

*** = Min Soket Length Sta. 304+00 to 307+00
>>> = Min. Socket Length Sta. 300+00 to 304+00

D (ft.) = 1.5

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-010-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 2.0 feet**
**Rock Socket Diameter = 24 inches** **RDM 5/17/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 188 | 214 | 94 | 107 | 201 | 75 |
| >>> | 2.0 | 30.0 | 68 | 377 | 214 | 188 | 107 | 295 | 151 |
| | 3.0 | 30.0 | 68 | 565 | 214 | 283 | 107 | 390 | 226 |
| *** | 4.0 | 30.0 | 68 | 754 | 214 | 377 | 107 | 484 | 302 |
| | 5.0 | 30.0 | 68 | 942 | 214 | 471 | 107 | 578 | 377 |
| | 6.0 | 30.0 | 68 | 1131 | 214 | 565 | 107 | 672 | 452 |
| | 7.0 | 30.0 | 68 | 1319 | 214 | 660 | 107 | 767 | 528 |
| | 8.0 | 30.0 | 68 | 1508 | 214 | 754 | 107 | 861 | 603 |
| | 9.0 | 30.0 | 68 | 1696 | 214 | 848 | 107 | 955 | 679 |
| | 10.0 | 30.0 | 68 | 1885 | 214 | 942 | 107 | 1049 | 754 |
| | 11.0 | 30.0 | 68 | 2073 | 214 | 1037 | 107 | 1144 | 829 |
| | 12.0 | 30.0 | 68 | 2262 | 214 | 1131 | 107 | 1238 | 905 |
| | 13.0 | 30.0 | 68 | 2450 | 214 | 1225 | 107 | 1332 | 980 |
| | 14.0 | 30.0 | 68 | 2639 | 214 | 1319 | 107 | 1426 | 1056 |
| | 15.0 | 30.0 | 68 | 2827 | 214 | 1414 | 107 | 1521 | 1131 |
| | 16.0 | 30.0 | 68 | 3016 | 214 | 1508 | 107 | 1615 | 1206 |
| | 17.0 | 30.0 | 68 | 3204 | 214 | 1602 | 107 | 1709 | 1282 |
| | 18.0 | 30.0 | 68 | 3393 | 214 | 1696 | 107 | 1803 | 1357 |
| | 19.0 | 30.0 | 68 | 3581 | 214 | 1791 | 107 | 1898 | 1433 |
| | 20.0 | 30.0 | 68 | 3770 | 214 | 1885 | 107 | 1992 | 1508 |
| | | | | | | | | | |
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| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

*** = Min Soket Length Sta. 304+00 to 307+00
>>> = Min. Socket Length Sta. 300+00 to 304+00

D (ft.) = 2.0

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-010-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 2.5 feet**
**Rock Socket Diameter = 30 inches** **RDM 5/17/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 236 | 334 | 118 | 167 | 285 | 94 |
| >>> | 2.0 | 30.0 | 68 | 471 | 334 | 236 | 167 | 403 | 188 |
| | 3.0 | 30.0 | 68 | 707 | 334 | 353 | 167 | 520 | 283 |
| | 4.0 | 30.0 | 68 | 942 | 334 | 471 | 167 | 638 | 377 |
| *** | 5.0 | 30.0 | 68 | 1178 | 334 | 589 | 167 | 756 | 471 |
| | 6.0 | 30.0 | 68 | 1414 | 334 | 707 | 167 | 874 | 565 |
| | 7.0 | 30.0 | 68 | 1649 | 334 | 825 | 167 | 992 | 660 |
| | 8.0 | 30.0 | 68 | 1885 | 334 | 942 | 167 | 1109 | 754 |
| | 9.0 | 30.0 | 68 | 2121 | 334 | 1060 | 167 | 1227 | 848 |
| | 10.0 | 30.0 | 68 | 2356 | 334 | 1178 | 167 | 1345 | 942 |
| | 11.0 | 30.0 | 68 | 2592 | 334 | 1296 | 167 | 1463 | 1037 |
| | 12.0 | 30.0 | 68 | 2827 | 334 | 1414 | 167 | 1581 | 1131 |
| | 13.0 | 30.0 | 68 | 3063 | 334 | 1532 | 167 | 1698 | 1225 |
| | 14.0 | 30.0 | 68 | 3299 | 334 | 1649 | 167 | 1816 | 1319 |
| | 15.0 | 30.0 | 68 | 3534 | 334 | 1767 | 167 | 1934 | 1414 |
| | 16.0 | 30.0 | 68 | 3770 | 334 | 1885 | 167 | 2052 | 1508 |
| | 17.0 | 30.0 | 68 | 4006 | 334 | 2003 | 167 | 2170 | 1602 |
| | 18.0 | 30.0 | 68 | 4241 | 334 | 2121 | 167 | 2287 | 1696 |
| | 19.0 | 30.0 | 68 | 4477 | 334 | 2238 | 167 | 2405 | 1791 |
| | 20.0 | 30.0 | 68 | 4712 | 334 | 2356 | 167 | 2523 | 1885 |
| | | | | | | | | | |
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| AASHTO Table 10.5.5.2.4-1 | | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

*** = Min Soket Length Sta. 304+00 to 307+00
>>> = Min. Socket Length Sta. 300+00 to 304+00

D (ft.) = 2.5

# Load and Resistance Factor Design (LRFD)

## DRILLED SHAFT AXIAL RESISTANCE TABLE

**Fayette Co.,Item #: 7-80154.00, S-010-2021**
**Noise Barrier Wall, KY-4 (New Circle Rd.)**

**Rock Socket Diameter = 3.0 feet**
**Rock Socket Diameter = 36 inches** **RDM 5/17/21**

| | Rock Socket Length (ft.) | Nominal Unit Side Shear $q_{ss}$ (ksf) | Nominal Unit End Bearing $q_{eb}$ (ksf) | Nominal Side Resistance $R_{sr}$ (kips) | Nominal End Bearing Resistance $R_{eb}$ (kips) | Factored Side Resistance $\phi R_{sr}$ (kips) | Factored End Bearing Resistance $\phi R_{eb}$ (kips) | Total Factored Axial Resistance $\phi R_t$ (kips) | Total Factored Uplift Resistance $\phi R_{tu}$ (kips) |
|---|---|---|---|---|---|---|---|---|---|
| | 0.0 | | | | | | | | |
| | 1.0 | 30.0 | 68 | 283 | 481 | 141 | 240 | 382 | 113 |
| >>> | 2.0 | 30.0 | 68 | 565 | 481 | 283 | 240 | 523 | 226 |
| | 3.0 | 30.0 | 68 | 848 | 481 | 424 | 240 | 664 | 339 |
| | 4.0 | 30.0 | 68 | 1131 | 481 | 565 | 240 | 806 | 452 |
| | 5.0 | 30.0 | 68 | 1414 | 481 | 707 | 240 | 947 | 565 |
| *** | 6.0 | 30.0 | 68 | 1696 | 481 | 848 | 240 | 1089 | 679 |
| | 7.0 | 30.0 | 68 | 1979 | 481 | 990 | 240 | 1230 | 792 |
| | 8.0 | 30.0 | 68 | 2262 | 481 | 1131 | 240 | 1371 | 905 |
| | 9.0 | 30.0 | 68 | 2545 | 481 | 1272 | 240 | 1513 | 1018 |
| | 10.0 | 30.0 | 68 | 2827 | 481 | 1414 | 240 | 1654 | 1131 |
| | 11.0 | 30.0 | 68 | 3110 | 481 | 1555 | 240 | 1795 | 1244 |
| | 12.0 | 30.0 | 68 | 3393 | 481 | 1696 | 240 | 1937 | 1357 |
| | 13.0 | 30.0 | 68 | 3676 | 481 | 1838 | 240 | 2078 | 1470 |
| | 14.0 | 30.0 | 68 | 3958 | 481 | 1979 | 240 | 2220 | 1583 |
| | 15.0 | 30.0 | 68 | 4241 | 481 | 2121 | 240 | 2361 | 1696 |
| | 16.0 | 30.0 | 68 | 4524 | 481 | 2262 | 240 | 2502 | 1810 |
| | 17.0 | 30.0 | 68 | 4807 | 481 | 2403 | 240 | 2644 | 1923 |
| | 18.0 | 30.0 | 68 | 5089 | 481 | 2545 | 240 | 2785 | 2036 |
| | 19.0 | 30.0 | 68 | 5372 | 481 | 2686 | 240 | 2926 | 2149 |
| | 20.0 | 30.0 | 68 | 5655 | 481 | 2827 | 240 | 3068 | 2262 |
| | | | | | | | | | |
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| | | | | | | | | | |
| AASHTO Table 10.5.5.2.4-1 | | | | | Resistance Factor, $\phi$ | 0.50 | 0.50 | | 0.40 |

*** = Min Soket Length Sta. 304+00 to 307+00
>>> = Min. Socket Length Sta. 300+00 to 304+00

D (ft.) = 3.0

########
EV0000
Kentucky Transportation Cabinet
Version 8.30.004
Query: COORDINATE DATA FILE
Project: n:\geotech\gint\projects\s-010-2021.gpj Library: n:\geotech\gint\libraries\kytc library version 5.1.g

| ID | Latitude | Longitude | Hole | Station | Offset | Elevation | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 38.05098 | -84.5617 | 1020 | 30100 | 0 | 955.99 | |
| 2 | 38.05121 | -84.5616 | 1021 | 30200 | 0 | 960.54 | |
| 3 | 38.05144 | -84.5614 | 1022 | 30300 | 0 | 964.21 | |

# PART II

# SPECIFICATIONS AND STANDARD DRAWINGS

## SPECIFICATIONS REFERENCE

Any reference in the plans or proposal to previous editions of the *Standard Specifications for Road and Bridge Construction* and *Standard Drawings* are superseded by *Standard Specifications for Road and Bridge Construction, Edition of 2019* and *Standard Drawings, Edition of 2020.*

# SUPPLEMENTAL SPECIFICATIONS

The contractor shall use the Supplemental Specifications that are effective at the time of letting. The Supplemental Specifications can be found at the following link:

http://transportation.ky.gov/Construction/Pages/Kentucky-Standard-Specifications.aspx

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## SPECIAL NOTE FOR PORTABLE CHANGEABLE MESSAGE SIGNS

This Special Note will apply when indicated on the plans or in the proposal.

**1.0 DESCRIPTION.** Furnish, install, operate, and maintain variable message signs at the locations shown on the plans or designated by the Engineer. Remove and retain possession of variable message signs when they are no longer needed on the project.

**2.0 MATERIALS.**

**2.1 General.** Use LED Variable Message Signs Class I, II, or III, as appropriate, from the Department's List of Approved Materials.

Unclassified signs may be submitted for approval by the Engineer. The Engineer may require a daytime and nighttime demonstration. The Engineer will make a final decision within 30 days after all required information is received.

**2.2 Sign and Controls.** All signs must:

1) Provide 3-line messages with each line being 8 characters long and at least 18 inches tall. Each character comprises 35 pixels.
2) Provide at least 40 preprogrammed messages available for use at any time. Provide for quick and easy change of the displayed message; editing of the message; and additions of new messages.
3) Provide a controller consisting of:
   a) Keyboard or keypad.
   b) Readout that mimics the actual sign display. (When LCD or LCD type readout is used, include backlighting and heating or otherwise arrange for viewing in cold temperatures.)
   c) Non-volatile memory or suitable memory with battery backup for storing pre-programmed messages.
   d) Logic circuitry to control the sequence of messages and flash rate.
4) Provide a serial interface that is capable of supporting complete remote control ability through land line and cellular telephone operation. Include communication software capable of immediately updating the message, providing complete sign status, and allowing message library queries and updates.
5) Allow a single person easily to raise the sign to a satisfactory height above the pavement during use, and lower the sign during travel.
6) Be Highway Orange on all exterior surfaces of the trailer, supports, and controller cabinet.
7) Provide operation in ambient temperatures from -30 to + 120 degrees Fahrenheit during snow, rain and other inclement weather.
8) Provide the driver board as part of a module. All modules are interchangeable, and have plug and socket arrangements for disconnection and reconnection. Printed circuit boards associated with driver boards have a conformable coating to protect against moisture.
9) Provide a sign case sealed against rain, snow, dust, insects, etc. The lens is UV stabilized clear plastic (polycarbonate, acrylic, or other approved material) angled to prevent glare.
10) Provide a flat black UV protected coating on the sign hardware, character PCB, and appropriate lens areas.
11) Provide a photocell control to provide automatic dimming.

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12) Allow an on-off flashing sequence at an adjustable rate.
13) Provide a sight to aim the message.
14) Provide a LED display color of approximately 590 nm amber.
15) Provide a controller that is password protected.
16) Provide a security device that prevents unauthorized individuals from accessing the controller.
17) Provide the following 3-line messages preprogrammed and available for use when the sign unit begins operation:

/KEEP/RIGHT/⇒⇒⇒/
/KEEP/LEFT/⇐⇐⇐/
/LOOSE/GRAVEL/AHEAD/
/RD WORK/NEXT/**MILES/
/TWO WAY/TRAFFIC/AHEAD/
/PAINT/CREW/AHEAD/
/REDUCE/SPEED/**MPH/
/BRIDGE/WORK/***0 FT/
/MAX/SPEED/**MPH/
/SURVEY/PARTY/AHEAD/
/MIN/SPEED/**MPH/
/ICY/BRIDGE/AHEAD/ /ONE LANE/BRIDGE/AHEAD/
/ROUGH/ROAD/AHEAD/
/MERGING/TRAFFIC/AHEAD/
/NEXT/***/MILES/
/HEAVY/TRAFFIC/AHEAD/
/SPEED/LIMIT/**MPH/
/BUMP/AHEAD/
/TWO/WAY/TRAFFIC/

*Insert numerals as directed by the Engineer.
Add other messages during the project when required by the Engineer.

**2.3 Power.**

1) Design solar panels to yield 10 percent or greater additional charge than sign consumption. Provide direct wiring for operation of the sign or arrow board from an external power source to provide energy backup for 21 days without sunlight and an on-board system charger with the ability to recharge completely discharged batteries in 24 hours.

**3.0 CONSTRUCTION.** Furnish and operate the variable message signs as designated on the plans or by the Engineer. Ensure the bottom of the message panel is a minimum of 7 feet above the roadway in urban areas and 5 feet above in rural areas when operating. Use Class I, II, or III signs on roads with a speed limit less than 55 mph. Use Class I or II signs on roads with speed limits 55 mph or greater.

Maintain the sign in proper working order, including repair of any damage done by others, until completion of the project. When the sign becomes inoperative, immediately repair or replace the sign. Repetitive problems with the same unit will be cause for rejection and replacement.

Use only project related messages and messages directed by the Engineer, unnecessary messages lessen the impact of the sign. Ensure the message is displayed in either one or 2 phases with each phase having no more than 3 lines of text. When no message is needed, but it is necessary to know if the sign is operable, flash only a pixel.

When the sign is not needed, move it outside the clear zone or where the Engineer directs. Variable Message Signs are the property of the Contractor and shall be removed from the project when no longer needed. The Department will not assume ownership of these signs.

**4.0 MEASUREMENT.** The final quantity of Variable Message Sign will be

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the actual number of individual signs acceptably furnished and operated during the project. The Department will not measure signs replaced due to damage or rejection.

**5.0 PAYMENT.** The Department will pay for the Variable Message Signs at the unit price each. The Department will not pay for signs replaced due to damage or rejection. Payment is full compensation for furnishing all materials, labor, equipment, and service necessary to, operate, move, repair, and maintain or replace the variable message signs. The Department will make payment for the completed and accepted quantities under the following:

| Code | Pay Item | Pay Unit |
|---|---|---|
| 02671 | Portable Changeable Message Sign | Each |

Effective June 15, 2012

11C

## SPECIAL NOTE FOR DRILLED SHAFTS

**1.0 DESCRIPTION.** Furnish all equipment, materials and labor necessary for constructing reinforced concrete drilled shafts in cylindrically excavated holes according to the details shown on the plans or as the Engineer directs. Construct the shaft to the lines and dimensions shown on the plans, or as the Engineer directs. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, current edition.

**2.0 MATERIALS.**

**2.1 Concrete.** Use Class A Modified concrete unless otherwise shown on the plans. The slump at the time of placement shall be 6.5 to 9.5 inches, the coarse aggregate shall be size 67, 68, 78, 8 or 9M, and the water/cementitious material ratio shall not exceed 0.45. Include water reducing and retarding admixtures. Type F high range water reducers used in combination with retarding admixtures or Type G high range water reducers fully meeting trial batch requirements are permitted and Class F fly ash is permitted in conformance with Section 601. Design the mix such that the concrete slump exceeds 4 inches at 4 hours after batching. If the estimated concrete transport, plus time to complete placement, exceeds 4 hours, design the concrete to have a slump that exceeds 4 inches or more for the greater time after batching and demonstrate that the slump requirement can be achieved after the extended time period using a trial batch.

Perform trial batches prior to beginning drilled shaft construction in order to demonstrate the adequacy of the proposed concrete mix. Demonstrate that the mix to be used will meet the requirements for temperature, slump, air content, water/cementitious material ratio, and compressive strength. Use the ingredients, proportions and equipment (including batching, mixing, and delivery) to be used on the project. Make at least 2 independent consecutive trial batches of 3 cubic yards each using the same mix proportions and meeting all specification requirements for mix design approval. Submit a report containing these results for slump, air content, water/cement ratio, temperature, and compressive strength and mix proportions for each trial batch to the Engineer for review and approval. Failure to demonstrate the adequacy of the concrete mix, methods, or equipment to the Engineer is cause for the Engineer to require appropriate alterations in concrete mix, equipment, and/or method by the Contractor to eliminate unsatisfactory results. Perform additional trial batches required to demonstrate the adequacy of the concrete mix, method, or equipment.

**2.2 Steel Reinforcement.** Provide Grade 60 deformed bars conforming to Section 811 of the Standard Specifications. Rail steel is permitted for straight bars only. Place according to Section 602 of the Standard Specifications, this Special Note, and the plans. Use non-corrosive centering devices and feet to maintain the specified reinforcement clearances.

**2.3 Casings.** Provide casing meeting the requirements of ASTM A 252 Grade 2 or better unless otherwise specified. Ensure casing is smooth, clean, watertight, true and straight, and of ample strength to withstand handling, installation, and extraction stresses and the pressure of both concrete and the surrounding earth materials. Ensure the outside diameter of casing is not less than the specified diameter of shaft.

Use only continuous casings. Cut off the casing at the prescribed elevation and trim to within tolerances prior to acceptance. Extend casing into bedrock a sufficient distance to stabilize the shaft excavation against collapse, excessive deformation, and/or flow of water if required and/or shown on the plans.

Install from the work platform continuous casing meeting the design thickness requirements, but not less than 3/8 inch, to the elevations shown on the plans. When drilled

shafts are located in open water areas, extend casings above the water elevation to the plan tip elevation to protect the shaft concrete from water action during concrete placement and curing. All casing is permanent unless temporary casing is specified in the contract drawings or documents. Permanent casing is incidental to the applicable drilled shaft unit bid price unless noted otherwise in the contract. Temporary casing may be required for drilled shafts not socketed into bedrock. If temporary surface casings are used, extend each casing up to the work platform. Remove all temporary surface casing prior to final acceptance unless otherwise permitted by the Central Office Construction Engineer.

Ensure casing splices have full penetration butt welds conforming to the current edition of AWS D1.1 with no exterior or interior splice plates and produce true and straight casing.

**2.4 Slurry.** When slurry is to be used for installation of the Drilled Shaft, submit a detailed plan for its use and disposal. The plan should include, but not be limited to the following:

1) Material properties
2) Mixing requirements and procedures
3) Testing requirements
4) Placement procedures
5) Disposal techniques

Obtain the Central Office Division of Construction's approval for the slurry use and disposal plan before installing drilled shafts.

**2.5 Tremies.** Provide tremies of sufficient length, weight, and diameter to discharge concrete at the shaft base elevation. Ensure the tremie diameter is least 6 times the maximum size coarse aggregate to be used in the concrete mix and no less than 10 inches. Provide adequate wall thickness to prevent crimping or sharp bends that restrict concrete placement. Support tremies used for depositing concrete in a dry drilled shaft excavation so that the free fall of the concrete does not cause the shaft excavation to cave or slough. Maintain a clean and smooth tremie surface to permit both flow of concrete and unimpeded withdrawal during concrete placement. Do not allow any aluminum parts to contact the concrete. Construct tremies used to deposit concrete for wet excavations so that they are watertight and will readily discharge concrete.

**2.6 Concrete Pumps.** Provide pump lines with a minimum diameter of 5 inches and watertight joints.

**2.7 Drop Chutes.** Do not use aluminum drop chutes.

## 3.0 CONSTRUCTION.

### 3.1 Preconstruction.

**3.1.1 Prequalification.** The Department will require prequalification by the Division of Construction Procurement before accepting a bid for the construction of Drilled Shafts.

**3.1.2 Pre-Bid Inspection.** Inspect both the project site and all subsurface information, including any soil or rock samples, prior to submitting a bid. Contact the Geotechnical Branch (502-564-2374) to schedule a viewing of the subsurface information. Failure to inspect the project site and view the

subsurface information will result in the forfeiture of the right to file a claim based on site conditions and may result in disqualification from the project.

**3.1.3 Drilled Shaft Installation Plan.** Upon request, the Department will review a Drilled Shaft Installation Plan. Submit the plan no later than 45 calendar days prior to constructing drilled shafts. Items covered in this plan should include, but not be limited to the following:

1) Name and experience record of jobsite drilled shaft superintendent and foremen in charge of drilled shaft operations for each shift.
2) List and size of proposed equipment including cranes, drills, augers, bailing buckets, final cleaning equipment, de-sanding equipment, slurry pumps, core sampling equipment, tremies or concrete pumps, casings, etc.
3) Details of overall construction operation sequence and the sequence of shaft construction in the bents or groups.
4) Details of shaft excavation methods including methods to over-ream or roughen shaft walls, if necessary.
5) Details of slurry when the use of slurry is anticipated. Include methods to mix, circulate, and de-sand the proposed slurry. Provide details of proposed testing, test methods, sampling methods, and test equipment.
6) Details of proposed methods to clean shaft and inside of casing after initial excavation.
7) Details of reinforcement handling, lifting, and placement including support and method to center in shaft. Also include rebar cage support during concrete placement and temporary casing removal.
8) Details of concrete placement including procedures for concrete tremie or pump. Include initial placement, raising during placement, and overfilling of the shaft to expel contaminated concrete.
9) Required submittals including shop drawings and concrete design mixes.
10) Other information shown in the plans or requested by the Engineer.
11) Special considerations for wet construction.
12) Details of environmental control procedures to protect the environment from discharge of excavation spoil, slurry (natural and mineral), and concrete over-pour.

The Division of Construction will review the submitted procedure and provide comments and recommendations. The Contractor is responsible for satisfactory construction and ultimate performance of the Drilled Shaft.

**3.2 General Construction.** Construct drilled shafts as indicated in the plans or described in this Special Note by either the dry or wet method. When the plans describe a particular method of construction, use this method unless the Engineer permits otherwise. When the plans do not describe a particular method, propose a method on the basis of its suitability to the site conditions. Approval of this proposed method is contingent upon the satisfactory results of the technique shaft.

The construction of the first drilled shaft or technique shaft will be used to determine if the methods and equipment used by the contractor are sufficient to produce a completed shaft meeting the requirements of the plans and specifications. Ability to control dimensions and alignment of excavations within tolerances; to seal the casing into impervious materials; to prevent caving or deterioration of subsurface materials by the use of slurry or other means; to

properly clean the completed shaft excavation; to construct excavations in open water areas when required by the plans; to establish methods for belling or over-reaming when required by the plans; to determine the elevation of ground water; to satisfactorily handle, lift, place, and support the reinforcement cage; to satisfactorily place concrete meeting the specifications within the prescribed time frame; and to satisfactorily execute any other necessary construction operations will be evaluated during construction of the first shaft(s). Revise the methods and equipment as necessary at any time during the construction of the first shaft when unable to satisfactorily carry out any of the necessary operations described above or unable to control the dimensions and alignment of the shaft excavation within tolerances. Accurately locate technique so they may be used in the finished structure unless directed otherwise in the contract document or by the Engineer.

If at any time the Contractor fails to satisfactorily demonstrate, to the satisfaction of the Engineer, the adequacy of methods or equipment and alterations are required, additional technique shafts will be required at no additional cost to the Department and with no extension of contract time. Additional technique shafts shall be located as near as possible to the proposed production shafts but in a location as not to interfere with other construction activities. Once approval has been given to construct production shafts, no changes will be permitted in the methods or equipment used to construct the satisfactory shaft without written approval of the Engineer.

Do not make a claim against the Department for costs of construction delays, or any materials, labor, or equipment that may be necessary due to the Contractor's failure to furnish drilled shafts of a length sufficient to obtain the required bearing values, or for variations in length due to subsurface conditions that may be encountered. Soundings, boring logs, soil profiles, or other subsurface data included in the Contract documents are used by the Department for design and making preliminary estimates of quantities and should be used only at the risk of the Contractor for determining equipment, materials, or labor necessary for drilling shafts as required by the contract.

When necessary, set temporary removable surface casing. Use surface casing of sufficient length to prevent caving of the surface soils and to aid in maintaining shaft position and alignment. Pre-drilling with slurry and/or over-reaming to the outside diameter of the casing may be required to install the surface casing at some sites.

Provide equipment capable of constructing shafts to the deepest shaft depth shown in the plans plus 15 feet, 20 percent greater than the longest shaft (measured from the ground or water surface to the tip of the shaft), or 3 times the shaft diameter, whichever is greater. Blasting excavation methods are not permitted.

Use permanent casing unless otherwise noted in the Contract. Place casing as shown on the plans before beginning excavation. If full penetration cannot be attained, the Engineer may direct that excavation through the casing be accomplished and the casing advanced until reaching the plan tip elevation. In some cases, over-reaming to the outside diameter of the casing may be required before placing the casing. Cut off the casing at the prescribed elevation and leave the remainder of the casing in place. Do not use vibratory hammers for casing installation within 50 feet of shafts that have been completed less than 24 hours.

**3.2.1 Dry Construction Method.** Use the dry construction method only at sites where the ground water table and soil conditions (generally stiff to hard clays or rock above the water table) make it feasible to construct the shaft in a relatively dry excavation and where the sides and bottom of the shaft are stable and may be visually inspected by the Engineer prior to placing the concrete. The dry construction method consists of drilling the shaft excavation, removing accumulated seepage water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation.

**3.2.2 Wet Construction Method.** Use the wet construction method at all sites where it is impractical to excavate by the dry method. The wet construction method consists of drilling the shaft excavation below the water table, keeping the shaft filled with water (including natural slurry formed during the drilling process) or slurry as defined in part 2.4 of this Special Note, desanding and cleaning the slurry as required, final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other approved devices and placing the shaft concrete (with a tremie or concrete pump beginning at the shaft bottom) which displaces the water or slurry as concrete is placed.

Where drilled shafts are located in open water areas, construct the shafts by the wet method using casings extending from above water elevation to the plan casing tip elevation to protect the shaft concrete from water action during placement and curing. Install the casing in a manner that will produce a positive seal at the bottom of the casing.

**3.3 Slurry.** When the Contractor elects to use slurry, adjust construction operations so that the slurry is in contact with the bottom 5 feet of the shaft for less than 4 hours unless the Engineer approves otherwise. If the 4-hour limit is exceeded, over-ream the bottom 5 feet of shaft.

**3.4 Cleaning.** Over-reaming, cleaning, or wire brushing the sidewalls of the shaft excavation and permanent casings may be necessary to remove the depth of softening or to remove excessive slurry cake buildup as indicated by sidewall samples or other test methods employed by the Engineer. Over-ream around the perimeter of the excavation a minimum depth of 1/2 inch and maximum depth of 3 inches.

**3.5 Subsurface Exploration.** Take subsurface exploration borings when shown on the plans or as the Engineer directs to determine the character of the material that the shaft extends through and the material directly below the shaft excavation. Complete subsurface exploration borings prior to beginning excavation for any drilled shaft in a group. Unless directed otherwise, extend subsurface exploration borings a minimum depth of 3 shaft diameters but not less than 10 feet below the bottom of the anticipated tip of drilled shaft excavation as shown on the plans. For subsurface exploration borings where soil sampling is required use thin-wall tube samples and perform standard penetration tests according to the Department's current Geotechnical Manual. When shafts extend into bedrock, soil samples are not required unless otherwise specified. Perform rock core drilling according to the Department's Geotechnical Manual. When the Engineer directs, perform additional subsurface exploration borings prior to drilled shaft construction. Measure soil samples and/or rock cores and visually identify and describe them on the subsurface log according to the Department's current Geotechnical Manual. Subsurface exploration borings must be performed by contractors/consultants prequalified by the Department's Division of Professional Services for Geotechnical Drilling Services at the time that field work begins.

The Engineer or geotechnical branch representative may be on-site during the subsurface exploration process to evaluate the soil and/or rock core samples. The Engineer or geotechnical branch representative will determine the need to extend the borings to depths greater than the depths previously specified. Handle, label, identify, and store soil and/or rock samples according to the Department's current Geotechnical Manual and deliver them with the subsurface logs to the geotechnical branch's rock core lab in Frankfort within 24-hours of completing the borings, unless directed otherwise.

The Engineer will inspect the soil samples and/or cores and determine the final depth of required excavation (final drilled shaft tip elevation) based on evaluation of the material's suitability. The Engineer will establish the final tip elevations for shaft locations, other than

those for which subsurface exploration borings have been performed, based on the results of the subsurface exploration. Within 15 calendar days after completion of the subsurface exploration borings, the Engineer will notify the contractor of the final tip elevations for shaft locations.

**3.6 Excavations.** The plans indicate the expected depths, the top of shaft elevations, and the estimated bottom of shaft elevations between which the drilled shaft are to be constructed. Drilled shafts may be extended deeper when the Engineer determines that the material encountered while drilling the shaft excavation is unsuitable and/or is not the same as anticipated in the design of the drilled shaft. Drilled shafts may be shortened when the Engineer determines the material encountered is better than that anticipated.

Begin drilled shaft excavation the excavation, excavation inspection, reinforcement placement, and concrete placement can be completed as one continuous operation. Do not construct new shafts within 24 hours adjacent to recently completed shafts if the center-to-center spacing is less than 3 shaft diameters.

Dispose of excavated material removed from the shaft according to the Standard Specifications or the contract documents.

Do not allow workmen to enter the shaft excavation for any reason unless both a suitable casing has been installed and adequate safety equipment and procedures have been provided to the workmen entering the excavation. Recommended Procedures for the Entry of Drilled Shaft Foundation Excavations, prepared by ADSC: The International Association of Foundation Drilling provides guideline recommendations for down-hole entry of drilled excavations.

**3.7 Obstructions.** Remove subsurface obstructions at drilled shaft locations. Such obstructions may include man-made materials such as old concrete foundations or natural materials such as boulders. Blasting is not permitted.

**3.8 Inspections of Excavations.** Provide equipment for checking the dimensions and alignment of each shaft excavation. Determine the dimensions and alignment of the shaft excavation under the observation and direction of the Engineer. Provide equipment necessary to verify shaft cleanliness for the method of inspection selected by the Engineer.

Measure final shaft depths with a weighted tape or other approved methods after final cleaning. Ensure the base of each shaft has less than ½ inch of sediment at the time of concrete placement. For dry excavations, do not allow the depth of water to exceed 3 inches for tremie or pump methods of concrete placement. Verify shaft cleanliness to the Engineer using direct visual inspection or other method the Engineers determines acceptable. Video camera or underwater inspection procedures may be used if specified in the plans. Inspect the side surfaces of rock sockets to ensure they are rough and of such condition to ensure bond between the shaft concrete and the rock. Calipers, bent rods, or other devices may be used to inspect the diameter and roughness of rock sockets. When the Engineer directs, mechanically roughen surfaces found to be smooth.

**3.9 Reinforcing Steel Cage Fabrication and Placement.** Assemble the reinforcing steel cage, consisting of longitudinal bars, ties, spirals, cage stiffener bars, spacers, centering devices, and other necessary appurtenances and place as a prefabricated unit immediately after the shaft excavation is inspected and accepted, and just prior to concrete placement.

Tie the reinforcing steel with 100 percent double-wire ties and provide support so that it will remain within allowable tolerances for position. Locate splices as shown on the plans. Splice no more than 50 percent of the longitudinal reinforcing within 2-lap splice lengths of any location or within 3 feet of the splice location if approved mechanical connectors are used. All splices are to be in accordance with plan details. Use bands, temporary cross ties,

etc. as required to provide a reinforcement cage of sufficient rigidity to prevent racking, permanent deformations, etc. during installation.

Use concrete centering devices or other approved non-corrosive centering devices at sufficient intervals along the length of the reinforcement cage to ensure concentric spacing for the entire cage length. As a minimum, provide a set of non-corrosive centering devices at intervals not exceeding 5 feet throughout the length of the shaft. When the size of the longitudinal reinforcement exceeds one inch in diameter the minimum spacing may be increased to 10 feet. As a minimum, provide a set of centering devices within 2 feet of the top and 2 feet of the bottom of the shaft. In addition provide one set of centering devices 2 feet above and 2 feet below each change in shaft diameter. Provide feet (bottom supports) at the bottom of the shaft on vertical bars. As a minimum, provide non-corrosive centering devices at 60 degree intervals around the circumference of the shaft to maintain the required reinforcement clearances. Ensure the centering devices maintain the specified annular clearance between the outside of the reinforcing cage and the side of the excavated hole or casing.

Concrete centering devices and feet will be constructed of concrete equal in quality and durability to the concrete specified for the shaft. Use epoxy coated centering devices fabricated from reinforcing steel. Use feet (bottom supports) of adequate size and number to assure the rebar cage is the proper distance above the bottom as determined by part 3.11 3) of this Special Note. The feet are not intended to support the weight of the cage. In the event that the shaft has been excavated below the anticipated tip elevation, extend the reinforcing cage at the tip (low) end by lap splices, mechanical connectors, or welded splices conforming to the Standard Specifications. In this instance, splices need not be staggered and 100 percent of the reinforcing bars may be spliced at a given location. The bottom 12 inches of the shaft may not be reinforced when below plan tip elevation.

During concrete placement, support the reinforcing cage at or near the top of shaft such that the concrete feet are positioned approximately one inch above the bottom of shaft excavation. Not sooner than 24 hours after the completion of concrete placement, remove temporary supports. Provide the needed equipment, including extra cranes if necessary, to provide this cage support.

Prior to placing the reinforcement cage, demonstrate to the satisfaction of the Engineer that the fabrication and handling methods to be used will result in a reinforcing cage placed in the proper position, with the proper clearances, and without permanent bending, squashing, or racking of the reinforcement cage. During this demonstration bring the cage to an upright position, lower into a shaft excavation, and support as if for concrete placement.

Check the elevation of the top of the reinforcing cage before and after the concrete is placed. If the reinforcing cage is not maintained within the specified tolerances, correct to the satisfaction of the Engineer. Do not construct additional shafts until the contractor has modified his reinforcing cage support to obtain the required tolerances.

**3.10 Concrete Placement.** Place concrete according to the applicable portions of the Standard Specifications and with the requirements set forth herein. Do not apply the provisions of the Special Note 6U for Structural Mass Concrete.

Place concrete as soon as practical after reinforcing steel placement but no later than 4 hours after completion of the shaft excavation. Place concrete continuously from the bottom to above the top elevation of the shaft. For shafts that extend above ground or water surface, place concrete continuously after the shaft is full until good quality concrete is evident at the top of the shaft. Form any portion of the shaft above ground with a removable form or other approved method to the dimensions shown on the plans.

For shafts constructed in the wet with the top of the shaft below the water surface and below top of casing, place concrete to approximately one shaft diameter but no less than 2 feet above the top of shaft elevation. Remove contaminated concrete and deleterious material, as

determined by the Engineer, accumulated above the top of shaft elevation immediately after completing concrete placement. Deleterious material and contaminated concrete may be airlifted under a head of water or slurry provided that the head is maintained at or near the exterior water surface elevation. Carefully remove any concrete remaining above plan top of shaft after curing and excess casing removal.

Place concrete either by free fall, through a tremie, or concrete pump. Use the free fall placement method in dry holes only. The maximum height of free fall placement is 20 feet. Do not allow concrete placed by free fall to contact either the reinforcing cage or hole sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

Place concrete in the shaft in one continuous operation. Maintain a minimum slump of 4 inches or more throughout the placement for 4 hours after batching. Adjust approved admixtures in the concrete mix for the conditions encountered on the job so that the concrete remains in a workable plastic state throughout the placement. Perform slump loss tests to demonstrate that the concrete will maintain a 4-inch or greater slump for a period of time equal to the estimated transport plus the 2-hour placement time, but not less than 4 hours.

When the Engineer determines the concrete placement methods and/or equipment during construction of any technique and/or production shafts to be inadequate, make appropriate alterations to eliminate unsatisfactory results.

Drilled shafts not meeting the concrete placement requirements of this Special Note or contract plans are unacceptable. Correct all unacceptable completed shafts to the satisfaction of the Engineer.

**3.10.1 Tremie Placement.** Tremies may be used for concrete placement in either wet or dry holes. Extend the tremie to the shaft base elevation before starting underwater placement. Valves, bottom plates, or plugs may be used only if concrete discharge can begin approximately 2 inches above the excavation bottom. Remove plugs from the excavation unless otherwise approved by the Engineer. Maintain tremie discharge at or near the bottom of excavation as long as practical during concrete placement. Immerse tremie discharge end as deep as practical in the concrete but not less than 10 feet.

If at any time during the concrete pour the tremie line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete surface, the entire drilled shaft is considered defective. In such case, remove the reinforcing cage and concrete, complete any necessary sidewall cleaning or over-reaming as directed by the Engineer, and repour the shaft.

**3.10.2 Pumped Concrete.** Concrete pumps and lines may be used for concrete placement in either wet or dry excavations. Do not begin concrete placement until the pump line discharge orifice is at the shaft base elevation.

For wet excavations, use a plug or similar device to separate the concrete from the fluid in the hole until pumping begins. Remove the plug unless otherwise approved by the engineer.

Ensure the discharge orifice remains at least 10 feet below the surface of the fluid concrete. When lifting the pump line during concrete placement, reduce the line pressure until the orifice has been repositioned at a higher level in the excavation.

If at any time during the concrete pour the pump line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the Department will consider the shaft defective. In such case, remove the reinforcing cage and concrete, complete any necessary sidewall cleaning or over-reaming as the Engineer directs, and repour the shaft.

**3.10.3 Drop Chutes.** Drop chutes may be used to direct placement of free fall concrete in excavations where the maximum depth of water does not exceed one inch. Do not use the free fall method of placement in wet excavations. Concrete may be placed through either a hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. Reduce the height of free fall and/or reduce the rate of concrete flow into the excavation if the concrete placement causes the shaft excavation to cave or slough, or if the concrete strikes the reinforcing cage or sidewall. When the Engineer determines free fall placement cannot be accomplished satisfactorily, use either tremie or pumping to accomplish the pour.

**3.11 Construction Tolerances.** The following construction tolerances apply to drilled shafts unless otherwise stated in the contract document:

1) Construct drilled shaft within 3 inches of plan position in the horizontal plane at the top of the shaft.
2) Do not vary the vertical alignment of a shaft excavation from the plan alignment by more than 1/4 inch per foot of depth or 6 inches total.
3) Maintain the top of the reinforcing steel cage no more than 6 inches above and no more than 3 inches below plan position.
4) All casing diameters shown on the plans refer to O.D. (outside diameter) dimensions. The casing dimensions are subject to American Pipe Institute tolerances applicable to regular steel pipe. A casing larger in diameter than shown in the plans may be used, at no additional cost, with prior approval by the Department.
5) Maintain the top of shaft concrete within ± 3 inches from the plan top of shaft elevation, measured after excess shaft concrete has been removed.
6) Design excavation equipment and methods so that the completed shaft excavation will have a planar bottom. Maintain the cutting edges of excavation equipment normal to the vertical axis of the equipment within a tolerance of ± 3/8 inch per foot of diameter. The tip elevation of the shaft has a tolerance of ± 6 inches from final shaft tip elevation unless otherwise specified in the plans.

Drilled shaft excavations and completed shafts not constructed within the required tolerances are unacceptable. Correct all unacceptable shaft excavations and completed shafts to the satisfaction of the Engineer. When a shaft excavation is completed with unacceptable tolerances, present corrective measures designed by a registered Professional Engineer for approval.

**4.0 MEASUREMENT.**

**4.1 Drilled Shafts.** The Department will not measure for payment any trial batches required to demonstrate the adequacy of the concrete mix, method, or equipment; concrete required to fill an oversized casing or oversized excavation; obstruction removal; over-reaming or sidewall cleaning; inspection work or inspection equipment; materials or work necessary, including engineering analyses and redesign, to alter unacceptable work methods or to complete corrections for unacceptable work; and will consider them incidental to the Drilled Shaft. Unless noted otherwise in the contract documents, casing is incidental to the drilled shaft.

**4.1.1 Drilled Shaft, Common.** The Department will measure the length, in linear feet, of drilled shaft above the top of rock elevation shown on the plans. The

Department will consider this quantity Drilled Shaft, Common regardless of the character of material actually encountered.

**4.1.2 Drilled Shafts, Solid Rock.** The Department will measure the length, in linear feet, of drilled shaft below the top of rock elevation shown on plans. The Department will consider this quantity Drilled Shafts, Solid Rock regardless of the character of material actually encountered during excavation.

**4.2 Technique Shaft.** The Department will pay for technique shaft at the contract unit price per each as detailed on the plans or as directed by the Engineer. This will constitute full compensation for all costs incurred during installation as described herein for 'Drilled Shaft' or in the contract documents. No additional compensation beyond the number of technique shafts allowed for in the plans will be permitted for additional technique shafts required because of failure to demonstrate adequacy of methods.

**4.3 Rock Coring and Rock Sounding.** The Department will measure Rock Sounding and Rock Coring shown on the plans, as specified in part 3.5 of this Special Note, and as the Engineer directs, in linear feet to the nearest 0.1-foot. If soil samples are specified in the contract documents they will be incidental to the unit price bid for Rock Sounding. The Department will not measure or pay for subsurface exploration performed deeper than the elevations indicated on the plans and/or in this Special Note, unless directed by the Engineer, and will consider it incidental to these items of work. Additionally, the Department will consider all mobilization, equipment, labor, incidental items, and operations necessary to complete the boring operations incidental to these items of work.

**5.0 PAYMENT.** The Department will make payment for the completed and accepted quantities under the following:

| Code | Pay Item | Pay Unit |
|---|---|---|
| ----- | Drilled Shaft, Diameter*, Common | Linear Foot |
| ----- | Drilled Shaft, Diameter*, Solid Rock | Linear Foot |
| ----- | Technique Shaft | Each |
| 20745ED | Rock Sounding | Linear Foot |
| 20746ED | Rock Coring | Linear Foot |

* *See Plan Sheets for sizes of shafts*.

The Department will consider payment as full compensation for all work required in this note.

June 15, 2012

# PART III

# EMPLOYMENT, WAGE AND RECORD REQUIREMENTS

# TRANSPORTATION CABINET
# DEPARTMENT OF HIGHWAYS

## LABOR AND WAGE REQUIREMENTS
## APPLICABLE TO OTHER THAN FEDERAL-AID SYSTEM PROJECTS



### I. APPLICATION

1. These contract provisions shall apply to all work performed on the contract by the contractor with his own organization and with the assistance of workmen under his immediate superintendence and to all work performed on the contract by piecework, station work or by subcontract. The contractor's organization shall be construed to include only workmen employed and paid directly by the contractor and equipment owned or rented by him, with or without operators.

2. The contractor shall insert in each of his subcontracts all of the stipulations contained in these Required Provisions and such other stipulations as may be required.

3. A breach of any of the stipulations contained in these Required Provisions may be grounds for termination of the contract.

### II. NONDISCRIMINATION OF EMPLOYEES

AN ACT OF THE KENTUCKY
GENERAL ASSEMBLY TO PREVENT
DISCRIMINATION IN EMPLOYMENT
KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (forty and above); or limit, segregate, or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, color, religion, national origin, sex, disability or age forty (40) and over. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor shall not print or publish or cause to be printed or published a notice or advertisement relating to employment by such an employer or membership in or any classification or referral for employment by the employment agency, indicating any preference, limitation, specification, or discrimination, based on race, color, religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, except that such a notice or advertisement may indicate a preference, limitation, or specification based on religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, when religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, is a bona fide occupational qualification for employment.

3. If the contractor is in control of apprenticeship or other training or retraining, including on-the-job training programs, he shall not discriminate against an individual because of his race, color, religion, national origin, sex, disability or age forty (40) and over, in admission to, or employment in any program established to provide apprenticeship or other training.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will take such action with respect to any subcontract or purchase order as the administrating agency may direct as a means of enforcing such provisions, including sanctions for non-compliance.

Revised: January 25, 2017

# EXECUTIVE BRANCH CODE OF ETHICS

In the 1992 regular legislative session, the General Assembly passed and Governor Brereton Jones signed Senate Bill 63 (codified as KRS 11A), the Executive Branch Code of Ethics, which states, in part:

KRS 11A.040 (7) provides:

No present or former public servant shall, within six (6) months following termination of his office or employment, accept employment, compensation, or other economic benefit from any person or business that contracts or does business with, or is regulated by, the state in matters in which he was directly involved during the last thirty-six (36) months of his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, or for which he received, prior to his state employment, a professional degree or license, provided that, for a period of six (6) months, he personally refrains from working on any matter in which he was directly involved during the last thirty-six (36) months of his tenure in state government. This subsection shall not prohibit the performance of ministerial functions, including but not limited to filing tax returns, filing applications for permits or licenses, or filing incorporation papers, nor shall it prohibit the former officer or public servant from receiving public funds disbursed through entitlement programs.

KRS 11A.040 (9) states:

A former public servant shall not represent a person or business before a state agency in a matter in which the former public servant was directly involved during the last thirty-six (36) months of his tenure, for a period of one (1) year after the latter of:

a) The date of leaving office or termination of employment; or
b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not as a way to obtain private benefits.

If you have worked for the executive branch of state government within the past six months, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, 3 Fountain Place, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Revised: January 27, 2017

## Kentucky Equal Employment Opportunity Act of 1978

The requirements of the Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) shall apply to this Contract. The apparent low Bidder will be required to submit EEO forms to the Division of Construction Procurement, which will then forward to the Finance and Administration Cabinet for review and approval. No award will become effective until all forms are submitted and EEO/CC has certified compliance. The required EEO forms are as follows:

- EEO-1: Employer Information Report
- Affidavit of Intent to Comply
- Employee Data Sheet
- Subcontractor Report

These forms are available on the Finance and Administration's web page under ***Vendor Information, Standard Attachments and General Terms*** at the following address: **https://www.eProcurement.ky.gov**.

Bidders currently certified as being in compliance by the Finance and Administration Cabinet may submit a copy of their approval letter in lieu of the referenced EEO forms.

For questions or assistance please contact the Finance and Administration Cabinet by email at **finance.contractcompliance@ky.gov** or by phone at 502-564-2874.

# EMPLOYEE RIGHTS
## UNDER THE FAIR LABOR STANDARDS ACT

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

## FEDERAL MINIMUM WAGE
## $7.25 PER HOUR
**BEGINNING JULY 24, 2009**

**OVERTIME PAY**

At least 1½ times your regular rate of pay for all hours worked over 40 in a workweek.

**CHILD LABOR**

An employee must be at least **16** years old to work in most non-farm jobs and at least **18** to work in non-farm jobs declared hazardous by the Secretary of Labor.

Youths **14** and **15** years old may work outside school hours in various non-manufacturing, non-mining, non-hazardous jobs under the following conditions:

***No more than***
- **3** hours on a school day or **18** hours in a school week;
- **8** hours on a non-school day or **40** hours in a non-school week.

Also, work may not begin before **7 a.m.** or end after **7 p.m.**, except from June 1 through Labor Day, when evening hours are extended to **9 p.m.** Different rules apply in agricultural employment.

**TIP CREDIT**

Employers of "tipped employees" must pay a cash wage of at least $2.13 per hour if they claim a tip credit against their minimum wage obligation. If an employee's tips combined with the employer's cash wage of at least $2.13 per hour do not equal the minimum hourly wage, the employer must make up the difference. Certain other conditions must also be met.

**ENFORCEMENT**

The Department of Labor may recover back wages either administratively or through court action, for the employees that have been underpaid in violation of the law. Violations may result in civil or criminal action.

Employers may be assessed civil money penalties of up to $1,100 for each willful or repeated violation of the minimum wage or overtime pay provisions of the law and up to $11,000 for each employee who is the subject of a violation of the Act's child labor provisions. In addition, a civil money penalty of up to $50,000 may be assessed for each child labor violation that causes the death or serious injury of any minor employee, and such assessments may be doubled, up to $100,000, when the violations are determined to be willful or repeated. The law also prohibits discriminating against or discharging workers who file a complaint or participate in any proceeding under the Act.

**ADDITIONAL INFORMATION**

- Certain occupations and establishments are exempt from the minimum wage and/or overtime pay provisions.
- Special provisions apply to workers in American Samoa and the Commonwealth of the Northern Mariana Islands.
- Some state laws provide greater employee protections; employers must comply with both.
- The law requires employers to display this poster where employees can readily see it.
- Employees under 20 years of age may be paid $4.25 per hour during their first 90 consecutive calendar days of employment with an employer.
- Certain full-time students, student learners, apprentices, and workers with disabilities may be paid less than the minimum wage under special certificates issued by the Department of Labor.

For additional information:

**1-866-4-USWAGE**

(1-866-487-9243) TTY: 1-877-889-5627

WHD U.S. Wage and Hour Division

**WWW.WAGEHOUR.DOL.GOV**

U.S. Department of Labor | Wage and Hour Division

WHD Publication 1088 (Revised July 2009)

# PART IV

# INSURANCE

Refer to
*Kentucky Standard Specifications for Road and Bridge Construction,*
current edition

# PART V

# BID ITEMS

211326

# PROPOSAL BID ITEMS



**Report Date** 6/25/21

## Section: 0001 - ROADWAY

| LINE | BID CODE | ALT | DESCRIPTION | QUANTITY | UNIT | UNIT PRIC | FP | AMOUNT |
|---|---|---|---|---|---|---|---|---|
| 0010 | 00100 | | ASPHALT SEAL AGGREGATE | 3.70 | TON | | $ | |
| 0020 | 00103 | | ASPHALT SEAL COAT | .50 | TON | | $ | |
| 0030 | 01982 | | DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL WHITE | 2.00 | EACH | | $ | |
| 0040 | 02351 | | GUARDRAIL-STEEL W BEAM-S FACE | 175.00 | LF | | $ | |
| 0050 | 02367 | | GUARDRAIL END TREATMENT TYPE 1 | 1.00 | EACH | | $ | |
| 0060 | 02369 | | GUARDRAIL END TREATMENT TYPE 2A | 1.00 | EACH | | $ | |
| 0070 | 02396 | | REMOVE GUARDRAIL END TREATMENT | 2.00 | EACH | | $ | |
| 0080 | 02483 | | CHANNEL LINING CLASS II | 5.00 | TON | | $ | |
| 0090 | 02484 | | CHANNEL LINING CLASS III | 11.00 | TON | | $ | |
| 0100 | 02562 | | TEMPORARY SIGNS | 164.00 | SQFT | | $ | |
| 0110 | 02602 | | FABRIC-GEOTEXTILE CLASS 1 | 34.00 | SQYD | | $ | |
| 0120 | 02650 | | MAINTAIN & CONTROL TRAFFIC | 1.00 | LS | | $ | |
| 0130 | 02671 | | PORTABLE CHANGEABLE MESSAGE SIGN | 2.00 | EACH | | $ | |
| 0140 | 02701 | | TEMP SILT FENCE | 1,265.00 | LF | | $ | |
| 0150 | 02704 | | SILT TRAP TYPE B | 2.00 | EACH | | $ | |
| 0160 | 02707 | | CLEAN SILT TRAP TYPE B | 4.00 | EACH | | $ | |
| 0170 | 02726 | | STAKING | 1.00 | LS | | $ | |
| 0180 | 05952 | | TEMP MULCH | 3,767.00 | SQYD | | $ | |
| 0190 | 05953 | | TEMP SEEDING AND PROTECTION | 2,811.00 | SQYD | | $ | |
| 0200 | 05963 | | INITIAL FERTILIZER | .30 | TON | | $ | |
| 0210 | 05964 | | MAINTENANCE FERTILIZER | .20 | TON | | $ | |
| 0220 | 05989 | | SPECIAL SEEDING CROWN VETCH | 1,100.00 | SQYD | | $ | |
| 0230 | 06400 | | GMSS GALV STEEL TYPE A | 2,128.00 | LB | | $ | |
| 0240 | 06451 | | REMOVE SIGN SUPPORT BEAM | 3.00 | EACH | | $ | |
| 0250 | 06490 | | CLASS A CONCRETE FOR SIGNS | 6.28 | CUYD | | $ | |
| 0260 | 08003 | | FOUNDATION PREPARATION | 1.00 | LS | | $ | |
| 0270 | 20072ES805 | | GRANULAR EMBANKMENT | 72.00 | TON | | $ | |
| 0280 | 20191ED | | OBJECT MARKER TY 3 | 1.00 | EACH | | $ | |
| 0290 | 20194ED | | REMOVE & RESET TRAFFIC SIGN | 1.00 | EACH | | $ | |
| 0300 | 20257NC | | SITE PREPARATION | 1.00 | LS | | $ | |
| 0310 | 20418ED | | REMOVE & RELOCATE SIGNS | 1.00 | EACH | | $ | |
| 0320 | 20419ND | | ROADWAY CROSS SECTION | 1.00 | EACH | | $ | |
| 0330 | 21590EN | | SOUND BARRIER WALL | 37,741.00 | SQFT | | $ | |

## Section: 0002 - DEMOBILIZATION

| LINE | BID CODE | ALT | DESCRIPTION | QUANTITY | UNIT | UNIT PRIC | FP | AMOUNT |
|---|---|---|---|---|---|---|---|---|
| 0340 | 02569 | | DEMOBILIZATION | 1.00 | LS | | $ | |