TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Steven L. Beshear
Governor

Michael W. Hancock, P.E.
Secretary

November 13, 2015

CALL NO. 301
CONTRACT ID NO. 151270
ADDENDUM # 1

Subject: Jefferson County, FD04 SPP 056 0265 013-015
Letting November 20, 2015

(1) Deleted – Pages 13-55 of 142
(2) Added – Notes – Pages 1-54 of 54

Proposal revisions are available at http://transportation.ky.gov/Construction-Procurement/.

If you have any questions, please contact us at 502-564-3500.

Sincerely,

Rachel Mills

Rachel Mills, P.E.
Director
Division of Construction Procurement

RM:ks
Enclosures

JEFFERSON COUNTY
Install Sound Barrier Wall on the North Side of I-265
Between Smyrna Parkway and Pennsylvania
Run Road
Item No. 5-8806.00
Project No. FD04 056 0265 013-015

TABLE OF CONTENTS

SOUND BARRIER WALL PROJECT DESCRIPTION

Project No. FD04 056 0265 013-015

The purpose of this project is to construct a sound barrier wall on the North side of I-265 (Gene Snyder) between Smyrna Parkway and Pennsylvania Run Road, as shown on the plan set. The project includes the following items:

- Installation of sound barrier wall which includes the design of the sound barrier wall with foundation; and
- Construction of drainage structures; and
- Maintaining and controlling traffic; and
- Other miscellaneous items defined in the plans, notes, and estimated bid item quantities.

GENERAL NOTES

Project No. FD04 056 0265 013-015

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 replace any existing signs as specified in the plan set.

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 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 WHOM 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 056 0265 013-015

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.

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 Temporary Easement 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 **"Maintenance of Traffic General Notes"** in the Roadway Plan Set.

SPECIAL NOTES FOR SOUND BARRIER WALLS

Project No. FD04 056 0265 013-015

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 the sound barrier wall and foundation design, 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, 7th Edition.

The **"Appendix"** to this Special Note contains the project specific requirements.

II. DESIGN

A. General

Furnish plans for sound barrier walls and drilled shaft foundations designed by a Registered Professional engineer licensed to practice in the Commonwealth of Kentucky. Design according to Section 15 of the AASHTO LRFD Bridge Design Specifications, and the Contract plans and documents. Design for an upstream surface condition of "Sparse Suburban".

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.

Design a free standing sound barrier wall finished on both sides. 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; spread footings or other type foundation designs will not be accepted unless otherwise specified in the geotechnical report.

B. Site Conditions

Be advised that Section 102.06 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 and the bottoms of footings and sound barrier walls are to be a minimum of two feet below finished grade unless otherwise shown on the contract plans or "**Appendix"**.

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. 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.

Submit three complete sets of the design calculations and five complete sets of the 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 (dowels, etc.) between panels. Include drilled shaft/alternative spread footing foundation design for axial and lateral loading. Show on the plans the drilled shaft/alternative spread footing 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 the Guide Specifications, AASHTO, this Special Note, and the Contract Documents. The design calculations, plans, details and dimensions may

not be completely checked. 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 drawings of the Contractor's approved plans to the Engineer in a .pdf format in accordance with KYTC requirements. 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 ten sets of reviewed and approved shop drawings 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 two copies 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

See the "**Appendix"** for permitted wall type and architectural treatment.

Precast Concrete Wall

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. Concrete panels shall be reinforced and designed to compensate for backfill loadings.

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. 'Uncoated Steel Bars for Prestressed Concrete'. Prestressing strands shall be seven wire strands conforming to ASTM A416, 'Uncoated Seven-wire Stress-Relieved Strand for Prestressed Concrete'.

Use drilled shafts as foundation unless an alternative foundation is allowed in the geotechnical report. 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. The Contractor will not be required to conduct a subsurface exploration as outlined in Section 3.5 of the Special Note for Drilled Shafts if an adequate subsurface exploration is conducted as outlined in Section II.D of this note.

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

Use epoxy coated steel dowels to provide positive horizontal alignment of panels coated in accordance with Section 811.10.

Provide positive means of alignment between panels. Use tongue and grove joints or steel dowels. If steel dowels are used at horizontal joints between panels, install no less than one dowel at the mid-point for panels up to 20 feet long and no less than two dowels at the third point for panels over 20 feet long.

Seal all joints between panels and between pilasters and panels to prevent sound leaks. Obtain the Engineer’s approval of the sealant before use.

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 or above the elevation of the top of the sound barrier shown on the contract plans.

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.

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. Clear and grub the minimum area required to construct the wall. Sound standing trees and shrubs within the construction limits shall be trimmed or removed only as directed or approved by the Engineer. The Engineer may direct minor alignment changes to avoid damage to existing trees or shrubs. Trim/Remove vegetation will be incidental to the site preparation bid item.

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

Site Preparation will be measured as Lump Sum. The work will include, but not be limited to, clearing and grubbing, incidental excavation, grading, backfilling, embankment, and ditching and shouldering; 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 and the Contractor shall make his own determination. Construct silt traps and temporary silt fence as directed by the Engineer. Perform all site preparation only as approved or directed by the Engineer. Other than the specific items listed, all site preparation work will be incidental to the lump sum bid for **Site Preparation**.

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

APPENDIX

Standard Specifications: Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, latest Edition.

AASHTO: AASHTO Standard Specifications for Highway Bridges, latest Edition with Current Interims.

Guide Specifications: AASHTO Guide Specifications for Structural Design of Barriers, latest Edition with Interims.

The Exposure Category is C.

The permitted Wall Type is precast concrete panels mounted on reinforced concrete pilasters, with drilled shaft foundation with an alternative spread footing foundation as specified by the geotechnical report.

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 using pigmentation matching Sherwin Williams HC Shield Plus Flat #7507 Stone Lion, matching the existing sound barrier walls along the south side of I-265 near the Smyrna Interchange, 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**.

SPECIAL NOTE FOR DRILLED SHAFTS

Project No. FD04 056 0265 013-015

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 2012 Standard Specifications for Road and Bridge Construction.

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 PAYMENT

The Department will not make separate payment for drilled shafts. All work to design and construct the drilled shafts will be incidental to Foundation Preparation.

SPECIAL NOTE FOR DISINCENTIVES

Project No. FD04 056 0265 013-015

Disincentives or liquidated damages in the amount of $3,000 will be assessed for the first hour or part of an hour a lane closure remains in place during periods prohibited by the Traffic Management Plan. Liquidated damages of $10,000 will be assessed for each hour thereafter:

Contrary to KYTC Standard Specification Section 108.09, liquidated damages will be assessed regardless of whether seasonal limitations prohibit the Contractor from performing work on the controlling operation.

All liquidated damages will be applied accumulatively.

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

PROJECT COMPLETION DATE

Project No. FD04 056 0265 013-015

The specified completion date for this project is **September 1, 2016.** See "**Special Note for Disincentives".**

STANDARD DRAWINGS

Project No. FD04 056 0265 013-015

RBI-001-10	TYPICAL GUARDRAIL INSTALLATIONS
RBI-002-06	TYPICAL GUARDRAIL INSTALLATIONS
RBI-003-08	TYPICAL INSTALLATION FOR GUARDRAIL END TREATMENT TYPE 2A
RBR-010-05	GUARARIL TERMINAL SECTIONS
RBR-016-04	GUARDRAIL POSTS
RBR-035-09	GUARDRAIL END TREATMENT TYPE 4A
RDB-005-08	DROP BOX INLET TYPE 5A-5B-5C-5D-5E & 5F
RDD-040-04	CHANNEL LINING CLASS II AND III
RDI-001-09	CULVERT, ENTRANCE & STORM SEWER PIPE TYPES & COVER HEIGHTS
RDI-020-08	PIPE BEDDING FOR CULVERTS, ENTRANCE AND STORM SEWER PIPE
RDI-021	PIPE BEDDING FOR CULVERTS, ENTRANCE AND STORM SEWER REINFORCED CONCRETE PIPE
RDI-025-04	PIPE BEDDING, TRENCH CONDITION
RDI-026	PIPE BEDDING, TRENCH CONDITION REINFORCED CONC. PIPE
RDI-035-01	COATINGS, LININGS AND PAVINGS FOR NON-STRUCTURAL PLATE PIPE
RDX-210-02	TEMPORARY SILT FENCE
RDX-230	SILT TRAP - TYPE C
TTC-115-02	LANE CLOSURE MULTI-LANE HIGHWAY CASE I
TTC-135-01	SHOULDER CLOSURE
TTD-120-01	WORK ZONE SPEED LIMITS & DOUBLE FINES

S-037-2015

cc: B. McKinney
R. Powell
T. Wright
J. Asher
E. Drury
B. Greene
A. Ulrich
T. Thompson

M E M O R A N D U M

TO: Mark Hite, P.E.
Division of Structural Design

FROM: Bart Asher, P.E.
Geotechnical Branch Manager

BY: Michael Carpenter, P.E. MC
Geotechnical Branch

DATE: August 20, 2015

SUBJECT: Jefferson County
Sound Barrier Wall; I-265 between
Smyrna Parkway and Pennsylvania Run Road
FD04 1100 056 0265 013-015 01D
MARS# 8955601D
Noise Barrier Wall
Item No. 05-8806.0
Geotechnical Engineering Structure Foundation Report

1.0 Introduction

This abbreviated geotechnical engineering structural foundation report addresses the geotechnical issues for the proposed design and construction of a sound barrier along the Smyrna exit ramp and the north side of I-265 between mileposts 13.5 and 14.3. This wall will be approximately 2820 feet long. The structure is located in the Brooks (#961) Geologic Quadrangle. The geologic mapping indicates that the bedrock at this site is part of the Louisville Limestone Formation.

2.0 Subsurface Conditions

Thirty-one borings were completed for this wall. Twenty of the holes were mechanical rockline soundings. Of the remaining holes six were soil sample and rock core holes and five were rock core holes. Limestone boulders and/or floaters were indicated in drillers long from station 857+00 through 874+20. The project site is located in an area considered to be karst intense. Some karst features were noted in the geologist logs and recoveries in some holes indicated weathered and solutioned features of the bedrock can be expected to extend to a depth of 0 to 3.4 feet below the top of rock.

The overburden depths for the wall varied widely along the length of the wall but can be roughly grouped as shown below:

Approximate Station	Soil Overburden Depth	Bedrock Elevation
846+00 to 854+40	0.5 to 3.5 feet	620 to 636 feet
854+40 to 866+00	9.5 to 34.5 feet	582 to 604 feet
866+00 to 874+20	2.0 to 14.0 feet	597 to 618 feet

Jefferson County
Item 5-8806.00
I-265 between Smyrna and Pennsylvania Run Road

Soil samples were determined to consist inorganic clay, gravelly and sandy clay, and inorganic silt. Using the Unified Classification System they were classified as CL, GC, SC and SM. In the AASHTO classification system the samples were designated as A-6, A-4, and A-2-6. The cores revealed brown to gray limestone. Some cores were pitted and marked with solutioning while others indicated shale partings and laminations. KY RQD's ranged from 32% to 90% and the percent of core recovery ranged from 69% to 100%.

3.0 Engineering Analysis

A drilled shaft foundation is proposed for the noise barrier wall foundation. The shafts will be founded into bedrock. The Idealized Soil and Bedrock Profile Sheet and the Drilled Shaft Axial Tables are attached. Recommendations are also provided for an alternate spread footing foundation along stations 846+00 to 854+40. Because of the structure type and pre-existing site conditions embankment stability and settlement analyses were not required.

4.0 Foundation Recommendations

4.1 Stations 846+00 through 854+40
Drilled shafts with the highest recommended tip embedded a minimum of 2 feet into sound bedrock. Evaluate the allowable axial capacities using the attached Drilled Shaft Axial Capacity Tables. Lower tip elevations may be necessary in order to satisfy lateral capacity or other structural requirements.

4.2 (Alternate Foundation 846+00 to 854+40):
Stations 846+00 through 848+80
Use a spread footing bearing either on granular replacement extended to sound bedrock or on sound bedrock. For granular replacement extended to sound bedrock size the footing at service limit state using a presumptive factored nominal bearing resistance of 8 ksf. On sound bedrock size the footing at service limit state using a presumptive factored nominal bearing resistance of 20 ksf. Contact this branch for a more detailed analysis if capacity issues arise.

Stations 848+80 through 854+40
Use a spread footing bearing on sound bedrock. Size the footing at service limit state using a presumptive factored nominal bearing resistance of 20 ksf. Contact this branch for a more detailed analysis if capacity issues arise.

4.3 Stations 854+40 through 874+20
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 below. Otherwise, evaluate the allowable axial capacities using the attached Drilled Shaft Axial Capacity Tables. Axial capacities obtained through soil may not be combined with capacities obtained through bedrock. Refer to General Note 5.1 and Plan Note 6.3 below for a discussion of variability in the rockline and its impact on shaft design and construction.

Jefferson County
Item 5-8806.00
I-265 between Smyrna and Pennsylvania Run Road

Summary of Capacities in Soil for 15' Drilled Shafts Plus Incremental Nominal Side Resistance per Additional Foot of Embedment							
Diameter (feet)	End Bearing (kips)	Side Resistance (kips)	End Bearing Factored (kips)	Side Resistance Factored (kips)	Uplift Resistance Facored (kips)	Available Factored Side Resistance Per Foot of Additional Embedment	
						Side (kips)	Uplift (kips)
1.5	9.94	27.54	3.98	12.39	9.64	1.46	1.13
2	17.67	34.56	7.07	15.55	12.10	1.94	1.51
2.5	27.61	40.50	11.04	18.22	14.17	2.43	1.89
3	39.76	45.36	15.90	20.41	15.87	2.92	2.27
Calculation Notes: Top 5 (feet) and bottom 1 Diameter (feet) are neglected Capacities through soil must be neglected if rock socket is utilized End Bearing Resistance has been reduced due to greater magnitude of settlement required for mobilization Resistance Factors: Side = 0.45; End = 0.40; Uplift = 0.35							

5.0 General for Stations 846+00 through 874+20 (Entire Wall)

5.1 The rock line along the proposed wall was found to be variable (particularly after station 854+40). It is possible that assumed 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:

Soil supported shafts:
If bedrock is encountered above the minimum shaft length of 15 feet the contractor shall provide a 2 foot rock socket. In these cases the design axial capacities of the piles can be conservatively assumed to be met. Lateral support conditions should still be verified and approved by the wall design consultant.

Bedrock supported shafts:
If bedrock is below the anticipated excavation depth the contractor must extend the shaft to bedrock in order provide the required socket length unless the wall design consultant considers and approves the corresponding reduction in axial and lateral capacity.

5.2 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.

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

5.4 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.

Jefferson County
Item 5-8806.00
I-265 between Smyrna and Pennsylvania Run Road

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

5.6 Evidence of karst features were noted in the core samples obtained during drilling. This project is located in a site considered to be karst intense. There is a potential to encounter unsound bedrock or for concrete loss during shaft construction. The contractor should be prepared to address this potential complication. Remedies could include: extended shaft lengths, pouring of lean concrete and re-drilling for structural concrete after setup, and permanent casing extended through unsound portion of the rock socket.

5.7 A double 16'x5' RCBC is located from approx. wall stations 858+93 through 859+27. Depending on the final design shaft length the wall panel placement may need to be adjusted to ensure the existing culvert does not interfere with shaft construction. No additional measures will be required.

5.8 If temporary casing is selected for use during construction there is a potential for construction problems due boulders and limestone fragments observed from stations 857+00 through 874+20. Primarily this will manifest as concrete loss or shaft degradation due to soil slaking that occurs as temporary casing is being pulled. In these instances permanent casing will be required to ensure shaft integrity. Regardless of shaft installation methodology a bid item for some permanent casing should be established to cover this potential expense.

5.9 Sound Barrier 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 panel and foundation designs are required in order to safely construct a hybrid retaining / sound barrier 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.

6.0 Plan Notes:

6.1 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. In shallow overburden, unsupported excavation or some other shoring method may be utilized at the contractor's discretion. Boulders and limestone fragments were observed from stations 857+00 through 874+20. Boulders or rock fragments encountered in embankment can result in concrete loss or shaft degradation due to soil slaking that occurs as temporary casing is being pulled. In these instances permanent casing will be required to ensure shaft integrity.

Jefferson County
Item 5-8806.00
I-265 between Smyrna and Pennsylvania Run Road

6.2 Except as permitted by special design sound barrier 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.

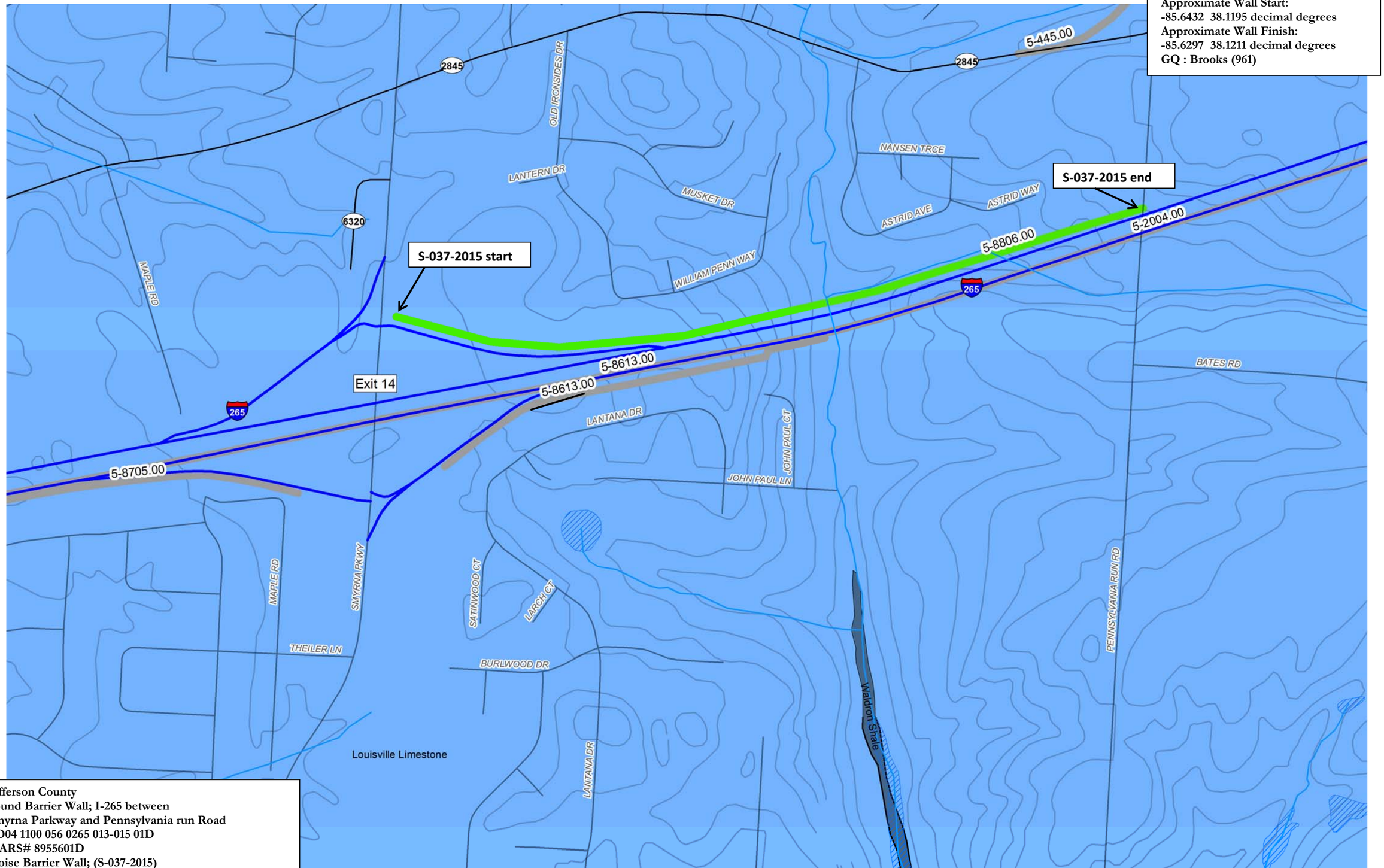
6.3 Due to variability in the rockline the potential for field adjustments in shaft lengths shall be addressed in the following manner:

Soil supported shafts:
If bedrock is encountered above the required shaft length, continue with rock excavation to provide a 2 foot rock socket. Lateral support conditions shall be verified and approved by the wall design consultant.

Bedrock supported shafts:
If bedrock is below the anticipated excavation depth, extend the shaft excavation to bedrock and provide the required socket length. Reductions to the required socket length may only be approved by the wall design consultant after considering the corresponding reduction in axial and lateral capacity.

Attachments:

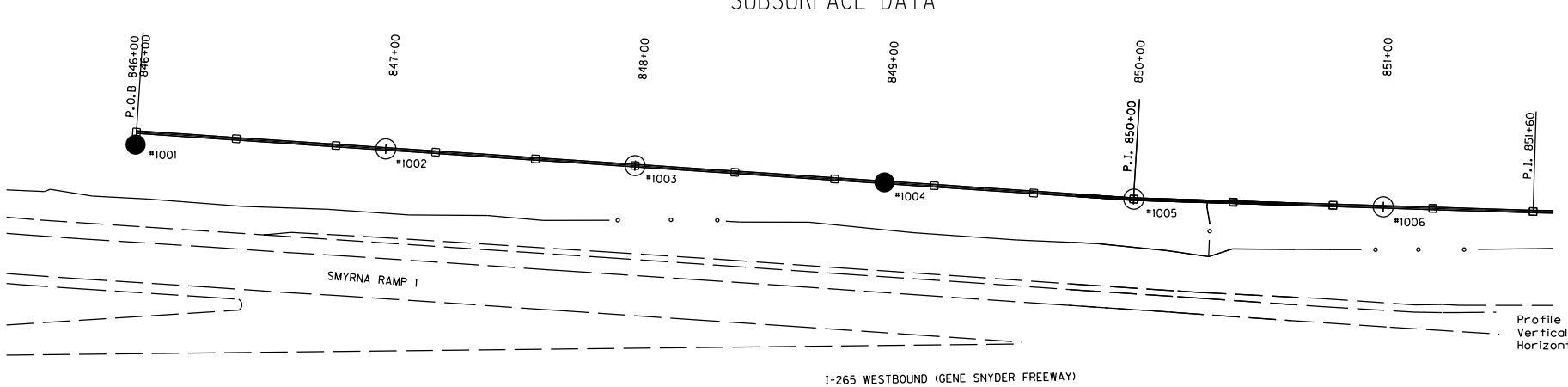
- Project Location Map
- Subsurface Data Sheets
- Idealized Soil and Bedrock Profile Sheets
- Coordinate Data Sheet



Jefferson County
Sound Barrier Wall; I-265 between
Smyrna Parkway and Pennsylvania run Road
FD04 1100 056 0265 013-015 01D
MARS# 8955601D
Noise Barrier Wall; (S-037-2015)
Item No. 05-8806.00
Geotechnical Engineering Structure Foundation Report

SUBSURFACE DATA

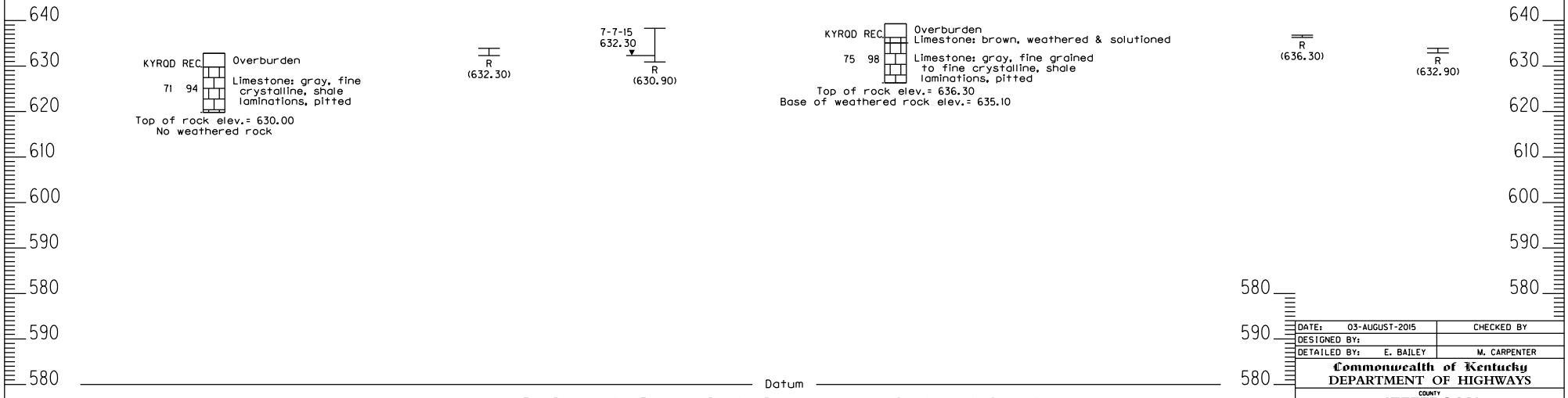
Plan Scale 1" = 20'



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

I-265 WESTBOUND (GENE SNYDER FREEWAY)

Hole No.	1001	1002	1003	1004	1005	1006
Station	846+00.00	847+00.00	848+00.00	849+00.00	850+00.00	851+00.00
Offset	5.00 ft. Rt.	4.00 ft. Rt.	℄	℄	℄	℄
Elev. (NAVD 88 datum)	633.00	633.90	638.30	639.30	636.80	633.90



The Presumptive Factored Bearing Resistance at the Service Limit State is
20 ksf for Spread Footings on Competent Unweathered Bedrock

DATE: 03-AUGUST-2015	CHECKED BY
DESIGNED BY:	
DETAILED BY: E. BAILEY	M. CARPENTER

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS

COUNTY: JEFFERSON

ROUTE: I-265 | CROSSING: Sound Barrier Wall

SUBSURFACE DATA

PREPARED BY: Division of Structural Design
GEOTECHNICAL BRANCH

SHEET NO.

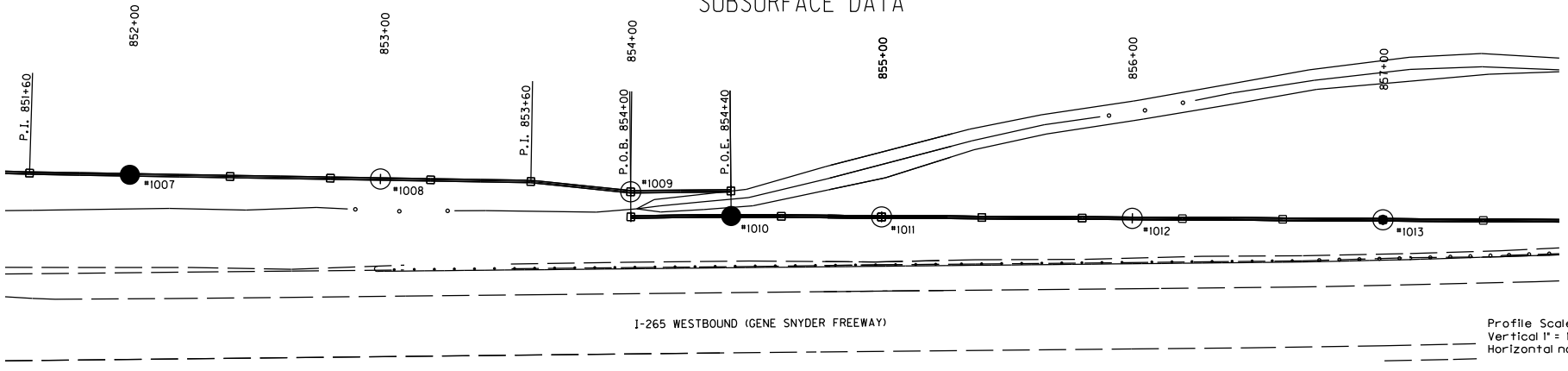
DRAWING NO. 00000

S-037-15
ITEM NUMBER
5-8806.00

SHEET LOCATION:
FILE NAME: $$$$design$file$specification$$$$
USERNAME: $$$$USER$$$$
DATE: $$$$DATE$$$$
E-SHEET NAME:

SUBSURFACE DATA

Plan Scale 1" = 20'



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

Hole No.	1007	1008	1009	1010	1011	1012	1013
Station	852+00.00	853+00.00	854+00.00	854+40.00	855+00.00	856+00.00	857+00.00
Offset	℄	℄	℄	℄	℄	℄	℄
Elev. (NAVD 88 datum)	629.50	625.60	621.90	620.40	618.70	617.70	616.60

640 630 620 610 600 590 580

KYROD REC. 75 93 — Overburden; Cored Overburden; Limestone: gray, fine grained to fine crystalline, shale laminations, pitted, some solutioning
Top of rock elev.= 627.20
No weathered rock

R (622.80)

R (620.30)

KYROD REC. 82 92 — Overburden; Cored Overburden; Limestone: gray, fine grained to fine crystalline, pitted, some solutioning
Top of rock elev.= 616.80
No weathered rock

R (600.20)

7-7-15
606.70

R (600.70)

D_{50} (mm) w% LI

N=18
0.082 14 -0.28 A-6(3),SC,S+C=48(29+19)
N=19
KYROD REC. N=50/0.5 Cored Overburden
55 83 Limestone: brown, solutioned, broken & fractured at top; Limestone: tan, micro crystalline, pitted, shale laminations
51 95 Limestone: gray, fine grained to fine crystalline, shale laminations
Top of rock elev.= 597.10
Base of weathered rock elev.= 594.90

640 630 620 610 600 590 580

590 580

Datum

The Presumptive Factored Bearing Resistance at the Service Limit State is 20 ksf for Spread Footings on Competent Unweathered Bedrock

DATE:	03-AUGUST-2015	CHECKED BY
DESIGNED BY:		
DETAILED BY:	E. BAILEY	M. CARPENTER

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS

COUNTY: JEFFERSON

ROUTE: I-265 | CROSSING: Sound Barrier Wall

SUBSURFACE DATA

PREPARED BY: Division of Structural Design
GEOTECHNICAL BRANCH

SHEET NO.

DRAWING NO. 00000

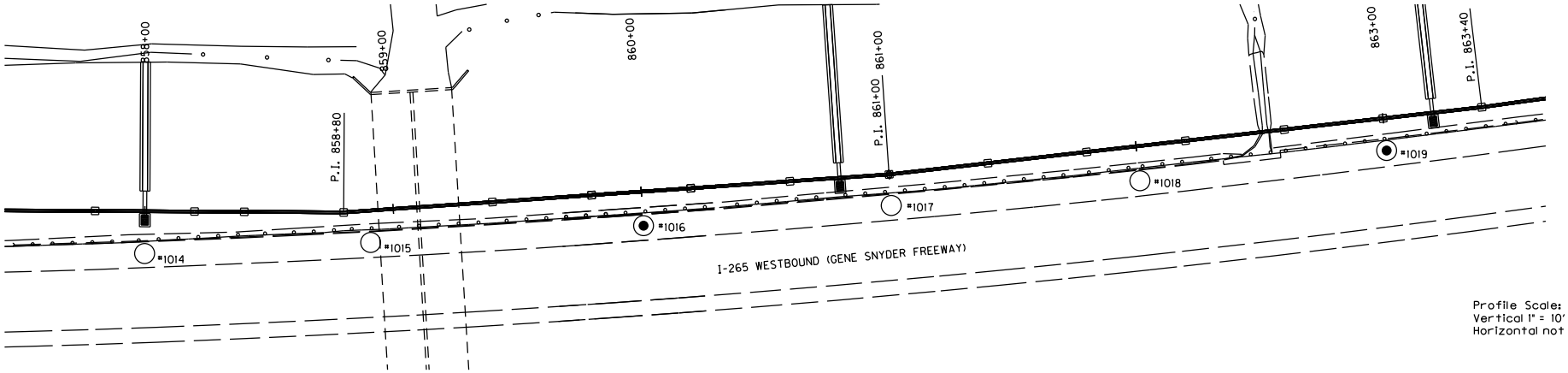
S-037-15

ITEM NUMBER: 5-8806.00

SHEET LOCATION:
FILE NAME: $$$$designsfile$specification$$$$
USERNAME: $$$$USER$$$$
DATE: $$$$DATE$$$$
E-SHEET NAME:

SUBSURFACE DATA

Plan Scale 1" = 20'



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

Hole No.	1014	1015	1016	1017	1018	1019
Station	858+00.00	858+90.00	860+00.00	861+00.00	862+00.00	863+00.00
Offset	17.00 ft. Rt.	12.80 ft. Rt.	13.70 ft. Rt.	12.50 ft. Rt.	13.90 ft. Rt.	13.00 ft. Rt.
Elev. (NAVD 88 datum)	616.90	617.00	615.90	615.70	613.90	613.70

640 630 620 610 600 590 580

7-7-15
DRY
R
(598.40)

R
(582.50)

UU (psf)	D_{50} (mm)	w%	LI	
	0.451	4	-1.59	A-4(0), SC, S+C=37(27+10)
				N=24
	5.553	18	-0.04	A-2-6(2), GC, S+C=35(21+14)
	0.159	9	-0.52	A-6(4), GC, S+C=47(27+20)
				N=24
	0.103	18		A-4(0), SM, S+C=44(34+10)
				N=40
2535	0.023	23	0.24	A-4(4), CL, S+C=68(56+12)
		KYROD	REC	
		89	97	Limestone: gray, fine grained to fine crystalline, pitted, solutioning, shale partings

Top of rock elev.= 582.40
No weathered rock

R
(599.90)

R
(601.90)

D_{50} (mm)	w%	LI	
0.010	23	0.16	A-4(5), CL-ML, S+C=97(85+12)
4.055	12	-0.41	N=17, A-2-6(0), GC-GM, S+C=21(16+5)
0.262	8	-0.73	A-6(2), GC, S+C=43(33+10)
0.267	8	-0.67	N=22, A-6(2), SC, S+C=43(30+13)
			N=74
2.060	24	0.84	A-2-4(0), SC, S+C=27(17+10)
KYROD	REC		N=50/0.5
			Cored Overburden
32	69		Limestone: gray, fine grained fractured
			Limestone: gray, fine grained to fine crystalline, shale laminations
70	98		Limestone: gray, fine grained to fine crystalline, pitted, some solutioning

Top of rock elev.= 592.10
Base of weathered rock elev.= 588.70

Datum

The Presumptive Factored Bearing Resistance at the Service Limit State is
20 ksf for Spread Footings on Competent Unweathered Bedrock

DATE:	03-AUGUST-2015
DESIGNED BY:	
DETAILED BY:	E. BAILEY
CHECKED BY	M. CARPENTER

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS

COUNTY: JEFFERSON

ROUTE: I-265

CROSSING: Sound Barrier Wall

SUBSURFACE DATA

PREPARED BY: Division of Structural Design
GEOTECHNICAL BRANCH

SHEET NO.

DRAWING NO. 00000

S-037-15

ITEM NUMBER

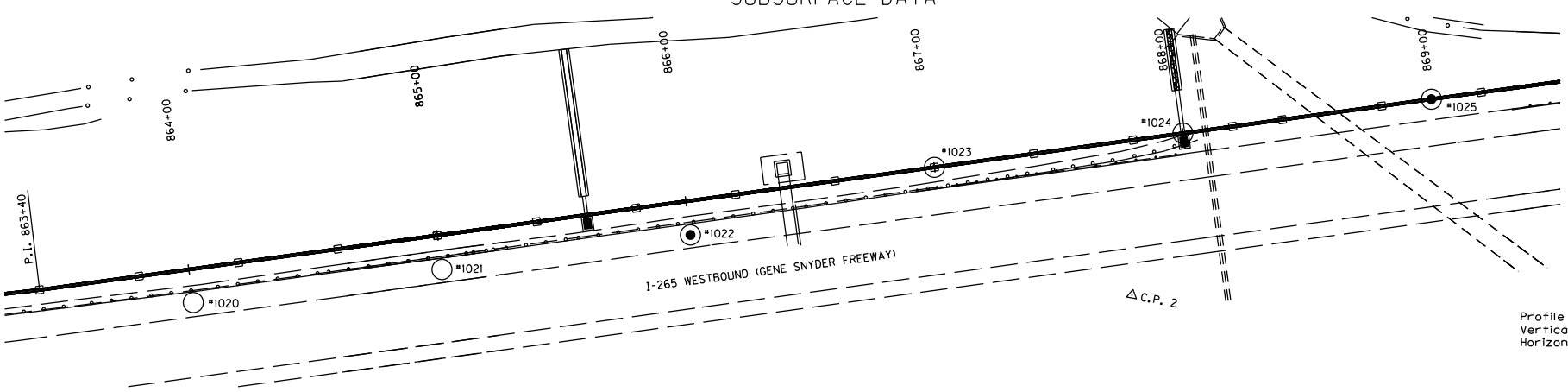
5-8806.00

SHEET LOCATION:
FILE NAME: $$$$design$file$specification$$$$
USERNAME: $$$$USER$$$$
DATE: $$$$DATE$$$$
E-SHEET NAME:

SHEET LOCATION:
FILE NAME: $$$$design$$file$$specification$$$$
USERNAME: $$$$USER$$$$
DATE: $$$$DATE$$$$
E-SHEET NAME:

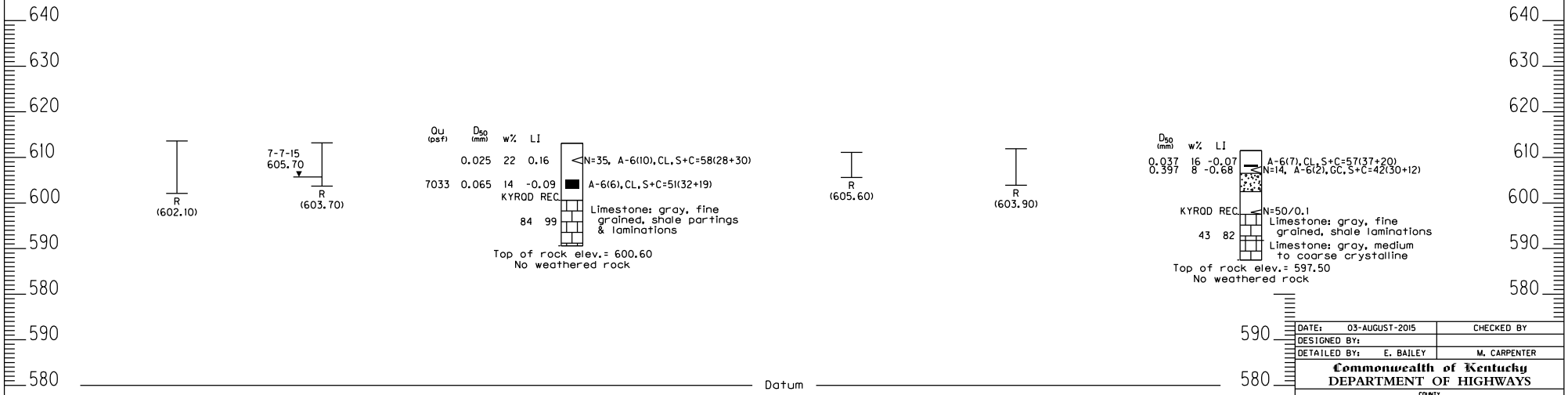
SUBSURFACE DATA

Plan Scale 1" = 20'



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

Hole No.	1020	1021	1022	1023	1024	1025
Station	864+00.00	865+00.00	866+00.00	867+00.00	868+00.00	869+00.00
Offset	13.30 ft. Rt.	13.70 ft. Rt.	13.50 ft. Rt.	℄	℄	℄
Elev. (NAVD 88 datum)	613.60	613.20	613.10	611.10	611.90	611.50



The Presumptive Factored Bearing Resistance at the Service Limit State is
20 ksf for Spread Footings on Competent Unweathered Bedrock

DATE: 03-AUGUST-2015	CHECKED BY
DESIGNED BY:	
DETAILED BY: E. BAILEY	M. CARPENTER

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS

COUNTY: JEFFERSON

ROUTE: I-265 | CROSSING: Sound Barrier Wall

SUBSURFACE DATA

S-037-15

ITEM NUMBER: 5-8806.00

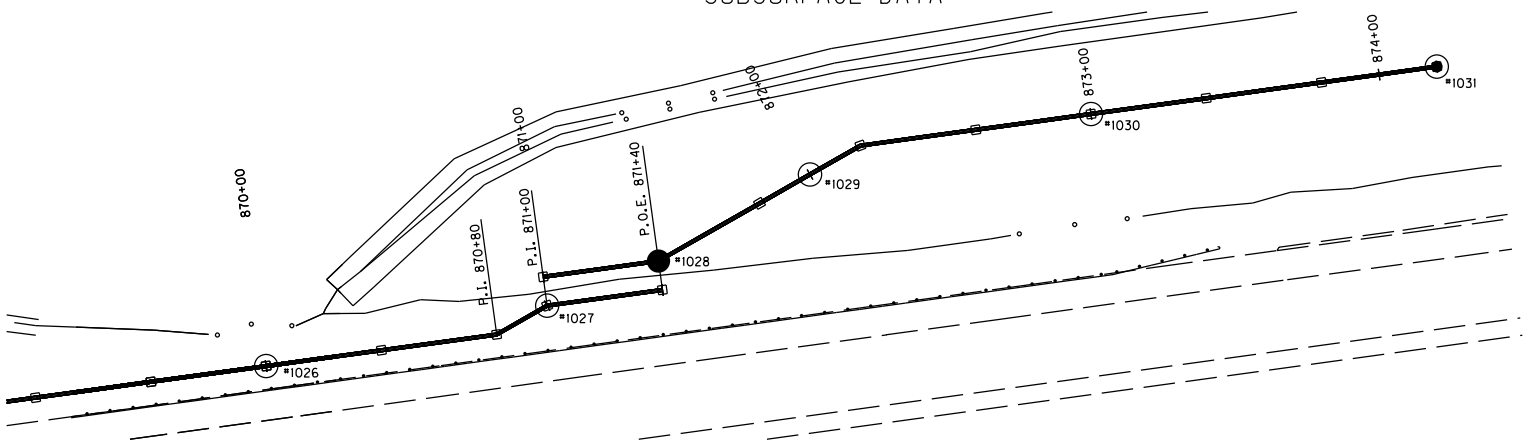
PREPARED BY: Division of Structural Design
GEOTECHNICAL BRANCH

SHEET NO.

DRAWING NO. 00000

SUBSURFACE DATA

Plan Scale 1" = 20'



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

Hole No.	1026	1027	1028	1029	1030	1031
Station	870+00.00	871+00.00	871+40.00	872+00.00	873+00.00	874+20.00
Offset	℄	℄	℄	℄	℄	℄
Elev. (NAVD 88 datum)	611.80	611.30	611.60	617.60	622.80	626.90

7-7-15
DRY
R
(602.80)

R
(609.30)

KYROD REC.
54 98
Overburden
Limestone: brown, fine to medium crystalline, heavy pitting & solutioning throughout
Limestone: gray, fine grained to fine crystalline, pitted, shale laminations
Top of rock elev.= 608.50
No weathered rock

R
(612.60)

7-7-15
DRY
R
(617.80)

Q_U (psf)	D_{50} (mm)	w%	LI	
9481	0.005	18	-0.14	A-7-6(24), CL, S+C=94(61+33)
6493	0.004	19	-0.19	A-7-6(24), CL, S+C=94(53+41)
	0.143	15		

KYROD REC.
N=50/0.5, A-2-4(0), SM, S+C=31(26+5)
71 98
90 100
Limestone: gray, fine grained to medium crystalline, pitted, solutioned
Top of rock elev.= 612.90
Base of weathered rock elev.= 611.50

640 630 620 610 600 590 580

Datum

The Presumptive Factored Bearing Resistance at the Service Limit State is 20 ksf for Spread Footings on Competent Unweathered Bedrock

DATE:	03-AUGUST-2015
DESIGNED BY:	
DETAILED BY:	E. BAILEY
CHECKED BY	M. CARPENTER

Commonwealth of Kentucky
DEPARTMENT OF HIGHWAYS

COUNTY: JEFFERSON

ROUTE: I-265

CROSSING: Sound Barrier Wall

SUBSURFACE DATA

PREPARED BY: Division of Structural Design
GEOTECHNICAL BRANCH

SHEET NO.

DRAWING NO. 00000

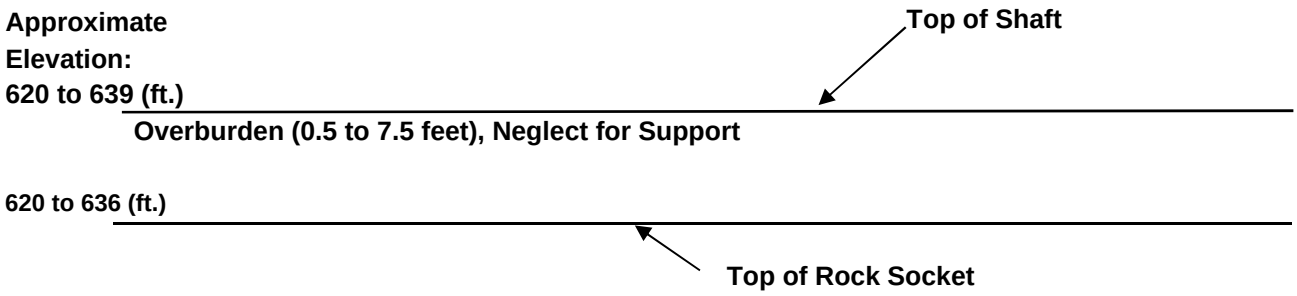
S-037-15
ITEM NUMBER
5-8806.00

SHEET LOCATION:
FILE NAME: $$$$designs$filespecification$$$$
USERNAME: $$$$USER$$$$
DATE: $$$$DATE$$$$
E-SHEET NAME:

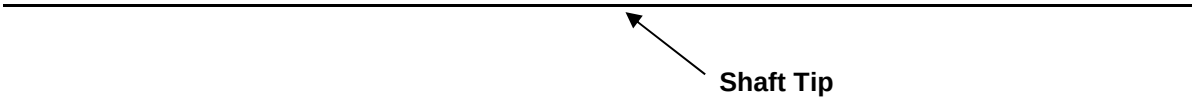
IDEALIZED SOIL AND BEDROCK PROFILE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 846+00 through 854+40

DPB 7/20/2007



Strata		Parameters for Lateral Load Analyses		
Limestone		Strong Rock (Vuggy Limestone)		
γ_t (lb/ft^3) =	140	Effective Unit Weight,	γ_e (lb/in^3) =	0.081
q_u (psi) =	4000	Elastic Modulus,	E_r (psi) =	400,000
q_{eb} (ksf) =	120	Uniaxial Compressive Strength,	q_u (psi) =	4000
f_s (ksf) =	21.2	Cohesive Strength,	c_u (psi) =	2000



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

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 846+00 through 854+40

Rock Socket Diameter = 1.5 feet
Rock Socket Diameter = 18 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	100	212	50	106	156	40
>>> 2.0	21.2	120	200	212	100	106	206	80
3.0	21.2	120	300	212	150	106	256	120
4.0	21.2	120	400	212	200	106	306	160
5.0	21.2	120	500	212	250	106	356	200
6.0	21.2	120	600	212	300	106	406	240
7.0	21.2	120	700	212	350	106	456	280
8.0	21.2	120	800	212	400	106	506	320
9.0	21.2	120	900	212	450	106	556	360
10.0	21.2	120	1000	212	500	106	606	400
11.0	21.2	120	1101	212	550	106	656	440
12.0	21.2	120	1201	212	600	106	706	480
13.0	21.2	120	1301	212	650	106	756	520
14.0	21.2	120	1401	212	700	106	806	560
15.0	21.2	120	1501	212	750	106	856	600
16.0	21.2	120	1601	212	800	106	906	640
17.0	21.2	120	1701	212	850	106	956	680
18.0	21.2	120	1801	212	900	106	1006	720
19.0	21.2	120	1901	212	950	106	1056	760
20.0	21.2	120	2001	212	1000	106	1107	800
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 1.5

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 846+00 through 854+40

Rock Socket Diameter = 2.0 feet
Rock Socket Diameter = 24 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	133	377	67	188	255	53
>>> 2.0	21.2	120	267	377	133	188	322	107
3.0	21.2	120	400	377	200	188	389	160
4.0	21.2	120	534	377	267	188	455	213
5.0	21.2	120	667	377	333	188	522	267
6.0	21.2	120	800	377	400	188	589	320
7.0	21.2	120	934	377	467	188	655	374
8.0	21.2	120	1067	377	534	188	722	427
9.0	21.2	120	1201	377	600	188	789	480
10.0	21.2	120	1334	377	667	188	855	534
11.0	21.2	120	1467	377	734	188	922	587
12.0	21.2	120	1601	377	800	188	989	640
13.0	21.2	120	1734	377	867	188	1056	694
14.0	21.2	120	1868	377	934	188	1122	747
15.0	21.2	120	2001	377	1000	188	1189	800
16.0	21.2	120	2134	377	1067	188	1256	854
17.0	21.2	120	2268	377	1134	188	1322	907
18.0	21.2	120	2401	377	1201	188	1389	960
19.0	21.2	120	2535	377	1267	188	1456	1014
20.0	21.2	120	2668	377	1334	188	1522	1067
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 2.0

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 846+00 through 854+40

Rock Socket Diameter = 2.5 feet
Rock Socket Diameter = 30 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	167	589	83	295	378	67
>>> 2.0	21.2	120	333	589	167	295	461	133
3.0	21.2	120	500	589	250	295	545	200
4.0	21.2	120	667	589	333	295	628	267
5.0	21.2	120	834	589	417	295	711	333
6.0	21.2	120	1000	589	500	295	795	400
7.0	21.2	120	1167	589	584	295	878	467
8.0	21.2	120	1334	589	667	295	962	534
9.0	21.2	120	1501	589	750	295	1045	600
10.0	21.2	120	1667	589	834	295	1128	667
11.0	21.2	120	1834	589	917	295	1212	734
12.0	21.2	120	2001	589	1000	295	1295	800
13.0	21.2	120	2168	589	1084	295	1378	867
14.0	21.2	120	2334	589	1167	295	1462	934
15.0	21.2	120	2501	589	1251	295	1545	1000
16.0	21.2	120	2668	589	1334	295	1629	1067
17.0	21.2	120	2835	589	1417	295	1712	1134
18.0	21.2	120	3001	589	1501	295	1795	1201
19.0	21.2	120	3168	589	1584	295	1879	1267
20.0	21.2	120	3335	589	1667	295	1962	1334
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 2.5

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 846+00 through 854+40

Rock Socket Diameter = 3.0 feet
Rock Socket Diameter = 36 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	167	589	83	295	378	67
>>> 2.0	21.2	120	333	589	167	295	461	133
3.0	21.2	120	500	589	250	295	545	200
4.0	21.2	120	667	589	333	295	628	267
5.0	21.2	120	834	589	417	295	711	333
6.0	21.2	120	1000	589	500	295	795	400
7.0	21.2	120	1167	589	584	295	878	467
8.0	21.2	120	1334	589	667	295	962	534
9.0	21.2	120	1501	589	750	295	1045	600
10.0	21.2	120	1667	589	834	295	1128	667
11.0	21.2	120	1834	589	917	295	1212	734
12.0	21.2	120	2001	589	1000	295	1295	800
13.0	21.2	120	2168	589	1084	295	1378	867
14.0	21.2	120	2334	589	1167	295	1462	934
15.0	21.2	120	2501	589	1251	295	1545	1000
16.0	21.2	120	2668	589	1334	295	1629	1067
17.0	21.2	120	2835	589	1417	295	1712	1134
18.0	21.2	120	3001	589	1501	295	1795	1201
19.0	21.2	120	3168	589	1584	295	1879	1267
20.0	21.2	120	3335	589	1667	295	1962	1334
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 3.0

IDEALIZED SOIL AND BEDROCK PROFILE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 854+40 through 866+00

DPB 7/20/2007

Approximate Elevation:

Top of Shaft

613 to 619 (ft.) — Parameters for Lateral Load Analyses

Fill Material / Overburden, with Boulders From Station 857+00

Stiff Clay without freewater

γ_t (lb/ft^3) =	125	Effective Unit Weight, γ_e (lb/in^3) =	0.072
γ_e (lb/ft^3) =	125	Cohesive Strength, C_u (psi) =	8.6
C_u (psf) =	1250	Soil Strain Parameter, ε_{50} =	0.007
		Soil Modulus Parameter, K (lb/in^3)=	500

605 (ft.) ▽

Stiff Clay with freewater

γ_t (lb/ft^3) =	125	Effective Unit Weight, γ_e (lb/in^3) =	0.036
γ_e (lb/ft^3) =	62.6	Cohesive Strength, C_u (psi) =	8.6
C_u (psf) =	1250	Soil Strain Parameter, ε_{50} =	0.007
		Soil Modulus Parameter, K (lb/in^3)=	500

582 to 604 (ft.)

Top of Rock Socket

Strata		**Parameters for Lateral Load Analyses**		
Limestone		**Strong Rock (Vuggy Limestone)**		
γ_t (lb/ft^3) =	140	Effective Unit Weight,	γ_e (lb/in^3) =	0.081
q_u (psi) =	4000	Elastic Modulus,	E_r (psi) =	400,000
q_{eb} (ksf) =	120	Uniaxial Compressive Strength,	q_u (psi) =	4000
f_s (ksf) =	21.2	Cohesive Strength,	c_u (psi) =	2000

Shaft Tip

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

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 854+40 through 866+00

Rock Socket Diameter = 1.5 feet
Rock Socket Diameter = 18 inches **DPB 7/20/2007**

	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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
	0.0								
	1.0	21.2	120	100	212	50	106	156	40
>>>	2.0	21.2	120	200	212	100	106	206	80
	3.0	21.2	120	300	212	150	106	256	120
	4.0	21.2	120	400	212	200	106	306	160
	5.0	21.2	120	500	212	250	106	356	200
	6.0	21.2	120	600	212	300	106	406	240
	7.0	21.2	120	700	212	350	106	456	280
	8.0	21.2	120	800	212	400	106	506	320
	9.0	21.2	120	900	212	450	106	556	360
	10.0	21.2	120	1000	212	500	106	606	400
	11.0	21.2	120	1101	212	550	106	656	440
	12.0	21.2	120	1201	212	600	106	706	480
	13.0	21.2	120	1301	212	650	106	756	520
	14.0	21.2	120	1401	212	700	106	806	560
	15.0	21.2	120	1501	212	750	106	856	600
	16.0	21.2	120	1601	212	800	106	906	640
	17.0	21.2	120	1701	212	850	106	956	680
	18.0	21.2	120	1801	212	900	106	1006	720
	19.0	21.2	120	1901	212	950	106	1056	760
	20.0	21.2	120	2001	212	1000	106	1107	800
AASHTO Table 10.5.5.2.4-1				Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 1.5

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 854+40 through 866+00

Rock Socket Diameter = 2.0 feet
Rock Socket Diameter = 24 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	133	377	67	188	255	53
>>> 2.0	21.2	120	267	377	133	188	322	107
3.0	21.2	120	400	377	200	188	389	160
4.0	21.2	120	534	377	267	188	455	213
5.0	21.2	120	667	377	333	188	522	267
6.0	21.2	120	800	377	400	188	589	320
7.0	21.2	120	934	377	467	188	655	374
8.0	21.2	120	1067	377	534	188	722	427
9.0	21.2	120	1201	377	600	188	789	480
10.0	21.2	120	1334	377	667	188	855	534
11.0	21.2	120	1467	377	734	188	922	587
12.0	21.2	120	1601	377	800	188	989	640
13.0	21.2	120	1734	377	867	188	1056	694
14.0	21.2	120	1868	377	934	188	1122	747
15.0	21.2	120	2001	377	1000	188	1189	800
16.0	21.2	120	2134	377	1067	188	1256	854
17.0	21.2	120	2268	377	1134	188	1322	907
18.0	21.2	120	2401	377	1201	188	1389	960
19.0	21.2	120	2535	377	1267	188	1456	1014
20.0	21.2	120	2668	377	1334	188	1522	1067
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 2.0

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 854+40 through 866+00

Rock Socket Diameter = 2.5 feet
Rock Socket Diameter = 30 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	167	589	83	295	378	67
>>> 2.0	21.2	120	333	589	167	295	461	133
3.0	21.2	120	500	589	250	295	545	200
4.0	21.2	120	667	589	333	295	628	267
5.0	21.2	120	834	589	417	295	711	333
6.0	21.2	120	1000	589	500	295	795	400
7.0	21.2	120	1167	589	584	295	878	467
8.0	21.2	120	1334	589	667	295	962	534
9.0	21.2	120	1501	589	750	295	1045	600
10.0	21.2	120	1667	589	834	295	1128	667
11.0	21.2	120	1834	589	917	295	1212	734
12.0	21.2	120	2001	589	1000	295	1295	800
13.0	21.2	120	2168	589	1084	295	1378	867
14.0	21.2	120	2334	589	1167	295	1462	934
15.0	21.2	120	2501	589	1251	295	1545	1000
16.0	21.2	120	2668	589	1334	295	1629	1067
17.0	21.2	120	2835	589	1417	295	1712	1134
18.0	21.2	120	3001	589	1501	295	1795	1201
19.0	21.2	120	3168	589	1584	295	1879	1267
20.0	21.2	120	3335	589	1667	295	1962	1334
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 2.5

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 854+40 through 866+00

Rock Socket Diameter = 3.0 feet
Rock Socket Diameter = 36 inches **DPB 7/20/2007**

	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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
	0.0								
	1.0	21.2	120	200	848	100	424	524	80
>>>	2.0	21.2	120	400	848	200	424	624	160
	3.0	21.2	120	600	848	300	424	724	240
	4.0	21.2	120	800	848	400	424	824	320
	5.0	21.2	120	1000	848	500	424	924	400
	6.0	21.2	120	1201	848	600	424	1024	480
	7.0	21.2	120	1401	848	700	424	1124	560
	8.0	21.2	120	1601	848	800	424	1225	640
	9.0	21.2	120	1801	848	900	424	1325	720
	10.0	21.2	120	2001	848	1000	424	1425	800
	11.0	21.2	120	2201	848	1101	424	1525	880
	12.0	21.2	120	2401	848	1201	424	1625	960
	13.0	21.2	120	2601	848	1301	424	1725	1041
	14.0	21.2	120	2801	848	1401	424	1825	1121
	15.0	21.2	120	3001	848	1501	424	1925	1201
	16.0	21.2	120	3202	848	1601	424	2025	1281
	17.0	21.2	120	3402	848	1701	424	2125	1361
	18.0	21.2	120	3602	848	1801	424	2225	1441
	19.0	21.2	120	3802	848	1901	424	2325	1521
	20.0	21.2	120	4002	848	2001	424	2425	1601
AASHTO Table 10.5.5.2.4-1				Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 3.0

IDEALIZED SOIL AND BEDROCK PROFILE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 866+00 through 874+20

DPB 7/20/2007

Approximate Elevation:

Top of Shaft

611 to 627 (ft.)

Parameters for Lateral Load Analyses

Fill Material with Boulders / Overburden

Stiff Clay without freewater

γ_t (lb/ft^3) =	125	Effective Unit Weight, γ_e (lb/in^3) =	0.072
γ_e (lb/ft^3) =	125	Cohesive Strength, C_u (psi) =	8.6
C_u (psf) =	1250	Soil Strain Parameter, ε_{50} =	0.007
		Soil Modulus Parameter, K (lb/in^3)=	500

597 to 618 (ft.)

Top of Rock Socket

Strata — **Parameters for Lateral Load Analyses**

Limestone — **Strong Rock (Vuggy Limestone)**

γ_t (lb/ft^3) =	140	Effective Unit Weight,	γ_e (lb/in^3) =	0.081
q_u (psi) =	4000	Elastic Modulus,	E_r (psi) =	400,000
q_{eb} (ksf) =	120	Uniaxial Compressive Strength,	q_u (psi) =	4000
f_s (ksf) =	21.2	Cohesive Strength,	c_u (psi) =	2000

Shaft Tip

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

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 866+00 through 874+20

Rock Socket Diameter = 1.5 feet
Rock Socket Diameter = 18 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	100	212	50	106	156	40
>>> 2.0	21.2	120	200	212	100	106	206	80
3.0	21.2	120	300	212	150	106	256	120
4.0	21.2	120	400	212	200	106	306	160
5.0	21.2	120	500	212	250	106	356	200
6.0	21.2	120	600	212	300	106	406	240
7.0	21.2	120	700	212	350	106	456	280
8.0	21.2	120	800	212	400	106	506	320
9.0	21.2	120	900	212	450	106	556	360
10.0	21.2	120	1000	212	500	106	606	400
11.0	21.2	120	1101	212	550	106	656	440
12.0	21.2	120	1201	212	600	106	706	480
13.0	21.2	120	1301	212	650	106	756	520
14.0	21.2	120	1401	212	700	106	806	560
15.0	21.2	120	1501	212	750	106	856	600
16.0	21.2	120	1601	212	800	106	906	640
17.0	21.2	120	1701	212	850	106	956	680
18.0	21.2	120	1801	212	900	106	1006	720
19.0	21.2	120	1901	212	950	106	1056	760
20.0	21.2	120	2001	212	1000	106	1107	800
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 1.5

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 866+00 through 874+20

Rock Socket Diameter = 2.0 feet
Rock Socket Diameter = 24 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	133	377	67	188	255	53
>>> 2.0	21.2	120	267	377	133	188	322	107
3.0	21.2	120	400	377	200	188	389	160
4.0	21.2	120	534	377	267	188	455	213
5.0	21.2	120	667	377	333	188	522	267
6.0	21.2	120	800	377	400	188	589	320
7.0	21.2	120	934	377	467	188	655	374
8.0	21.2	120	1067	377	534	188	722	427
9.0	21.2	120	1201	377	600	188	789	480
10.0	21.2	120	1334	377	667	188	855	534
11.0	21.2	120	1467	377	734	188	922	587
12.0	21.2	120	1601	377	800	188	989	640
13.0	21.2	120	1734	377	867	188	1056	694
14.0	21.2	120	1868	377	934	188	1122	747
15.0	21.2	120	2001	377	1000	188	1189	800
16.0	21.2	120	2134	377	1067	188	1256	854
17.0	21.2	120	2268	377	1134	188	1322	907
18.0	21.2	120	2401	377	1201	188	1389	960
19.0	21.2	120	2535	377	1267	188	1456	1014
20.0	21.2	120	2668	377	1334	188	1522	1067
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 2.0

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 866+00 through 874+20

Rock Socket Diameter = 2.5 feet
Rock Socket Diameter = 30 inches **DPB 7/20/2007**

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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
0.0								
1.0	21.2	120	167	589	83	295	378	67
>>> 2.0	21.2	120	333	589	167	295	461	133
3.0	21.2	120	500	589	250	295	545	200
4.0	21.2	120	667	589	333	295	628	267
5.0	21.2	120	834	589	417	295	711	333
6.0	21.2	120	1000	589	500	295	795	400
7.0	21.2	120	1167	589	584	295	878	467
8.0	21.2	120	1334	589	667	295	962	534
9.0	21.2	120	1501	589	750	295	1045	600
10.0	21.2	120	1667	589	834	295	1128	667
11.0	21.2	120	1834	589	917	295	1212	734
12.0	21.2	120	2001	589	1000	295	1295	800
13.0	21.2	120	2168	589	1084	295	1378	867
14.0	21.2	120	2334	589	1167	295	1462	934
15.0	21.2	120	2501	589	1251	295	1545	1000
16.0	21.2	120	2668	589	1334	295	1629	1067
17.0	21.2	120	2835	589	1417	295	1712	1134
18.0	21.2	120	3001	589	1501	295	1795	1201
19.0	21.2	120	3168	589	1584	295	1879	1267
20.0	21.2	120	3335	589	1667	295	1962	1334
AASHTO Table 10.5.5.2.4-1			Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 2.5

Load and Resistance Factor Design (LRFD)

DRILLED SHAFT AXIAL RESISTANCE TABLE

Jefferson Co. S-037-2015; Noise Barrier Wall I-265 between Smyrna Parkway and Pennsylvania Run Road Sta. 866+00 through 874+20

Rock Socket Diameter = 3.0 feet
Rock Socket Diameter = 36 inches **DPB 7/20/2007**

	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 ϕR_{sr} (kips)	Factored End Bearing Resistance ϕR_{eb} (kips)	Total Factored Axial Resistance ϕR_t (kips)	Total Factored Uplift Resistance ϕR_{tu} (kips)
	0.0								
	1.0	21.2	120	200	848	100	424	524	80
>>>	2.0	21.2	120	400	848	200	424	624	160
	3.0	21.2	120	600	848	300	424	724	240
	4.0	21.2	120	800	848	400	424	824	320
	5.0	21.2	120	1000	848	500	424	924	400
	6.0	21.2	120	1201	848	600	424	1024	480
	7.0	21.2	120	1401	848	700	424	1124	560
	8.0	21.2	120	1601	848	800	424	1225	640
	9.0	21.2	120	1801	848	900	424	1325	720
	10.0	21.2	120	2001	848	1000	424	1425	800
	11.0	21.2	120	2201	848	1101	424	1525	880
	12.0	21.2	120	2401	848	1201	424	1625	960
	13.0	21.2	120	2601	848	1301	424	1725	1041
	14.0	21.2	120	2801	848	1401	424	1825	1121
	15.0	21.2	120	3001	848	1501	424	1925	1201
	16.0	21.2	120	3202	848	1601	424	2025	1281
	17.0	21.2	120	3402	848	1701	424	2125	1361
	18.0	21.2	120	3602	848	1801	424	2225	1441
	19.0	21.2	120	3802	848	1901	424	2325	1521
	20.0	21.2	120	4002	848	2001	424	2425	1601
AASHTO Table 10.5.5.2.4-1				Resistance Factor, ϕ		0.50	0.50		0.40

>>> indicates minimum socket length into sound bedrock

D (ft.) = 3.0

COORDINATE DATA SUBMISSION FORM
KYTC DIVISION OF STRUCTURAL DESIGN -- GEOTECHNICAL BRANCH

County Jeferson **Date** 4/13/2015

Road Number I-265

Survey Crew / Consultant D5

Contact Person

Item # 05-8806.00

Mars # 8955601D

Project # FD04 1100 056 0265 013-015 01D

(circle one)

Elevation Datum **NAVD 88** **Assumed**

Notes:

Approximate Wall Start:

-85.6432 38.1195 decimal degrees

Approximate Wall Finish:

-85.6297 38.1211 decimal degrees

GQ : Brooks (961)

HOLE NUMBER	LATITUDE (Decimal Degrees)	LONGITUDE (Decimal Degrees)	HOLE NUMBER	STATION	OFFSET	ELEVATION (ft)
1001	38.11913483	-85.63981760	1001	846+00.00	5.00 Rt.	633.04
1002	38.11916595	-85.63602835	1002	847+00.00	4.00 Rt.	633.87
1003	38.11919705	-85.63912676	1003	848+00.00	CL(wall)	638.30
1004	38.11922822	-85.63878140	1004	849+00.00	CL(wall)	639.30
1005	38.11925925	-85.63843615	1005	850+00.00	CL(wall)	636.79
1006	38.11929999	-85.63809226	1006	851+00.00	CL(wall)	633.88
1007	38.11934251	-85.63774878	1007	852+00.00	CL(wall)	629.48
1008	38.11938719	-85.63740566	1008	853+00.00	CL(wall)	625.62
1009	38.11942260	-85.63706132	1009	854+00.00	CL(wall)	621.92
1010	38.11941637	-85.63691830	1010	854+40.00	CL(wall)	620.35
1011	38.11944493	-85.63671296	1011	855+00.00	CL(wall)	618.73
1012	38.11949252	-85.63637066	1012	856+00.00	CL(wall)	617.67
1013	38.11954015	-85.63602835	1013	857+00.00	CL(wall)	616.64
1014	38.11958781	-85.63568580	1014	858+00.00	17.00 Rt.	616.86
1015	38.11963259	-85.63537837	1015	858+90.00	12.80 Rt.	617.02
1016	38.11970724	-85.63500792	1016	860+00.00	13.70 Rt.	615.88
1017	38.11977500	-85.63467103	1017	861+00.00	12.50 Rt.	615.35
1018	38.11985440	-85.63433802	1018	862+00.00	13.90 Rt.	613.89
1019	38.11993372	-85.63400529	1019	863+00.00	13.00 Rt.	613.69
1020	38.12001686	-85.63367395	1020	864+00.00	13.30 Rt.	613.63
1021	38.12010219	-85.63334356	1021	865+00.00	13.70 Rt.	613.19
1022	38.12018766	-85.63301313	1022	866+00.00	13.50 Rt.	613.13
1023	38.12027307	-85.63268291	1023	867+00.00	CL(wall)	611.08
1024	38.12035856	-85.63235223	1024	868+00.00	CL(wall)	611.89
1025	38.12044388	-85.63202192	1025	869+00.00	CL(wall)	611.45
1026	38.12052934	-85.63169166	1026	870+00.00	CL(wall)	611.80
1027	38.12063289	-85.63137430	1027	871+00.00	CL(wall)	611.27
1028	38.12069334	-85.63125278	1028	871+40.00	CL(wall)	611.62
1029	38.12079927	-85.63109305	1029	872+00.00	CL(wall)	617.57
1030	38.12090302	-85.63077575	1030	873+00.00	CL(wall)	622.81
1031	38.12100566	-85.63037940	1031	874+20.00	CL(wall)	626.92