

The following summarizes the modifications made to the Plans and Special Note for Steel Sheet Pile Cutoff Wall completed as part of this Addendum for Project Number STP 0151(093).

Plan Changes:

- Sheet No. R2
  - Updated the spacing of the #4 epoxy coated bars for the concrete slab from 24" to 12" O.C. in Detail "A" .
- Sheet No. R2A
  - Updated the Total Project quantities for Items "08039 Pre-Drilling for Piles", "08151 Steel Reinforcement-Epoxy Coated", and "23911EC Grout".
  - Removed Item "24550EC Vibration Monitoring" from the General Summary.
- Sheet No. G02
  - Updated Geotechnical Note 9 to require pre-drilling for all sheet piles and removed the approximate pre-drilling station limits.
  - Removed text indicating the Engineer will designate the locations of the additional core borings in Geotechnical Note 10.
- Sheet No. G03
  - Removed callout referencing Geotechnical Note 9 for STA. 124+53 to 125+55.
  - Removed station limits (STA. 125+79 to 126+58) for callout reference to Geotechnical Note 9.
- Sheet No. G04
  - Removed station limits (STA .126+78 to 128+78) for callout reference to Geotechnical Note 9.

Special Note (Steel Sheet Pile Cutoff Wall) Changes:

- Changed "drive" to "install", including all tenses and variations, in select locations throughout the Special Note.
- Section 2.2
  - Removed "select reaches" of the wall in reference to predrilling.
- Section 4.2.1.C
  - Removed "estimated predrilling limits".
- Section 4.2.1.D
  - Replaced with "Proposed plan to confirm sheet piles are seated on bedrock."
- Section 4.2.1.E
  - Removed reference to predrilling limits.
- Section 4.2.2 and Section 4.2.3
  - Deleted.
- Section 4.3
  - Removed "Vibration Instrumentation Specialist" as a required representative of the Contractor at the Pre-Construction Meeting.
- Section 6.2
  - Updated to include the appropriate ASTM testing for grout.
- Section 7.1
  - Removed the requirement for the Contractor to perform the Pre-Construction Condition Survey. The Survey will be performed by the Department's representative.

- Section 7.2
  - Removed the requirement for the Contractor to hire an independent vibration consultant to perform vibration monitoring. The vibration monitoring will be performed by the Department's representative within 300 feet from pile installation activities.
- Section 7.4.2
  - Reconstructed the sentence format for the requirements for sheet pile installation records.
- Section 7.8
  - Updated Items 20 and 21. Added Items 22 and 23. The updates require that predrilling be performed "along the entire wall alignment" and not just along some reaches. The updates also require that predrilling must extend slightly into the bedrock surface.
- A2.0
  - Value engineering restriction removed.
- A8.0
  - Removed reference to "estimated predrilling limits" and requirements to "determine other reaches of the wall that may require predrilling".
- A12.0
  - Removed the requirement for a Pile Test Program if pre-drilling is performed for all sheet pile sections.
- A14.0
  - Removed reference to "estimated predrilling limits" and the requirement to identify other areas of the wall alignment that requires predrilling.
- A15.0
  - Removed the requirement for the plan to include measures to prevent premature refusal of the sheet pile sections.
- A16.4
  - Removed measurement and payment criteria for "Vibration Monitoring".
- A16.8
  - Removed Pay Item "24550EC Vibration Monitoring".

# Special Note for Steel Sheet Pile Cutoff Wall

## *KY Highway 15 – Panbowl Lake Dam (Item # 10-172.00)*

### 1.0 DESCRIPTION

- 1.1 This work is for the construction of a permanent “Sheet Pile Cutoff Wall” that will serve as a seepage cutoff wall at the West Embankment of the Panbowl Lake Dam System. Use an approved Specialty Contractor that has the expertise and capability to complete the work required by this Special Note. Only Contractors pre-qualified by the Kentucky Department of Highways (the “Department”) as a Specialty Contractor for “Grouting for Ground Improvements” (Work Item I39) OR “Jet Grouting” (Work Item J20) may bid on this project as the prime contractor and perform the work required by this Special Note. Subsurface data from the geotechnical exploration(s) are included in the Construction Plans and this Special Note with Appendices. Rock cores are available for viewing at the Geotechnical Branch in Frankfort, 502-564-2374. Contractors must call a minimum of two (2) days in advance to schedule a viewing of rock cores. Project related information, including the Geotechnical Report(s), are accessible on the Department’s Construction Procurement webpage.
- 1.2 The prospective bidders are responsible to familiarize themselves with the available geotechnical data, which provides further information regarding the anticipated soil and bedrock conditions, that will affect the installation of the steel sheet pile cutoff wall. Failure to inspect the project site and view the available rock cores and geotechnical data will result in the forfeiture of the right to file a claim based on site conditions and may result in disqualification from the project.

### 2.0 SCOPE OF WORK

- 2.1 The contract item “Sheet Piling” includes furnishing materials, labor, tools, equipment, and other incidental items required for the construction and testing of permanent sheet piling as described herein. See the Construction Plans for an overview of the steel sheet pile cutoff wall.
- 2.2 Steel sheet pile cutoff wall construction includes predrilling ~~select reaches of the wall prior to pile installation (where required);~~ installing interlock sealant; ~~driving~~ **installing** piles; splicing pile sections (if required); providing, placing, and grouting the annular space created by predrilling; and removing damaged or non-conforming piles.
- 2.3 Refer to Figure 9-16 in the USACE Engineering Manual (EM) 1110-2-1901 “Seepage Analysis and Control for Dams” for the components of a sheet pile cutoff wall. Refer to USACE EM 1110-2-2504 “Design of Sheet Pile Walls” and FHWA NHI-99-025 “Earth Retaining Structures” for additional characteristics of sheet piling.
- 2.4 Sheet pile cutoff wall construction requires disturbing an existing embankment dam.

***Construction within and in the vicinity of embankment dams requires special care and effort compared to general construction. Special care is required to prevent damage, slope instability, and the creation of seepage pathways within the embankment.*** The Contractor should take this into account during bidding and should consult all requirements of this Special Note and the Construction Plans for details.

- 2.5 Subject to the requirements in the Construction Plans and this Special Note, select the installation method and equipment to meet the performance requirements specified herein.
- 2.6 In construction of the sheet pile cutoff wall, consider the potential risks involved due to slope failure and generation of seepage pathways. Embankment integrity, slope stability, wall alignment, and preservation of wall condition are the Contractor's responsibilities from the beginning of work until final acceptance. Damage to property (public or private) or to the wall itself during construction is the responsibility of the Contractor. Construct the sheet pile cutoff wall system to ensure that the wall system will function as intended.
- 2.7 The main body of this Special Note is general for permanent sheet piling. Refer to the Appendix or Appendices for any project specific requirements.
- 2.8 Construction Plans are defined as plans prepared by the Department and/or authorized representative containing the sheet pile wall profile and layout, details, subsurface data, etc., to be used by the Steel Sheet Pile Cutoff Wall Contractor to construct the wall. These plans are included in the Bid Proposal.

### **3.0 REFERENCES**

The documents below apply to this work. Unless noted otherwise, use the current edition as of the letting date of this project.

- 1. Construction Plans and Plan Notes.
- 2. The "Kentucky Standard Specifications for Road and Bridge Construction", Current Edition with supplements. This document may be referred to as "Specifications" or "Standard Specifications" elsewhere in this Special Note.
- 3. The Department Manuals "Kentucky Methods", "List of Approved Materials", and "Field Sampling and Testing Practices".
- 4. American Society for Testing and Materials (ASTM) Standards, Current Edition.
- 5. American Association of State Highway and Transportation Officials (AASHTO) Standards, Current Edition.
- 6. FHWA Publication FHWA NHI-99-025, "Earth Retaining Structures" (NHI Course No. 13236 – Module 6), April 1999.
- 7. USACE EM 1110-2-1901, "Seepage Analysis and Control for Dams", April 1993.
- 8. USACE EM 1110-2-2504, "Design of Sheet Pile Walls", March 1994.
- 9. AASHTO Standard Specifications for Highway Bridges, Current Edition, with all interims.



10. AISC Steel Construction Manual for the design of structural hardware applies if the design is not covered in the AASHTO Standard Specifications for Highway Bridges, Current Edition, with all interims.

#### 4.0 EXPERIENCE REQUIREMENTS AND SUBMITTALS

Requirements for personnel experience and pre-construction submittals, **including submittal deadlines**, are in this section. Do not begin construction of the steel sheet pile cutoff wall, other than stockpiling of wall materials, until the Engineer receives and accepts all submittals required in this section. Additional submittals and records required during and after construction may be included in other sections of this Special Note. The use of electronic submittals (preferably in .pdf format) will expedite the approval process.

- 4.1 Personnel Experience Requirements: The Department considers a satisfactory record of experience in both permanent sheet piling serving as a hydraulic barrier and earthen embankment dam construction important to successfully complete this work. Use personnel meeting the requirements below on this project and submit one (1) electronic copy of all information necessary to verify that they meet the requirements. Submit this information no later than seven (7) calendar days after receiving Notice of Award. **Submit this information to Aric Skaggs at the following email address: aric.skaggs@ky.gov.** As a minimum, include the following for each project necessary to satisfy the requirements:

1. The names and current phone numbers of the Owner's representative(s) who can verify that the Contractor meets the requirements.
2. The dates of construction.
3. The type (temporary/permanent) of structure.
4. The sheet pile section.
5. The maximum pile penetration.
6. Subsurface and bearing conditions.

The Department will review the experience requirements and respond to the Contractor within fourteen (14) calendar days. Review and acceptance by the Engineer is for evidence of the required experience and does not in any way relieve the Contractor of full responsibility for the successful and satisfactory completion of the work.

- 4.1.1 Project Engineer Experience Requirements:

Use an engineer meeting the requirements below to have overall technical responsibility for sheet piling construction on this project. It is not necessary for the Project Engineer to be on-site daily. Consultants or manufacturers' representatives may not be used to satisfy these requirements. The requirements for the Project Engineer are:

- a. Licensed Professional Engineer in the U.S.
- b. A minimum of five (5) years design and/or construction experience on permanent steel sheet piling serving as a hydraulic barrier and/or other seepage cutoff walls, with experience on a minimum of five (5) projects of similar size and complexity, constructed in the past five (5) years.
- c. An employee of the Steel Sheet Pile Cutoff Wall Contractor.

#### 4.1.2 On-Site Supervisor Experience Requirements:

Use an on-site supervisor (project manager, superintendent, etc.) meeting the requirements below to be responsible for the daily sheet piling construction activities on this project. Consultants or manufacturers' representatives may not be used to satisfy the requirements of this section. The requirements for the On-Site Supervisor are:

- a. A minimum of three (3) years construction experience on permanent steel sheet piling serving as a hydraulic barrier and/or other seepage cutoff walls, with experience on a minimum of three (3) projects of similar size and complexity, constructed in the past three (3) years.
- b. An employee of the Steel Sheet Pile Cutoff Wall Contractor.

The On-Site Supervisor and the Project Engineer may be the same person if that person meets all the stated requirements. The Department will consider allowing a team of more than one supervisor to satisfy these requirements and perform the associated functions, subject to certain conditions at the discretion of the Engineer. The Department may consider related experience with other similar types of specialty construction.

- #### 4.1.3
- The Engineer may suspend work on the wall if the Contractor substitutes unqualified and/or unapproved personnel or if the personnel are not performing the required duties. If work is suspended due to substitution of unqualified and/or unapproved personnel, the Contractor is fully liable for all costs resulting from the suspension of work. No adjustment in contract time resulting from this suspension of work will be allowed.

- #### 4.2
- Construction and Materials Submittals: Submit six (6) hard copies or one (1) electronic copy of the following **no later than thirty (30) calendar days after receiving Notice to Begin Work.**

1. The proposed start date and proposed wall construction sequence and schedule including:
  - a. Plan describing how surface water will be diverted, controlled and disposed of.
  - b. Proposed methods for delivery, storage, and handling of sheet piling.
  - c. Proposed sheeting installation plan, including the ~~driving~~ **installation** sequence, ~~estimated predrilling limits~~, and sheet piling tip elevation of each pile section.
  - d. **Proposed plan to confirm sheet piles are seated on bedrock** ~~Proposed plan to mitigate premature refusal of sheet piles.~~
  - e. Proposed methods and equipment for predrilling, including the type of equipment, manufacturer, and model number as well as the estimated elevations ~~and limits~~ of the predrilling program ~~if different from the approximate limits shown in Construction Plans.~~
  - f. Proposed method and equipment for backfilling annular space created from the predrilling program, including batching and placing grout.
  - g. Proposed method for installing the interlock sealant between pile

- sections.
- h. Proposed methods and equipment for installing and extracting the sheet piling, including the type of ~~driving~~ **installation** equipment, the manufacturer of the equipment, protection caps, leads, model number and ~~driving~~ energy. The proposed methods should include measures to install sheet piling straight and plumb at the locations shown on the Construction Plans.
  - i. Proposed procedure of insufficient pile length including methods for pulling and re**installing** ~~driving~~ damaged or non-conforming sheet piling.
  - j. Information on provisions for working in the proximity of both overhead and underground facilities or utilities.
  - ~~k. Vibration instrumentation and monitoring program plan.~~
  - ~~l. Preconstruction Condition Survey Report.~~
2. Certification of land surveyor to be utilized for specified portions of the sheet piling work.
  3. Provide welding and steel plant certificates stating full compliance with the contract requirements.
  4. Product technical data including:
    - a. Acknowledgement that products submitted meet the requirements of standards referenced.
    - b. Manufacturer's installation instructions.
  5. Submit certified material test reports showing that sheet piling and appurtenant metal materials meet the specified requirements for each shipment and identified with specific lots prior to installing materials. Material test reports must meet the requirements of ASTM A6/A6M.
    - a. Sheet piling and appurtenant materials must be tested and certified by the manufacturer to meet the specified chemical, mechanical and section property requirements prior to delivery to the site.
    - b. Testing of sheet piling for mechanical properties must be performed after the completion of all rolling and forming operations.
  6. Submit shop drawings for the sheet piling showing fabricated section that include completed piling dimensions and details, as well as the ~~driving~~ **installation** sequence and location of ~~installing piling~~.
  7. Grout submittal including:
    - a. type of mixer;
    - b. water/cement ratio;
    - c. type of additives;
    - d. type of cement;
    - e. quantity of bentonite;
    - f. mix design;
    - g. design strength (*maximum* of 80 pounds per square inch (psi)); and
    - h. mix verification testing.
  8. Pile ~~driving~~ **installation** records as required by this Special Note, including a summary of location coordinates of in-place sheet piling.
  9. Any other documentation required to verify that proposed construction procedures and materials fully comply with all requirements in the contract documents.

The Department will complete the review within fourteen (14) calendar days after receiving each submittal; the Department will not extend the specified completion date for this review period. Unacceptable methods or documentation, as judged by the Engineer, will be cause for withholding acceptance. The Contractor is fully liable for all costs resulting from acceptance being withheld; the Department will not extend the specified completion date as the result of not accepting the construction and materials submittals. Review and acceptance by the Engineer is for evidence of work to be performed and does not in any way relieve the Contractor of full responsibility for the successful and satisfactory completion of the work.

4.3 Steel Sheet Pile Cutoff Wall Pre-Construction Meeting: A Pre-Construction Meeting to discuss the steel sheet pile cutoff wall construction will be required. This meeting will be held after all sheet pile wall submittals in Section 4.1 and 4.2 have been received, reviewed, and accepted by the Department, and at least ten (10) working days prior to the beginning of sheet pile wall construction. The purpose of the meeting is to discuss construction procedures, personnel, and equipment to be used. The following will be expected to attend:

- Representing the Contractor and Subcontractors - Contractor Representative, Project Engineer and On-Site Supervisor, ~~and Vibration Instrumentation Specialist~~. Also, representatives of the Surveyor, if different than the Prime Contractor.
- Representing the Quality Control Team - QCP Manager and Lead Inspector as defined in Appendix C of this Special Note.
- Representing the Department – Section Engineer, Central Office Construction Engineer, Geotechnical Branch Representative, and others as deemed appropriate by the Section Engineer.

If the Contractor's key personnel change or if the Contractor proposes a significant revision to sheet piling construction procedures, additional Pre-Construction meetings may be required at the discretion of the Engineer.

## 5.0 MATERIALS

Provide materials conforming to the requirements below when the materials are required by this Special Note, the Construction (Contract) Plans, or elsewhere in the Contract Documents.

### 5.1 Sheet Piling:

1. Subject to compliance with this Special Note, the following manufacturers are acceptable:
  - a. Sheet Piling:
    - i. Skyline Steel Corporation.
    - ii. Gerdau Ameristeel.
    - iii. Or approved equal.
  - b. Sheet Piling points:
    - i. Associated Pile and Fitting Corporation.
    - ii. Or approved equal.
2. PZ-35 or approved equal.
3. Hot-rolled steel section.

4. ASTM A328/A328M.
5. Piling sections shall be continuously interlocking.
6. Piling shall be reasonably free sliding to grade when threaded.
7. Provide standard handling hole approximately 4 IN from one end.

5.2 Corners, Tees, and Wyes:

1. As appropriate with ASTM A328/A328M piling.
2. Fabricated from matching pieces of sheet piling, ASTM A36/A36M plates or angles, and ASTM F3125, Grade A325 high-strength bolts.
3. Bolts shall be furnished with washers.

5.3 Welding Electrodes:

1. AWS D1.1 and AWS D1.3, E70 electrode.

5.4 Interlock Sealant:

1. Subject to compliance with this Special Note, the interlock sealant shall meet the following:
  - a. Hydrophilic waterstop (swells in contact with water).
  - b. Tested and certified to prevent water from passing thru interlock joints under 5 bars (approximately 70 PSI) of pressure.
  - c. Remains flexible at 41 DEGF.
  - d. Remains bonded to sheet pile.
  - e. Compatible with steel piling and to be placed in the female (socket) interlock along the full length of the sheet pile.
  - f. Installed by the Manufacturer.

5.5 Grout:

1. A mixture of cement, water, bentonite, and air having a consistency which will flow under a very low head.
2. Type I cement conforming to Section 801 of the Standard Construction Specifications.
3. Use fine powdered (less than No. 200 sieve), high yielding sodium bentonite.
4. Use grout that has a maximum seven (7) day compressive strength of 80 pounds per square inch (psi) when tested using applicable portions of ASTM C 109.
5. Batched to following proportions:
  - a. One (1) 94-lb bag of Type I Cement; to
  - b. 25 lbs. powdered sodium bentonite; to
  - c. 30 gallons of water.

5.6 Reinforced Concrete Load Distributor: A concrete load distributor is required along the entire length of the steel sheet pile cutoff wall, as shown in the Construction Plans. The load distributor will also serve as part of the roadbed. The concrete load distributor shall use materials meeting the following:

5.6.1 Cast-in-Place Concrete: Conform to Section 601.02 and 601.03 of the Standard Specifications for Class B concrete.

5.6.2 Reinforcing Steel: Epoxy coated No. 4 steel reinforcing bars at 12-inch by 12-inch

centers conforming to Section 602 and 811 of the Standard Specifications.

5.7 Material Delivery, Handling, and Storage:

Comply with the Standard Specifications. Develop and submit plans for the delivery, storage, and handling of sheet piling at least 30 days prior to delivery of piles to the job site.

5.7.1 Delivery and Storage:

Materials delivered to the site must be new and undamaged and must be accompanied by certified test reports, as required by this Special Note. Provide the manufacturer's logo and mill identification mark on the sheet piling. Store sheet piling in the manner recommended by the manufacturer to prevent permanent deflection, distortion or damage to the interlocks; as a minimum, support on level blocks or racks spaced not more than 10 feet apart and not more than 2 feet from the ends. Storage of sheet piling should also facilitate required inspection activities.

Sheet piling must be transported and stored so that the interlock sealant does not come into contact with standing water. Standing water increases the risk of expansion of the product after polymerization and loss of adhesion to the steel.

5.7.2 Handling:

Lift piles to ensure that the maximum permissible curvature is not exceeded. Holes may be burned above the cutoff length for lifting piles into the leads as specified in this Special Note. If there is evidence of pile damage during driving due to the holes, the Engineer may restrict the burning of holes. Do not damage piles when dragging piles across the ground.

Inspect piles for excessive curvature and for damage before transporting them from the storage area to the driving area and immediately prior to placement in the driving leads. Curvature in the pile must be measured with the pile laying on a flat surface and is the distance between the pile at the mid-length of the pile and the flat surface. During the inspection for curvature, the piling may be laid in either a concave up or down position in accordance with the manufacturer's storage recommendations for sheet piling with interlock sealant. Straightness of the sections of piles must conform to AWS D1.5M/D1.5, Section 3.5.1.1. Piles having excessive curvature will be rejected.

5.7.3 Damaged Piles:

Inspect each pile for straightness and structural damage before transporting them to the project site and immediately prior to placement in the driving leads. Piles which are damaged during delivery, storage, or handling to the extent they are rendered unsuitable for the work, in the opinion of the Engineer, will be rejected and removed from the project site, or may be repaired, if approved.

## 6.0 MATERIALS TESTING AND ACCEPTANCE

- 6.1 Materials Sampling and Testing will be in accordance with Section 106 of the Standard Specifications, the Department's current "Kentucky Methods", the current "Manual of Field Sampling and Testing Practices", and other referenced

documents.

- 6.2 Concrete and grout testing will be performed at the minimum frequencies indicated in the Manual of Field Sampling and Testing Practices or as necessary to determine the quality. The tests will be performed according to the procedures outlined by the applicable **ASTM or Kentucky Method**. **Concrete** compressive strength specimens will be cast and tested for compressive strength according to KM 64-305 and ASTM C 39, respectively. In cases of failures, the Department will evaluate **concrete** cylinder results according to KM 64-314 to determine whether in-place investigation may be necessary. **Grout specimens will be tested for compressive strength according to ASTM C109.**
- 6.3 Use only materials accepted by the Department before use. The Engineer may suspend work on the wall if the Contractor does not have acceptance of materials to be used and there is no other work on the wall that may be done. If work is suspended due to lack of material acceptance, the Contractor is fully liable for additional cost from the suspension of work. No additional contract time resulting from the suspension of work will be allowed.
- 6.4 Sheet piling and appurtenant materials must be tested and certified by the manufacturer to meet the specified chemical, mechanical and section property requirements prior to delivery to the site. Testing of sheet piling for mechanical properties must be performed after the completion of all rolling and forming operations. Testing of sheet piling must meet the requirements of ASTM A6/A6M.

## 7.0 CONSTRUCTION

Construct the permanent sheet piling according to the Construction Plans, the Standard Specifications, and the requirements below in a manner that creates a hydraulic barrier through the embankment. In all cases, provide materials and personnel conforming to the Materials Section and Personnel Experience Requirements of this Special Note. Quality Control Plan personnel requirements are included in Appendix C of this Special Note.

### 7.1 Preconstruction Condition Survey:

1. **The preconstruction condition survey will be performed by the Department's representative.** ~~Perform preconstruction condition survey of structures, embankment slopes, and utilities within 500 feet of the pile driving activity.~~
2. ~~Perform outreach to the owner of the structures, either the Department or Private Owners, 28 days before performing the preconstruction condition survey.~~
3. ~~Obtain written permission from the owner of the structure (for private owners) prior to accessing the structure.~~
4. ~~The preconstruction condition survey must include video and photographic documentation of the exterior and interior of above ground structures and of the interior of underground structures.~~
5. ~~Video documentation must be in high definition, and show existing conditions and highlight, where possible, existing cracks, deteriorated concrete, exposed and corroded reinforcement, cracked or broken brick or mortar, and other signs of distress.~~

- ~~6. For utilities, perform the survey when the greatest extent of the interior is exposed. Provide supplementary artificial lighting as needed.~~
- ~~7. The video must include annotation with location and structure nomenclature which describes any areas of distress over the video and time code superimposed on the video.~~
- ~~8. Photographs must be accompanied by sketches or descriptions that indicate the location and direction of each photograph.~~
- ~~9. For each structure surveyed, provide a Pre-Construction Condition Survey Report following completion of the survey. The report must contain all documentation associated with the survey including DVD copies. In the report, include notes, sketches, photographs, and videos. Provide general information, such as location details and structure type, as well as particular information on materials, condition, existing damage, aperture and persistence of cracks, and disrepair observed during visual survey. Provide a graphical depiction of locations of damage or other features of concern.~~
- ~~10. Submit the Preconstruction Condition Survey Reports no later than 28 days before the commencement of pile driving activity.~~
- ~~11. The Contractor accept responsibility for damages to existing adjacent or adjoining structures created by sheet pile driving work and repair any damages to these structures without cost to the owner/Department.~~

## 7.2 Vibration Control:

1. **The Department's representative** will perform vibration monitoring during the pile driving **installation** operations.
2. Perform Vibration monitoring **will be performed by the Department** using seismographs and geophones within ~~500~~ **300** feet from the pile driving **installation** activity at locations identified by the independent vibration consultant **Department's representative**.
- ~~3. Engage the services of a qualified, independent vibration consultant to conduct the vibration monitoring.~~
  - ~~a. The vibration consultant must have minimum of five years of experience in vibration monitoring.~~
  - ~~b. A minimum of 28 days before the installation of vibration monitors, submit to the Department the name of the vibration consultant and a list of at least three previously completed projects of similar scope and purpose.~~
4. Prior to the pile driving activities, obtain **Do not begin the pile installation before** baseline readings of ambient vibrations **are collected**.
5. The vibration during the pile driving **installation** activities must be limited to a peak particle velocity of not more than 2 inches per seconds.
6. During pile driving **installation** activities, monitor the vibrations to ensure the limits are not exceeded.
7. If the limits are exceeded, cease the pile driving **installation** activity causing the vibration until the Vibration consultant **Department's representative** and **the** Engineer are on site to observe the structures nearest to the vibration monitor which has exceeded the limits. **Submit an alternative installation method or plan for limiting vibration levels to the Engineer for review and approval before continuing to install sheet piling.**
8. The Contractor is responsible for all damages resulting from the pile driving



**installation** operations and must take whatever measures necessary to maintain peak particle velocity within the specified limit.

9. ~~After completion of the project, remove the vibration monitors off the site and restore the monitoring locations back to their original condition.~~

### 7.3 Preparation:

1. Do not begin sheet pile installation until the earthwork in the area where sheet piles are to be ~~driven~~ **installed** has been completed to the extent that grade elevation is as indicated on the details shown in Construction Plans.

### 7.4 Installation Records:

1. Maintain a pile ~~driving~~ record for each sheet pile ~~driven~~ **installed**.
2. Indicate on the installation record: installation dates and times, type and size of hammer, rate of operation, total driving time, dimensions of driving helmet and cap used, ~~blows required per foot for each foot of penetration, final driving resistance in blows for final 6 inches,~~ pile locations, tip elevations, ground elevations, cut-off elevations, and any reheading or cutting of piles. **If sheet piles are installed using an impact hammer include the blows required per foot for each foot of penetration and the final driving resistance in blows for the final 6 inches.**
3. Record any unusual ~~pile driving~~ problems during ~~driving~~ **installation**.
4. Submit complete records to Engineer.

### 7.5 Interlock Sealant:

1. Use the manufacturer's installation personnel to install interlock sealant before or after the sheet piling is delivered to the site.
2. Apply the sealant under shelter if installed after the sheet piling is delivered to the site.
3. Install sealant in the female (socket) interlock along the full length of the sheet piling.
4. Place sealant in the trailing interlock end of a single sheet pile section. The trailing interlock end is defined as the interlock opposite of the driving direction.
5. Keep the sheet piling horizontal and the interlocks dry and free of grease during installation.
6. Cleaning the interlocks with compressed air, a steel wire brush or high-pressure water jet if necessary.
7. Block or clog the ends at the top and bottom using a mastic to prevent the sealant from flowing out of the ends of the sheet piling when the interlocks are filled.
8. Chamfer the leading interlock (side in direction of driving) on the top and the sealed trailing interlock cut on the toe.
9. A commercial soapy product may be used to lubricate the interlock sealant before driving. Spread the lubricant in the sealed interlock using a paintbrush or by any other means. Only lubricants recommended by the interlock manufacturer and approved by the Engineer shall be used.

### 7.6 Pile Length Markings:

1. Mark each pile prior to ~~driving~~ **installing** with horizontal lines at one-foot

intervals. Mark the interval number on pile every 5 feet from pile tip.

7.7 Placement:

1. Any excavation required within the area where sheet pilings are to be installed must be completed prior to placing sheet pilings. Pilings properly placed and ~~driven~~ **installed** must be interlocked throughout their length with adjacent pilings to form a continuous diaphragm throughout the length or run of piling wall.
2. Install sheet piles straight and plumb and to the dimensions shown on the Construction Plans. Ensure that the wall is compatible with the horizontal and vertical alignment indicated in the Construction Plans.
3. Pilings must be carefully located as indicated on the Construction Plans. Pilings must be placed plumb with out-of-plumbness not exceeding 1/4 inch per foot of length and true to line. Place the pile so the face will not be more than 6 inches from vertical alignment at any point. Top of pile at elevation of cut-off must be within 1/2 inch horizontally and 2 inches vertically of the location indicated in the Construction Plans. Manipulation of piles to force them into position will not be permitted.
4. Check all piles for heave. Re-~~drive~~ **install** all heaved piles to the required tip elevation **at the top of bedrock**.
5. Adequately support and hold sheet piles in correct vertical position during ~~driving~~ **installation**. ~~by means of adequate driving equipment.~~
6. Provide temporary wales, templates, or guide structures to ensure that the pilings are placed and ~~driven~~ **installed** to the correct alignment. Use a system of structural framing sufficiently rigid to resist lateral and **any** driving forces and to adequately support the sheet piling until design tip elevation is achieved. Use two templates, at least, when placing each piling not less than 20 feet apart. Templates must not move when supporting sheet piling. Fit templates with wood blocking to bear against the web of each alternate sheet pile and hold the sheet pile at the design location alignment. Provide outer template straps or other restraints as necessary to prevent the sheets from warping or wandering from the alignment. Mark template for the location of the leading edge of each alternate sheet pile. If in view, also mark the second level to assure that the piles are vertical and in position. If two guide marks cannot be seen, other means must be used to keep the sheet pile vertical along its leading edge.

7.8 Sheet Pile Installation Driving:

1. Use method to ~~drive~~ **install** piling that will not cause damage to nearby buildings, structures, or embankments.
2. Hammers must be steam, air, or diesel drop, single-acting, double-acting, differential-acting, or vibratory type. The driving energy of the hammers must be as recommended by the manufacturer for the piling weights, **conditions**, and subsurface materials to be encountered.
3. ~~Drive~~ **Install** piling to the top of bedrock. ~~and~~ Each pile section must be seated individually on the rock surface. Estimated piling tip elevations are shown in the Construction Plans. Contact the Engineer should any pile section refuse at elevations above the estimated tip elevations shown in the Construction Plans. Do not continue the installation of subsequent sheet

- piles until directed by the Engineer.
4. Sheet piles shall be installed as one continuous member unless splices are permitted by Engineer.
  5. Drive ~~Install~~ pilings with the proper size hammer and by approved methods so as not to subject the pilings to damage and to ensure proper interlocking throughout their lengths.
  6. Complete ~~driving~~ ~~installation~~ of each sheet pile section in less than two hours after the piles contacts water (i.e., ground water).
  7. Maintain ~~driving~~ hammers in proper alignment during driving operations by use of leads or guides attached to the hammer.
  8. Caution must be taken in the sustained use of vibratory hammers when a hard driving condition is encountered to avoid interlock-melt or damages. Discontinue the use of vibratory hammers and impact hammers employed when the penetration rate due to vibratory loading is one foot or less per minute. Care must be taken that the temperature in the interlocks never exceeds 130°C (risk of damaging the seal) when using a vibratory hammer.
  9. Employ a protecting cap in driving when using impact hammers to prevent damage to the tops of pilings.
  10. Use cast steel shoe to prevent damage to the tip of the sheet piling.
  11. Remove and replace pilings damaged during ~~driving~~ ~~installation~~ or driven out of interlock at the Contractor's expense.
  12. Drive ~~Install~~ pilings without the aid of a water jet.
  13. ~~Before commencing the driving of the final 5 feet,~~ Firmly seat the pile in place ~~on bedrock~~ by the application of a number of reduced energy hammer blows.
  14. Take adequate precautions to ensure that pilings are ~~driven~~ ~~installed~~ plumb.
  15. If an open socket is leading, the interlock shall be prepared in a manner that minimizes packing material into it and ease driving for the next sheet.
  16. If at any time the forward or leading edge of the piling wall is found to be out-of-plumb in the plane of the wall, the piling being driven must be driven to the required depth and tapered pilings must be provided and driven to interlock with the out-of-plumb leading edge or other approved corrective measures must be taken to insure the plumbness of succeeding pilings.
  17. Obstructions restricting ~~driving~~ ~~installation~~ of piling to the specified penetration must be removed or reduced by predrilling.
  18. Pilings must extend up to the elevation indicated for the top of pilings.
  19. A tolerance of 1 inch above the indicated top elevation will be permitted.
  20. Predrilling of piles ~~should be performed along~~ ~~will be necessary along some reaches~~ the ~~entire~~ wall alignment.
  21. ~~Predrilling shall extend slightly into the bedrock surface, as directed by the Engineer. This will serve to provide a flat surface to better seat the sheet piles and will provide a better seal to prevent seepage. Changes in sheet pile and predrilling quantities resulting from this operation, will be reflected in the actual paid quantities.~~
  22. ~~Discontinue predrilling at the top of competent bedrock. Seat the pile tip on the bedrock surface after predrilling by driving the pile in accordance with this Special Note. The seating must not damage the pile and the pile interlocks.~~
  23. ~~Predrilling should be performed in a manner that any eliminates~~ obstruction including but not limited to boulders, rocks, rubble, existing foundations or timbers ~~that may be encountered which prevent driving the installation~~ of

piling to bedrock, threaten piling damage or cause piling to drift from required location horizontally; ~~cease driving and perform predrilling as directed by Engineer.~~

#### 7.9 Cutting-Off and Splicing:

1. Obtain cut off elevations from the Construction Plans.
2. Provide additional length of piling sufficient to allow cutting off the top of the piling that may be damaged during ~~driving~~ **installation** and construction operations.
3. ~~Pilings driven to refusal or~~ **installed** to the point where additional penetration cannot be attained and are extending above the required top elevation in excess of the specified tolerance must be cut off to the required elevation. Pilings driven below the required top elevation and pilings damaged by driving and cut off to permit further driving must be extended as required to reach the top elevation by splicing when directed at no additional cost.
4. If directed, pilings must be spliced as required to ~~drive~~ **install** them to depths greater than shown and extend them up to the required top elevation.
5. Pilings adjoining spliced pilings must be full length unless otherwise approved. Splices are not allowed in adjoining pilings.
6. Ends of pilings to be spliced must be squared before splicing to eliminate dips or camber.
7. Where splices are permitted, make splices by full penetration groove welding the entire cross-sectional area of the piles at the splice location.
8. Pilings must be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips or camber at the abutting interlocks.
9. Spliced pilings must be free sliding and able to obtain the maximum swing with contiguous pilings. Welding of splices must conform to the requirements of these Notes. Shop and field welding, qualification of welding procedures, welders, and welding operators must be in accordance with AWS D1.1/D1.1M.
10. Perform welding using operators who have passed the above referenced welding qualification tests during previous 12-month period prior to commencement of required welding.
11. The tops of pilings excessively battered during driving must be trimmed when directed. Piling cut-offs are the property of the Contractor and must be removed from the site.
12. Cut holes in pilings for bolts, rods, drains or utilities in a neat and workmanlike manner, as shown in the Construction Plans or as directed. Use a straight edge in cuts made by burning to avoid abrupt nicks. Bolt holes in piling must be drilled or may be burned and reamed by approved methods which will not damage the surrounding metal. Holes other than bolt holes must be reasonably smooth and the proper size for rods and other items to be inserted.

#### 7.10 Pulling and Re**installation** driving:

1. Damaged piling includes but is not necessarily limited to sheet piles bent, buckled, cracked, with fabrication tolerances beyond those indicated in ASTM A328/A328M, or with any other defect, as determined by the Engineer, that would weaken the sheet pile.

2. Should any sheet pile, as determined by the Engineer, be damaged or otherwise not conform to these Notes, withdraw sheet pile and ~~drive~~ **install** another sheet pile in its place.
3. Provide pulling holes in pilings, as required.
4. Extractors must be of suitable type and size.
5. Care shall be exercised during pulling of pilings to avoid damaging piling interlocks and adjacent construction.
6. If adjacent permanent construction has been damaged during pulling, the Contractor will be required to repair this construction at no extra cost.
7. Pull pilings one sheet at a time.
8. Pilings fused together must be separated prior to pulling, unless the Contractor demonstrates, to the satisfaction of the Engineer, that the pilings cannot be separated.
9. The Contractor will not be paid for the removal of pilings damaged beyond structural use due to proper care not being exercised during pulling.
10. Any piling so pulled and found to be damaged, to the extent that its usefulness in the structure is impaired, must be removed and replaced at the Contractor's expense.
11. Pilings pulled and found to be in satisfactory condition as determined by the Engineer may be re-~~driven~~ **installed** when directed by the Engineer.
12. If it is impossible to withdraw damaged or rejected sheet pile, install additional sheet piles at locations indicated by Engineer.

#### 7.11 Sorting, Cleaning, Inventorying and Storing:

1. Pulled pilings must be sorted, cleaned, inventoried and stored by type into groups as:
  - a. Piling usable without reconditioning.
  - b. Piling requiring reconditioning.
  - c. Piling damaged beyond structural use.

#### 7.12 Damaged Piles:

1. Any pile damaged by reason of internal defects or by improper ~~driving~~ **installation** must be corrected by one of the following methods approved by the Engineer for the pile in question. These methods also apply to piles ~~driven~~ **installed** out of its proper location or out of plumb.
  - a. The pile is withdrawn, if practicable, and replaced by a new and, if necessary, longer pile.
  - b. One or more replacement piles are ~~driven~~ **installed** adjacent to the defective pile.

#### 7.13 Inspection of ~~Driven~~ Piling **Installation**:

1. Perform continuous inspection during pile ~~driving~~ **installation**.
2. Inspect all piles for compliance with tolerance requirements.
3. Inspect the interlocked joints of ~~driven~~ **installed** pilings extending above ground.
4. Pilings found to be out of interlock must be removed and replaced at the Contractor's expense.

#### 7.14 Survey Data:

1. After the ~~driving~~ **installation** of each pile group is complete, submit an as-~~built~~ **driven** survey showing actual location and top elevation of each pile.
2. Submit an as-~~driven~~ **built** survey showing actual location and top elevation of each pile within 7 calendar days of completing the pile installation. Do not proceed with placing roadway surface until the Engineer has reviewed the survey. Present a survey in such form that it gives deviation from plan location in two perpendicular directions and elevations of each pile to nearest half inch. Survey must be prepared and certified by a land surveyor licensed in the state of Kentucky.

#### 7.15 Reinforced Concrete Load Distributor:

1. Construct the concrete load distributor in accordance with Section 601.03 of the Standard Specifications.
2. The load distributor must be constructed using cast-in-place concrete to a minimum thickness of 6-inches.
3. Reinforce the concrete slab with epoxy-coated No. 4 bars placed on 12-inch centers in both directions.
4. Place reinforcing bars in the middle of the concrete slab, ensuring that placement and vibration of concrete does not result in the migration of the reinforcement within the slab.
5. Provide a minimum of 2.5 inches of clear cover from the base and top surface of the concrete slab. Provide 3 inches of clear cover from each vertical face on the sides of the concrete slab.
6. Embed the top of the sheet piling a minimum of 2-inches into base of the concrete load distributor.

#### 7.16 Site Drainage Control:

1. Provide positive control and discharge of all surface water that will affect construction.
2. Maintain all pipes or conduits used to control surface water during construction.
3. Repair damage caused by surface water at no additional cost. Upon substantial completion of the wall, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place, may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.

### 8.0 **ACCEPTANCE REQUIREMENTS**

#### 8.1 Acceptance Criteria:

A sheet pile section is considered acceptable when the following criteria are met:

1. The section is installed to the top of bedrock near the elevations shown in the Construction Drawings.
2. The section satisfies the placement and ~~driving~~ **installation** criteria of Section 7.0 of this Special Note.
3. The section is not deemed damage by the Engineer as described in this



## Special Note.

### 8.2 Sheet Piling Rejection:

If sheet pile section does not satisfy the acceptance criterion outlined above, the Engineer will implement the procedures below.

1. The Engineer will evaluate the installation records and will reject installation methods and/or sheet pile sections that do not satisfy the requirements of this Special Note. Propose alternative methods and install replacement sheet piling as described by this Special Note. Install replacement sheet piling at no additional cost to the Department and with no extension of contract time.
2. Contractor modifications may include but are not limited to; **additional** predrilling prior to installing the sheet piles; increasing the pre-drillhole diameter to further remove potential obstructions; modifying the installation methods; or modifying the installation equipment. Any modifications to the installation method and/or equipment must be approved by the Engineer prior to implementing. The sheet piling sections may not be shortened beyond the lengths shown in the Construction Plans.

## 9.0 RECORDS

Provide the Engineer with one (1) hard and one (1) electronic copy of the following final records:

1. As-built drawings showing:
  - a. The actual location and orientation of the sheet piling, including deviation from specified tolerances and Contract location.
  - b. The actual sheet piling tip and cutoff elevation for each individual section.
  - c. The location of pile splices, where required.
  - d. The diameter and the horizontal and vertical extents of predrilling.
  - e. The locations of any instrumentation installed and any required instrumentation records.
  - f. Finished ground line elevations along the wall alignment.
2. Post-Construction survey report.
3. Other records as required by Section 106 of the Standard Specifications.
4. Structural Steel records required by Section 607 of the Standard Specifications.
5. Construction Records including:
  - a. Contractor's name.
  - b. Pile hammer operator's name.
  - c. Date and time of start and finish of **installation** driving.
  - d. ~~Driving~~ **Installation** difficulties.
  - e. Damaged, pulled, and re-driven **installed** sheet piling sections.
  - f. Groundwater conditions, if encountered during predrilling.
  - g. Grouting records performed for predrilling including: date, time and method grout was placed; cement type; and volume of grout placed.

## **10.0 MEASUREMENT AND PAYMENT**

- 10.1 The Department will pay for the accepted quantities of "Sheet Piling" at the contract unit bid price per "Square Foot" of sheet pile and will measure quantities as shown in the Construction Plans. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for constructing the permanent steel sheet pile cutoff wall as described herein and shown in the Construction Plans. This may include but is not limited to the following items: installing piling, installing interlock sealant, splicing, cutoff, removing damaged piling, all required submittals and records, and other incidental items necessary to provide a complete permanent steel sheet pile cutoff wall. Earth moving, drainage, and any other earthwork necessary to complete these walls and not included in other bid items, is included as an incidental part of this work.
- 10.2 Additional areas of wall, required due to unforeseen foundation conditions or other reasons and approved in writing by the Engineer, will be paid at the contract unit prices. In the event a decrease in the area of a wall is required, subject to acceptance by the Department, payment will be reduced due to the decrease in the wall area or length.
- 10.3 The Department will pay for the reinforced concrete load distributor at the contract unit bid prices for "Concrete-Class B" and "Steel Reinforcement-Epoxy Coated" at the quantities shown in the Construction Plans. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for constructing the reinforced concrete load distributor as described herein and shown in the Construction Plans.
- 10.4 All measurement will be based on plan dimensions or dimensions as ordered in writing.
- 10.5 Refer to an Appendix to this Special Note for Project Specific Measurement and Payment information.



# **Special Note for Steel Sheet Pile Cutoff Wall**

## **Appendix A – Project Specific Requirements**

### ***KY Highway 15 – Panbowl Lake Dam (Item # 10-172.00)***

#### **A1.0 STEEL SHEET PILE CUTOFF WALL CONTRACTOR REQUIREMENTS**

The requirements for the Steel Sheet Pile Cutoff Wall specialty contractor are below. Submit applicable documentation, including references, that the sheet pile cutoff wall specialty contractor is pre-qualified by the Department for "Grouting for Ground Improvements" (Work Item I39) OR "Jet Grouting" (Work Item J20).

#### **A2.0 VALUE ENGINEERING**

~~Section A2.0 not used. The Department will not consider any Value Engineering Proposals that would result in changes in wall location, sheet pile section, and/or elevations.~~

#### **A3.0 SUBSURFACE CONDITIONS**

The boring logs from drilling performed in 2021 and 2022 are presented on the Soil Profile Sheets in the Construction Plans. Subsurface Conditions may vary between boring locations. Boulders and cobbles are known to be present within the dam embankment fill and will be encountered during sheet pile cutoff wall installation.

#### **A4.0 ADDITIONAL CORE BORINGS**

Perform additional core borings as directed by the Engineer where it is deemed that insufficient geotechnical data is available along the steel sheet pile cutoff wall. The Department was unable to perform core borings from the beginning of the wall at STA 124+53 to STA 125+38 due to the presence of energized overhead utility lines. The estimated bedrock surface shown in the Construction Plans is based on interpolation and/or extrapolation from available data which includes auger and SPT sampler refusal elevations. Coring was only performed in a select number of the borings along the sheet pile cutoff wall to confirm bedrock conditions. Additional core borings must be executed in accordance with the following criteria:

- Advance through the embankment fill using rotary drilling techniques;
- Do not advance through the embankment fill with the aid of water, air, or other downhole pressurized drilling techniques;
- Backfill the borings using the tremie method with a mixture of cement, bentonite, water, and sand that produces a maximum compressive strength ( $f_c$ ) of 80 pounds per square inch (psi);
- Do not leave the boring sidewalls unsupported at any time during drilling and/or backfilling operations. A boring is considered unsupported if any interval is not

braced by either the backfill mix or drill tooling; and

- Conduct a 5-foot rock core run to confirm the presence of bedrock. Perform coring within temporary steel casing seated into the bedrock to develop a hydraulic seal.

## **A5.0 LOCATIONS OF EXISTING STRUCTURE UNITS**

Approximate locations and elevations of the existing structures and pavement are provided in the Construction Plans. These locations are based on plans in the Department's archives. However, the Department does not guarantee the accuracy of these locations. Field verify the locations of existing structure units prior to installing sheet piling.

The existing highway plans are Drawing No. HES 15-1(14). Plans for information only are accessible on the Department's Construction Procurement webpage, along with other project related information including the Geotechnical and Hydrologic and Hydraulic (H&H) Report(s).

## **A6.0 STAGING AREA**

The location selection for the construction staging area is the responsibility of the Contractor. This area shall be used for parking, equipment and material storage. If an on-site staging area is desired by the Contractor, written request to the Department shall be submitted describing the specific location of the proposed staging area. If on-site, the Contractor is responsible for any necessary signage, fencing, safety, sediment/erosion control, improvements, restorations, etc. in these areas.

## **A7.0 SHEET PILING PROTECTOR/SHOE**

All sheet piling shall be installed with protective steel piling shoes as indicated on the Construction Plans. The piling shoes shall meet the material and installation requirements of this Special Note.

## **A8.0 PREDRILLING WITHIN EMBANKMENT DAMS**

Predrilling is required to install the sheet piling to the top of bedrock elevations shown on the Construction Plans. ~~Estimated predrilling limits are shown in Construction Plans and shall be verified by the Contractor prior to construction.~~ Exercise extreme care while predrilling and backfilling within the embankment prior to the installation of the sheet piling. Predrilling shall be performed using rotary drilling techniques using soil and/or rock augers and core barrels. Under no circumstances shall predrilling be performed with the aid of water, air, or other downhole pressurized methods. Grout backfilling of the annular space created by predrilling shall be performed by the tremie method or other approved non-*pressurized* method. Predrilling holes shall not be left unsupported overnight and should be cased or grouted at the end of each workday. The cost of repairing any damage to the embankment or embankment slopes will be at the expense of the Contractor and with no extension of contract time.

The estimated ~~predrilling limits~~ and bedrock elevations provided in the Construction Plans are based on the subsurface investigation performed in 2021 and 2022 as part of the Phase I and Phase II investigations, respectively. Variations in both the bedrock surface and distribution of boulders may occur between boring locations. The Contractor is responsible for reviewing the subsurface investigation results provided in this Special Note and in the Construction Plans to ~~verify the estimated predrilling limits and determine other reaches of the wall that may require predrilling.~~ The **bedrock** depths and ~~predrilling limits~~ shown on the Plan are considered an estimate and will depend on the exact subsurface conditions along the sheet pile wall alignment.

## **A9.0 GROUNDWATER CONTROL**

Groundwater measurements were collected during the Phase I subsurface investigation at the time of drilling and seven days after drilling in observations wells. It is unknown if the observations wells installed during the Phase I investigation are still functioning. Measured groundwater elevations within the borings at the time of drilling ranged from approximately 702 to 709 ft. Groundwater measurements taken approximately seven days after the completion of drilling within the observation wells ranged from approximately 704 to 710 ft. The groundwater elevation is expected to be greatly influenced by the water elevation in Panbowl Lake and the North Fork of the Kentucky River. The Contractor shall be prepared for encountering groundwater during predrilling and providing any necessary measures to control the groundwater.

## **A10.0 SITE INSPECTIONS**

During construction, observe the conditions of the lakeside embankment slope daily for signs of ground movement or distress in the vicinity of the wall. Notify the Engineer immediately if signs of movements such as new cracks, sloughing, or increased size of old cracks are observed. If the Engineer determines that the movements exceed those anticipated for typical sheet piling construction and requires corrective action, immediately take corrective actions necessary to stop the movement or perform repairs at no additional cost to the Department.

## **A11.0 FIELD ADJUSTMENTS AND CONSTRUCTION TOLERANCES**

Field adjustments of individual sheet locations may be necessary due to the existing structure units or other considerations. The Engineer shall be notified prior to making adjustments to the locations that exceed the specified tolerances. Sheet piling sections that deviate from the Construction Plans shall be approved by the Engineer prior to installation.

## **A12.0 PILE TEST PROGRAM**

**If pre-drilling is performed for all sheet pile sections, a pile test program will not be required. However,** a pile test program shall be conducted along the wall alignment **where** predrilling is not **performed** ~~shown in the Construction Plans or identified by the Contractor.~~ At a minimum, the test program shall consist of two adjacent production pile sections. The pile sections shall be ~~driven~~ **installed** separately to demonstrate proper interlocking along the

length of the adjacent sections. The pile test program will confirm that the required pile tip elevations shown in Construction Plans on bedrock can be achieved by the Contractor's approved driving installation methods and equipment without damaging the sheet pile sections. The Contractor shall submit an alternative driving installation method and/or equipment to the Engineer for review if the test program reveals the Contractor cannot properly install the sheet piles to the required tip elevation without the risk of damage.

### A13.0 CONSTRUCTION SEQUENCE

The Contractor shall begin construction of the sheet pile cutoff wall at STA 129+75, designated in the Construction Plans as the end of the wall. Constructing the wall beginning at STA 129+75 provides additional time for the relocation of the overhead utility lines (to be performed by others) at the east end of the wall, designated as the beginning of the wall. This also provides additional time to perform supplemental core borings in this area.

### A14.0 SUMMARY OF SPT SAMPLE AND CORE BORINGS

Eighteen Standard Penetration Test (SPT) sample borings and three SPT sample borings with rock coring were performed in May of 2022 along KY 15 at the West Embankment. An additional three SPT sample borings and two SPT sample borings with rock coring were performed in June of 2021 at the West Embankment as part of the Phase I investigation. SPT "N" values, auger refusal depths, and depths to bedrock confirmed by rock coring are provided in the table below. The Contractor shall use the information provided in the table below to verify the estimated predrilling limits bedrock line shown on the Construction Plans, as well as to identify appropriate methods for other areas of the wall alignment that requires predrilling that meets the requirements of this Special Note.

Hole No.	North (Y)	East (X)	Elev. (Z)	SPT Sample <sup>(3)</sup>		Auger Refusal Depth (ft.)	Bedrock Depth (ft.)	Bedrock Core		
				Sample Depth (ft.)	SPT "N" Value			Sample Depth (ft.)	RQD (%)	REC (%)
B-101	3735232.2	5606132.5	740.15	50.5-50.8	50/0.3'	50.8	--	--	--	--
B-102	3735227.3	5606162.4	740.31	52.0-52.3	50/0.3'	52.3	--	--	--	--
B-103	3735224.2	5606182.1	740.44	52.5-52.7	50/0.2'	52.5	--	--	--	--
B-104	3735221.3	5606202.0	740.62	54.0-54.2	50/0.2'	54.2	--	--	--	--
B-105	3735218.6	5606221.8	740.88	54.0-54.1	50/0.1'	54.0	54.5	54.5-56.5	60	100
								56.5-58.5	75	95
								58.5-61.5	53	90
B-106	3735212.8	5606281.6	741.27	31.0-31.1	50/0.1'	31.0*	--	--	--	--
B-107	3735211.6	5606301.6	741.37	34.8-34.9	50/0.1'	34.8*	--	--	--	--
B-108	3735210.6	5606321.6	741.50	39.0-40.2	23-17-50/0.2'	39.0*	-- <sup>(1)</sup>	40.5-41.5	0	30
								41.5-44.0	0	48
								44.0-46.5	0	44
B-109	3735208.9	5606361.6	741.76	21.8-21.9	50/0.1'	21.9*	--	--	--	--

Hole No.	North (Y)	East (X)	Elev. (Z)	SPT Sample <sup>(3)</sup>		Auger Refusal Depth (ft.)	Bedrock Depth (ft.)	Bedrock Core		
				Sample Depth (ft.)	SPT "N" Value			Sample Depth (ft.)	RQD (%)	REC (%)
B-110	3735208.2	5606381.6	741.91	54.5-54.6	50/0.1'	51.6	--	--	--	--
B-111	3735207.6	5606401.6	742.06	12.5-12.6	50/0.1'	12.6*	--	--	--	--
B-112	3735206.9	5606421.6	742.21	53.0-53.1	50/0.1'	53.1	--	--	--	--
B-113	3735206.2	5606441.6	742.36	--	--	53.0	53.0	54.0-57.0	47	97
								57.0-60.0	63	93
B-114	3735205.9	5606461.6	742.48	23.8-23.9	50/0.1'	23.8*	--	--	--	--
B-115	3735205.5	5606481.6	742.58	28.7-28.8	50/0.1'	28.7*	--	--	--	--
B-116	3735205.2	5606501.6	742.70	37.2-37.4	50/0.2'	37.4*	--	--	--	--
B-117	3735205.2	5606521.6	742.84	50.5-50.6	50/0.1'	50.5	--	--	--	--
B-118	3735205.2	5606561.7	743.07	33.0-33.1	50/0.1'	33.0*	--	--	--	--
B-119 <sup>(2)</sup>	3735205.8	5606621.6	743.48	--	--	--	--	--	--	--
B-120 <sup>(2)</sup>	3735205.4	5606641.7	743.70	--	--	--	--	--	--	--
B-121	3735216.4	5606691.7	743.24	5.5-5.5	50/0.0'	5.5	5.5	5.5-8.0	16	96
								8.0-11.0	30	30
								11.0-15.5	76	98
B-1	3735242.0	5606110.1	739.75	49.5-50.5	18-50/0.5'	50.5	50.5	50.5-55.5	10	74
B-2	3735152.1	5606246.3	735.79	40.5-41.6	18-3-50/0.1'	41.6*	--	--	--	--
B-3	3735207.1	5606347.7	741.64	54.5-54.6	50/0.1'	54.6*	--	--	--	--
B-4	3735260.5	5606414.4	720.59	24.5-25.7	19-20-50/0.2	25.7*	--	--	--	--
B-5	3735202.9	5606544.3	743.10	46.0-46.3	50/0.3'	46.3	46.3	46.3-51.3	40	92
Minimum						5.5	5.5		0	30
Average						39.9	35.1		36.2	75.9
Maximum						54.6	54.5		76	100

**Notes:**

(1) Bedrock not encountered. Refusal encountered on material interpreted as a boulder. Recovered rock core visually classified as boulder fill.

(2) B-119 and B-120 not performed due to overhead utilities.

(3) SPT samples shown for 2021 borings are those that experienced refusal at either boring termination or the top of bedrock.

\* **Interpreted as** Areas requiring predrilling **premature auger refusal**. The Contractor shall review all drilling records provided in this Special Note to identify other areas that require predrilling.

## A15.0 TOP OF BEDROCK ELEVATIONS

The Phase I and Phase II subsurface exploration for this project consisted of rock core borings (with varying quantities of soil sampling) and SPT sample borings performed to auger refusal. Sample locations and intervals are shown on the Driller's Subsurface Log in Appendix B. The embankment is known to be constructed of rock fill consisting of shot rock, boulders, cobbles, and varying amounts of rock fragments, as confirmed at select locations of the subsurface investigation. Therefore, the "auger refusal" depths associated with the SPT sample borings do not necessarily correspond to competent bedrock but could indicate the presence of very stiff soil, weathered bedrock, boulders, or rock remnants. The bedrock depths presented in A14.0 are based on the Geologist or Engineer's evaluation of rock core specimens obtained from the rock core borings.

As the result of energized overhead utility lines, the Department was not able to perform exploratory borings near the east end of the proposed sheet pile cutoff wall. The plot of "Assumed Rockline" shown in the Construction Plans is based on interpolation and/or extrapolation from available bedrock data including some refusal elevations from SPT borings. The plotted "Assumed Rockline" elevations shall be considered an estimate and the nature of the top of bedrock beyond and between boring locations will likely vary. As required by this Special Note, the sheet piles shall be ~~driven~~ **installed** to the top of bedrock and each pile section must be seated individually on the rock surface. The actual rockline may occur at elevations higher or lower than the assumed rockline shown in the Construction Plans. Preparations shall be made to account for variability in the rockline.

Despite efforts to define a reasonable top of bedrock elevation, it will be necessary to establish procedures to evaluate the encountered top of bedrock elevations during construction. Submit a plan and proposed criteria to confirm that bedrock has been encountered, rather than a boulder, when pre-drilling ~~or~~ **and** installing sheet piles for the cutoff wall. The plan should include measures to ~~prevent premature refusal of sheet pile sections and~~ ensure each pile section is seated individually on the bedrock surface. In developing these criteria, consider at least:

- known subsurface conditions;
- equipment being used;
- operator experience; and
- prior experience in similar subsurface conditions with boulders present.

The use of a single operator and an operator with experience installing sheet piles in similar subsurface conditions is important to the successful completion of this work.

## A16.0 MEASUREMENT AND PAYMENT

A16.1 The Department will measure and pay for the accepted quantity of "Sheet Piling" as described in the Contract Plans, Section 10 of this Special Note, and below, at the Contract Unit Bid Price per Square Foot of sheet pile. The Department considers payment as full compensation for all costs and delays associated with sheet piling including but not limited to all materials, handling, storing, labor, equipment, tools, interlock sealant, and incidentals necessary to complete the work as necessary by this Special Note.

A16.2 Measurement of "Steel Piling" will be in projected square feet, to the nearest foot, from the pile tip to cut-off elevation and to the horizontal limits shown on the Construction Plans. Sheet piling extending above the cut-off elevation and beyond the horizontal limits shown on the Construction Plans will be considered as waste. Payment will not be made for damaged or rejected sheet piling or sheet piling classified as waste by the Engineer. For sheet piling directed to be cut off before reaching the estimated tip elevation shown in the Construction Plans, the portion cut off will be measured for payment as the difference between the total length of piling shown on the plans for that location and the length of piling installed below the point of cut-off.

A16.3 The Department will measure and pay for the accepted quantity of "Pre-Drilling for Piles" as described in the Contract Plans and below at the Contract Unit Bid Price per Linear Foot of pre-drilling. The Department considers payment as full compensation for all costs and delays associated with pre-drilling including but not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note.

A16.4 **Section A16.4 not used.** ~~The Department will measure and pay for the accepted quantity of "Vibration Monitoring" as described in Section 7.2 of this Special Note at the Contract Lump Sum Bid Price. The measurement and payment of "Vibration Monitoring" will include the *preconstruction condition survey* as described in Section 7.1 of this Special Note. The Department considers payment as full compensation for all costs and delays associated with monitoring vibrations and the *preconstruction condition survey* including but not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note.~~

A16.5 The Department will measure and pay for the accepted quantity "Grout" as described in this Special Note at the Contract Unit Bid Price per Cubic yard of grout. The Department considers payment as full compensation for all costs and delays associated with the grouting required to backfill the annular space resulting from pre-drilling. This includes but is not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note.

A16.6 The Department will measure and pay for the accepted quantity of "Rock Soundings" and "Rock Coring" as described in the Contract Plans and below at the Contract Unit Bid Price per Linear Foot of sounding and/or coring. The Department

considers payment as full compensation for all costs and delays associated with rock soundings and coring including but not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note.

A16.7 The “Sheet Piling”, “Grouting”, “Pre-Drilling for Piles”, “Rock Soundings”, and “Rock Corings” quantities shown in the Construction Plans are based on interpretations of existing subsurface data and horizontal projections of known bedrock surface and boulder/obstruction fields. Variations in the elevation of the bedrock surface and boulder/obstruction fields may occur between boring and coring locations. The “Sheet Piling”, “Grouting”, “Pre-Drilling for Piles”, “Rock Soundings”, and “Rock Corings” quantities shown in the Construction Plans shall therefore be considered an estimate and may fluctuate based on the exact subsurface conditions along sheet pile cutoff wall.

A16.8 Adjustment of base bid unit quantities for “Sheet Piling”, “Grouting”, “Pre-Drilling for Piles”, “Rock Soundings”, and “Rock Corings” shall be made in accordance with contract unit prices. Adjustment will be made on the total square footage of sheet piling installed, not individual sheets. In the event a decrease in quantity of sheet pile, grout, rock soundings/corings, and/or pre-drilling is required, subject to acceptance by the Department, payment will be reduced in accordance with the contract unit prices. Additional areas of sheet piling, grout, rock soundings/corings, and/or pre-drilling required where the bedrock surface and boulder/obstruction fields differs from those shown in the Construction Plans or other unforeseen conditions, will be paid at the contract unit prices.

<u>Code</u>	<u>Pay Item</u>	<u>Pay Unit</u>
24787EN	Sheet Piling	Square Foot
08039	Pre-Drilling for Piles	Linear Foot
<del>24550EG</del>	<del>Vibration Monitoring</del>	<del>Lump Sum</del>
23911EC	Grout	Cubic Yard
20745ED	Rock Soundings	Linear Foot
20746ED	Rock Corings	Linear Foot



***KY Highway 15 – Panbowl Lake Dam (Item # 10-172.00)***



## DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>	
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-1</u>		Immediate Water Depth <u>NA</u>		Start Date <u>06/23/2021</u>	
Surface Elevation <u>739.8'</u>		Static Water Depth <u>NA</u>		End Date <u>06/23/2021</u>	
Total Depth <u>55.5'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557498</u>	
Location <u>563+72.00 12.0' Rt.</u>				Longitude(83) <u>-83.387048</u>	
Hole Type <u>core and sample</u>		Rig Number <u>03-D50</u>			

  

Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
738.5	1.3	Asphalt.							
737.4	2.4	Aggregate Base.							
5		Brown, moist, clayey silt with rock fragments.		ST-1	2.5-4.5	1.8		ST	5
				ST-2	4.5-6.5	1.1		ST	
				ST-3	6.5-8.5	1.4		ST	
730.3	9.5			ST-4	8.5-9.5	1.0		ST	10
10		Brown, moist, clayey silt with shale.		SS-1	9.5-11.0		7-5-6	SPT	10
				SS-2	11.0-12.5		4-8-9	SPT	
				SS-3	12.5-14.0		2-2-9	SPT	
15				SS-4	14.0-15.5		7-7-6	SPT	15
				SS-5	15.5-17.0		3-5-10	SPT	
722.8	17.0	Brown, wet, clayey silt with some sand.		ST-5	17.0-19.0	0.5		ST	
20				SS-6	19.0-20.5		2-2-3	SPT	20
				ST-6	20.5-22.5	1.5		ST	
25				ST-7	22.5-24.5	0.6		ST	25
				SS-7	24.5-26.0		2-2-2	SPT	
				SS-8	26.0-27.5		1-1-1	SPT	
30				ST-8	27.5-29.5	0.0		ST	30
				SS-9	29.5-31.0		0-0-0	SPT	
				SS-10	31.0-32.5		0-0-0	SPT	
35				ST-9	32.5-34.5	0.0		ST	35
		Brown, saturated, silty sand.		SS-11	34.5-36.0		0-0-3	SPT	35
				SS-12	36.0-37.5		0-2-1	SPT	
40				SS-13	37.5-39.0		0-0-2	SPT	40
				SS-14	39.0-40.5		0-0-1	SPT	
				SS-15	40.5-42.0		0-0-1	SPT	
45				SS-16	42.0-43.5		0-0-1	SPT	45
				SS-17	43.5-45.0		1-1-1	SPT	
694.0	45.8	Gray, saturated, silty sand.		SS-18	45.0-46.5		0-0-0	SPT	
				SS-19	46.5-48.0		0-1-3	SPT	
690.8	49.0			SS-20	48.0-49.5		18-27-8	SPT	50
50		(Weathered shale).							50

## Driller's Subsurface Log for B-1 from Phase I Investigation

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>	
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-1</u>		Immediate Water Depth <u>NA</u>		Start Date <u>06/23/2021</u>	
Surface Elevation <u>739.8'</u>		Static Water Depth <u>NA</u>		End Date <u>06/23/2021</u>	
Total Depth <u>55.5'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557498</u>	
Location <u>563+72.00 12.0' Rt.</u>				Longitude(83) <u>-83.387048</u>	
Hole Type <u>core and sample</u>		Rig Number <u>03-D50</u>			

Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
689.3	50.5		(Begin Core)	SS-21	49.5-50.5		18-50/0.50'	SPT	
		Gray shale, silty.		10 / 0	5.0	3.7	74		
55 684.3	55.5								55.5
60		(Bottom of Hole 55.5')							60
65									65
70									70
75									75
80									80
85									85
90									90
95									95
100									100

Driller's Subsurface Log for B-1 from Phase I Investigation (Cont'd)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>	
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-2</u>		Immediate Water Depth <u>30.3 (06/24/21)</u>		Start Date <u>06/24/2021</u>	
Surface Elevation <u>735.8'</u>		Static Water Depth <u>29.8 (06/29/21)</u>		End Date <u>06/24/2021</u>	
Total Depth <u>41.6'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557242</u>	
Location <u>562+33.00 72.0' Lt.</u>				Longitude(83) <u>-83.386587</u>	
Hole Type <u>sample</u>		Rig Number <u>03-D50</u>			

  

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth							
735.5	0.3	Topsoil.	SS-1	0.0-1.5		4-6-5	SPT	
733.1	2.7	Brown, moist, clayey silt with rock fragments.	SS-2	1.5-3.0		2-4-7	SPT	
			SS-3	3.0-4.5		3-5-7	SPT	
			SS-4	4.5-6.0		6-7-18	SPT	
			SS-5	6.0-7.5		12-21-18	SPT	
			SS-6	7.5-9.0		18-7-5	SPT	
			SS-7	9.0-10.5		3-28-29	SPT	
			SS-8	10.5-12.0		7-18-42	SPT	
			SS-9	12.0-13.5		18-4-7	SPT	
			SS-10	13.5-15.0		8-8-17	SPT	
			SS-11	15.0-16.5		7-3-3	SPT	
			SS-12	16.5-18.0		4-3-2	SPT	
			SS-13	18.0-18.1		50/0.10'	SPT	
			SS-14	19.5-21.0		5-4-2	SPT	
			SS-15	21.0-22.5		2-3-3	SPT	
			SS-16	22.5-24.0		3-5-6	SPT	
			SS-17	24.0-25.5		3-9-3	SPT	
			SS-18	25.5-27.0		4-3-3	SPT	
			SS-19	27.0-28.5		8-7-2	SPT	
			SS-20	28.5-30.0		1-2-3	SPT	
			SS-21	30.0-31.5		4-4-2	SPT	
			SS-22	31.5-33.0		1-2-2	SPT	
			SS-23	33.0-34.5		2-2-4	SPT	
			SS-24	34.5-36.0		2-3-4	SPT	
			SS-25	36.0-37.5		34-10-7	SPT	
696.8	39.0		SS-26	37.5-39.0		13-1-4	SPT	
696.1	39.7	Gray, wet, sand with sandstone fragments.	SS-27	39.0-39.9		5-50/0.40'	SPT	
694.2	41.6	(Weathered shale).	SS-28	40.5-41.6		18-3-50/0.10'	SPT	
		(Bottom of Hole 41.6') (Refusal @ 41.6')						

## Driller's Subsurface Log for B-2 from Phase I Investigation

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>	
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-3</u>		Immediate Water Depth <u>NA</u>		Start Date <u>06/23/2021</u>	
Surface Elevation <u>741.6'</u>		Static Water Depth <u>NA</u>		End Date <u>06/23/2021</u>	
Total Depth <u>54.6'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557386</u>	
Location <u>561+34.00 13.0' Lt.</u>				Longitude(83) <u>-83.386232</u>	
Hole Type <u>sample</u>		Rig Number <u>03-D50</u>			

  

Lithology		Description	Overburden Rock Core	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth								
740.4	1.2	Asphalt.							
739.6	2.0	Aggregate Base.							
		Gray, moist, clayey silt with shale.	ST-1	2.0-4.0	2.0			ST	
			ST-2	4.0-4.5	0.5			ST	
			SS-1	4.5-6.0			6-9-8	SPT	
735.4	6.2	Dark brown, wet, clayey silt with rock fragments.	SS-2	6.0-7.5			3-8-8	SPT	
			SS-3	7.5-9.0			2-4-2	SPT	
			SS-4	9.0-10.5			15-8-8	SPT	
731.1	10.5								
		Gray, wet, clayey silt with shale (Saturated below 19.5 ft).	SS-5	10.5-12.0			9-5-4	SPT	
			SS-6	12.0-13.5			3-5-5	SPT	
			SS-7	13.5-15.0			3-2-8	SPT	
			SS-8	15.0-16.5			11-17-25	SPT	
			SS-9	16.5-18.0			7-27-8	SPT	
			SS-10	18.0-19.5			6-5-4	SPT	
			SS-11	19.5-21.0			4-6-17	SPT	
			SS-12	21.0-22.5			15-20-13	SPT	
			SS-13	22.5-24.0			8-11-32	SPT	
			SS-14	24.0-25.5			7-13-2	SPT	
		Dark gray, saturated, clayey silt with shale.	SS-15	25.5-27.0			1-0-1	SPT	
			SS-16	27.0-28.5			3-2-3	SPT	
			ST-3	28.5-30.5	1.7			ST	
			ST-4	30.5-32.5	1.0			ST	
			SS-17	32.5-34.0			2-4-3	SPT	
			SS-18	34.0-35.5			0-1-3	SPT	
			ST-5	35.5-37.0	1.4			ST	
			SS-19	37.0-38.5			7-9-9	SPT	
			SS-20	38.5-40.0			2-3-3	SPT	
			SS-21	40.0-41.5			2-4-3	SPT	
			SS-22	41.5-43.0			5-5-6	SPT	
697.6	44.0		ST-6	43.0-44.0	1.0			ST	
		Gray, saturated, clayey silt with rock fragments.	SS-23	44.0-45.5			19-8-7	SPT	
			SS-24	45.5-47.0			2-36-8	SPT	
			SS-25	47.0-48.5			4-6-5	SPT	
			SS-26	48.5-50.0			1-2-4	SPT	

## Driller's Subsurface Log for B-3 from Phase I Investigation

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>					
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>							
Hole Number <u>B-3</u>		Immediate Water Depth <u>NA</u>		Start Date <u>06/23/2021</u>					
Surface Elevation <u>741.6'</u>		Static Water Depth <u>NA</u>		End Date <u>06/23/2021</u>					
Total Depth <u>54.6'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557386</u>					
Location <u>561+34.00 13.0' Lt.</u>				Longitude(83) <u>-83.386232</u>					
Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
688.9	52.7	Gray, saturated, clayey silt with rock fragments.		SS-27	50.0-51.5		1-2-2	SPT	
				SS-28	51.5-53.0		1-4-14	SPT	
687.3	54.3	Gray, saturated, clayey silt with sand.		SS-29	53.0-54.5		6-5-36	SPT	
687.0	54.6	(Weathered sandstone).		SS-30	54.5-54.6		50/0.10'	SPT	
		(Bottom of Hole 54.6') (Refusal @ 54.6)							

Driller's Subsurface Log for B-3 from Phase I Investigation (Cont'd)





# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>	
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-5</u>		Immediate Water Depth <u>NA</u>		Start Date <u>06/17/2021</u>	
Surface Elevation <u>743.1'</u>		Static Water Depth <u>NA</u>		End Date <u>06/17/2021</u>	
Total Depth <u>51.3'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557361</u>	
Location <u>559+37.00 10.0' Lt.</u>				Longitude(83) <u>-83.385554</u>	
Hole Type <u>core and sample</u>		Rig Number <u>03-D50</u>			

  

Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
741.9	1.2	Asphalt.							
741.1	2.0	Aggregate Base.							
		Brown, moist, clayey silt with rock fragments.		ST-1	2.0-4.0	1.7		ST	
738.1	5.0			ST-2	4.0-5.0	1.0		ST	
736.6	6.5	Gray, moist, clayey silt with shale.		SS-1	5.0-6.5		17-23-35	SPT	
				SS-2	6.5-8.0		4-4-6	SPT	
		Brown, moist, clayey silt with rock fragments.		ST-3	8.0-9.0	1.0		ST	
				SS-3	9.0-10.5		6-7-10	SPT	
				SS-4	10.5-12.0		8-8-7	SPT	
729.6	13.5			SS-5	12.0-13.5		4-5-8	SPT	
				SS-6	13.5-15.0		6-12-17	SPT	
				SS-7	15.0-16.5		6-1-18	SPT	
				SS-8	16.5-18.0		8-3-5	SPT	
				SS-9	18.0-18.9		16-50/0.40'	SPT	
				SS-10	19.5-19.7		50/0.20'	SPT	
				SS-11	21.0-22.5		4-6-8	SPT	
				SS-12	22.5-23.9		5-5-50/0.40'	SPT	
				SS-13	24.0-24.2		50/0.20'	SPT	
		Gray, moist, clayey silt with shale.		SS-14	25.5-25.8		50/0.30'	SPT	
				SS-15	27.0-28.5		4-3-3	SPT	
				SS-16	28.5-30.0		6-7-5	SPT	
				SS-17	30.0-31.5		7-5-4	SPT	
				SS-18	31.5-33.0		3-5-7	SPT	
				SS-19	33.0-34.5		4-2-4	SPT	
				SS-20	34.5-36.0		5-7-5	SPT	
				SS-21	36.0-37.5		2-4-7	SPT	
704.4	38.7			SS-22	37.5-39.0		4-4-5	SPT	
		Dark gray, wet, clayey silt with some sand.		ST-4	39.0-41.0	0.0		ST	
702.1	41.0			SS-23	41.0-42.5		0-1-5	SPT	
		Gray, saturated, clayey silt with sand.		ST-5	42.5-44.5	0.0		ST	
697.0	46.1			SS-24	44.5-46.0		0-0-0	SPT	
696.8	46.3	(Weathered shale).	(Begin Core)	SS-25	46.0-46.3		50/0.30'	SPT	
		Gray shale, sandy.		40 / 16	5.0	4.6	92		

## Driller's Subsurface Log for B-5 from Phase I Investigation



# DRILLER'S SUBSURFACE LOG

Printed: 11/11/21

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Project ID: <u>M-004-2021</u>		<u>Breathitt - KY-15 MP 16.8-17.9</u>		Project Type: <u>Miscellaneous</u>				
Item Number: <u>10-00376.00</u>		Project Manager: <u>  </u>						
Hole Number <u>B-5</u>		Immediate Water Depth <u>NA</u>		Start Date <u>06/17/2021</u>				
Surface Elevation <u>743.1'</u>		Static Water Depth <u>NA</u>		End Date <u>06/17/2021</u>				
Total Depth <u>51.3'</u>		Driller <u>Horn, Grant</u>		Latitude(83) <u>37.557361</u>				
Location <u>559+37.00 10.0' Lt.</u>				Longitude(83) <u>-83.385554</u>				
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
691.8	51.3	Gray shale, sandy.		5.0	4.6	92		51.3
55		(Bottom of Hole 51.3')						55
60								60
65								65
70								70
75								75
80								80
85								85
90								90
95								95
100								100

Driller's Subsurface Log for B-5 from Phase I Investigation (Cont'd)

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>				
Hole Number <u>B-101</u> Surface Elevation <u>740.2'</u> Total Depth <u>50.8'</u> Location <u>563+49.64 3.5' Rt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/04/2022</u> End Date <u>05/04/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>				
Hole Type <u>sample</u> Rig Number <u>90-D120</u>								
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
739.0	1.2	Asphalt.						
737.7	2.5	Aggregate Base.						
5								5
10								10
15								15
20								20
25		Overburden.						25
30								30
35								35
40								40
45								45
691.2	49.0							50
689.4	50.8	Weathered Shale.						50
			SS-1	50.5-50.8		50/0.30'	SPT	
55		(Bottom of Hole 50.8') (Refusal @ 50.8)						55
60								60

Driller's Subsurface Log for B-101 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>				
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>						
Hole Number <u>B-102</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/03/2022</u>				
Surface Elevation <u>740.2'</u>		Static Water Depth <u>NA</u>		End Date <u>05/03/2022</u>				
Total Depth <u>52.3'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>				
Location <u>563+19.64 0.2' Lt.</u>				Longitude(83) <u>  </u>				
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
739.0	1.2	Asphalt.						
737.7	2.5	Aggregate Base.						
5		Overburden.						Difficult drilling @ 6-7.5
10								
15								
20								
25								
30								
35								
40								
45								
50								
689.7	50.5							
687.9	52.3	Weathered shale.						
55			SS-1	52.0-52.3		50/0.30'	SPT	
60		(Bottom of Hole 52.3') (Refusal @ 52.3)						

Driller's Subsurface Log for B-102 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>					
Hole Number <u>B-103</u> Surface Elevation <u>740.6'</u> Total Depth <u>52.7'</u> Location <u>562+99.78 4.7' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/03/2022</u> End Date <u>05/03/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>					
Hole Type <u>sample</u> Rig Number <u>90-D120</u>									
Lithology		Overburden		Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
739.3	1.3	Asphalt.							
738.1	2.5	Aggregate Base.							
5									
10									
15									
20									
25									
30		Overburden.							
35									
40									
45									
50	689.6	51.0							
	687.9	52.7	Weathered Shale.						
55				SS-1	52.5-52.7		50/0.20'	SPT	
60			(Bottom of Hole 52.7') (Refusal @ 52.7')						

Driller's Subsurface Log for B-103 from Phase II Investigation (2022)

Special Note for Steel  
Sheet Pile Cutoff Wall

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>				
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>						
Hole Number <u>B-104</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/02/2022</u>				
Surface Elevation <u>740.6'</u>		Static Water Depth <u>NA</u>		End Date <u>05/02/2022</u>				
Total Depth <u>54.2'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>				
Location <u>562+79.88 4.7' Lt.</u>				Longitude(83) <u>  </u>				
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
739.3	1.3	Asphalt.						
738.6	2.0	Aggregate Base.						
5								5
10								10
15								15
20								20
25								25
30		Overburden.						30
35								35
40								40
45								45
50								50
689.1	51.5							
686.4	54.2	Weathered Shale.						
55			SS-1	54.0-54.2		50/0.20'	SPT	55
60		(Bottom of Hole 54.2')						60

Driller's Subsurface Log for B-104 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>					
Hole Number <u>B-104</u> Surface Elevation <u>740.6'</u> Total Depth <u>54.2'</u> Location <u>562+79.88 4.7' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/02/2022</u> End Date <u>05/02/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>					
Hole Type <u>sample</u> Rig Number <u>90-D120</u>									
Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
65		(Refusal @ 54.2)							65
70									70
75									75
80									80
85									85
90									90
95									95
100									100
105									105
110									110
115									115
120								120	

Driller's Subsurface Log for B-104 from Phase II Investigation (2022) (Cont'd)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>	
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-105</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/04/2022</u>	
Surface Elevation <u>740.9'</u>		Static Water Depth <u>NA</u>		End Date <u>05/04/2022</u>	
Total Depth <u>61.5'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>	
Location <u>562+59.96 6.7' Lt.</u>				Longitude(83) <u>  </u>	
Hole Type <u>core and sample</u>		Rig Number <u>90-D120</u>			

  

Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
739.7	1.2	Asphalt.							
738.9	2.0	Aggregate Base.							
5									5
10									10
15									15
20									20
25									25
30		Overburden.							30
35									35
40									40
45									45
50									50
687.9	53.0								
686.4	54.5	Weathered shale. (Begin Core)		SS-1	54.0-54.1		50/0.10'	SPT	Casing
				60 / -	2.0	2.0	100		advancer @
		Gray shale, silty.		75 / -	2.0	1.9	95		54.1-54.5
				53 / -	3.0	2.7	90		No water
									return @ 54.5
60									60

Driller's Subsurface Log for B-105 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>				
Hole Number <u>B-105</u> Surface Elevation <u>740.9'</u> Total Depth <u>61.5'</u> Location <u>562+59.96 6.7' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/04/2022</u> End Date <u>05/04/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>				
Hole Type <u>core and sample</u> Rig Number <u>90-D120</u>								
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
679.4	61.5	Gray shale, silty.	53 / -	3.0	2.7	90		61.5
65		(Bottom of Hole 61.5')						65
70								70
75								75
80								80
85								85
90								90
95								95
100								100
105								105
110								110
115								115
120								120

Driller's Subsurface Log for B-105 from Phase II Investigation (2022) (Cont'd)



# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>				
Hole Number <u>B-106</u> Surface Elevation <u>741.2'</u> Total Depth <u>31.1'</u> Location <u>561+99.95 10.2' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/05/2022</u> End Date <u>05/05/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>				
Hole Type <u>sample</u> Rig Number <u>90-D120</u>								
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)
740.0	1.2	Asphalt.						
738.7	2.5	Aggregate Base.						
5								5
10								10
15								15
20		Overburden.						20
25								25
30								30
710.1	31.1							
			SS-1	31.0-31.1		50/0.10'	SPT	Difficult drilling, possible boulder @ 29.5-31.1
35		(Bottom of Hole 31.1') (Refusal @ 31.1)						35
40								40
45								45
50								50
55								55
60								60

Driller's Subsurface Log for B-106 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>				
Hole Number <u>B-107</u> Surface Elevation <u>741.3'</u> Total Depth <u>34.9'</u> Location <u>561+79.90 10.7' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/05/2022</u> End Date <u>05/05/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>				
Hole Type <u>sample</u> Rig Number <u>90-D120</u>								
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
740.1	1.2	Asphalt.						
739.0	2.3	Aggregate Base.						
5								5
10								10
15								15
20		Overburden.						20
25								25
30								30
35	706.4	34.9						35
40		(Bottom of Hole 34.9') (Refusal @ 34.9)	SS-1	34.8-34.9				40
45								45
50								50
55								55
60								60

Driller's Subsurface Log for B-107 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>					
Hole Number <u>B-108</u> Surface Elevation <u>741.4'</u> Total Depth <u>46.5'</u> Location <u>561+59.91 11.0' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/09/2022</u> End Date <u>05/09/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>					
Hole Type <u>core and sample</u> Rig Number <u>90-D120</u>									
Lithology		Overburden		Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
740.2	1.2	Asphalt.							
739.4	2.0	Aggregate Base.							
5									5
10									10
15									15
20		Overburden.							20
25									25
30									30
35									35
702.4	39.0								
40 700.9	40.5	Shot rock fill. (Begin Core)		SS-1	39.0-40.2		23-17-50/0.20*	SPT	Casing advancer @ 39-40.5
				0 / -	1.0	0.3	30		41.5
45		Shot rock fill.		0 / -	2.5	1.2	48		44.0
694.9	46.5			0 / -	2.5	1.1	44		46.5
50		(Bottom of Hole 46.5')							50
55									55
60									60

Driller's Subsurface Log for B-108 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>						
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>								
Hole Number <u>B-109</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/10/2022</u>						
Surface Elevation <u>741.8'</u>		Static Water Depth <u>NA</u>		End Date <u>05/10/2022</u>						
Total Depth <u>21.9'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>						
Location <u>561+19.87 11.2' Lt.</u>				Longitude(83) <u>  </u>						
Lithology		Overburden		Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks	
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)		
740.6	1.2	Asphalt.								
739.3	2.5	Aggregate Base.								
5		Overburden.							5	
10									10	
15									15	
20									20	
719.9	21.9								20	
25		(Bottom of Hole 21.9') (Refusal @ 21.9)	SS-1	21.8-21.9		50/0.10'	SPT	Difficult drilling @ 21.2-21.9	25	
30									30	
35									35	
40									40	
45									45	
50									50	
55									55	
60									60	

Driller's Subsurface Log for B-109 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>					
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>							
Hole Number <u>B-110</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/10/2022</u>					
Surface Elevation <u>741.9'</u>		Static Water Depth <u>NA</u>		End Date <u>05/10/2022</u>					
Total Depth <u>54.6'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>					
Location <u>560+99.87 11.1' Lt.</u>				Longitude(83) <u>  </u>					
Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
740.7	1.2	Asphalt.							
739.4	2.5	Aggregate Base.							
5		Overburden.							5
10									10
15									15
20									20
25									25
30									30
35									35
40									40
45									45
50									50
689.9	52.0								
687.3	54.6	Weathered shale.							
			SS-1	54.5-54.6		50/0.10'	SPT		55
60		(Bottom of Hole 54.6')							60

Driller's Subsurface Log for B-110 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>					
Hole Number <u>B-110</u> Surface Elevation <u>741.9'</u> Total Depth <u>54.6'</u> Location <u>560+99.87 11.1' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/10/2022</u> End Date <u>05/10/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>					
Hole Type <u>sample</u> Rig Number <u>90-D120</u>									
Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
65		(Refusal @ 51.6)							65
70									70
75									75
80									80
85									85
90									90
95									95
100									100
105									105
110									110
115									115
120								120	

Driller's Subsurface Log for B-110 from Phase II Investigation (2022) (Cont'd)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>	
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-111</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/11/2022</u>	
Surface Elevation <u>742.0'</u>		Static Water Depth <u>NA</u>		End Date <u>05/11/2022</u>	
Total Depth <u>12.6'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>	
Location <u>560+79.87 11.0' Lt.</u>				Longitude(83) <u>  </u>	
Lithology		Overburden		Sample No.	Depth (ft)
Description		Rock Core		Std/Ky RQD	Run (ft)
Elevation	Depth			Rec. (ft)	SPT Blows
				Rec (%)	Sample Type
					SDI (JS)
740.9	1.1	Asphalt.			
739.5	2.5	Aggregate Base.			
5		Overburden.			
10					
729.4	12.6	(Bottom of Hole 12.6') (Refusal @ 12.6')		SS-1	12.5-12.6
15					50/0.10'
20					SPT
25					
30					
35					
40					
45					
50					
55					
60					

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>				
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>						
Hole Number <u>B-112</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/11/2022</u>				
Surface Elevation <u>742.2'</u>		Static Water Depth <u>NA</u>		End Date <u>05/11/2022</u>				
Total Depth <u>53.1'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>				
Location <u>560+59.70 10.9' Lt.</u>				Longitude(83) <u>  </u>				
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
740.9	1.3	Asphalt.						
739.7	2.5	Aggregate Base.						
5								5
10								10
15								15
20								20
25								25
30		Overburden.						30
35								35
40								40
45								45
50								50
691.2	51.0							
689.1	53.1	Weathered shale.						
55			SS-1	53.0-53.1		50/0.10'	SPT	55
60		(Bottom of Hole 53.1') (Refusal @ 53.1)						60

Driller's Subsurface Log for B-112 from Phase II Investigation (2022)



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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>				
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>						
Hole Number <u>B-113</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/12/2022</u>				
Surface Elevation <u>742.4'</u>		Static Water Depth <u>NA</u>		End Date <u>05/12/2022</u>				
Total Depth <u>60.0'</u>		Driller <u>Grant Horn</u>		Latitude(83) <u>  </u>				
Location <u>560+39.87 10.8' Lt.</u>				Longitude(83) <u>  </u>				
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
741.3	1.1	Asphalt.						
739.9	2.5	Aggregate Base.						
5								5
10								10
15								15
20								20
25								25
30		Overburden.						30
35								35
40								40
45								45
50								50
690.4	52.0							
689.4	53.0	Weathered Shale.	(Begin Core)					
55								55
		Gray shale, silty.		47 / -	3.0	2.9	97	
								57.0
60	682.4			63 / -	3.0	2.8	93	
								60.0

Driller's Subsurface Log for B-113 from Phase II Investigation (2022)

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>					
Hole Number <u>B-113</u> Surface Elevation <u>742.4'</u> Total Depth <u>60.0'</u> Location <u>560+39.87 10.8' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/12/2022</u> End Date <u>05/12/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>					
Hole Type <u>core</u> Rig Number <u>90-D120</u>									
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks	
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)		SDI (JS)
65		(Bottom of Hole 60.0')							65
70									70
75									75
80									80
85									85
90									90
95									95
100									100
105									105
110									110
115									115
120									120

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>				
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>						
Hole Number <u>B-114</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/10/2022</u>				
Surface Elevation <u>742.4'</u>		Static Water Depth <u>NA</u>		End Date <u>05/10/2022</u>				
Total Depth <u>23.9'</u>		Driller <u>Grant Yeary</u>		Latitude(83) <u>  </u>				
Location <u>560+19.85 10.4' Lt.</u>				Longitude(83) <u>  </u>				
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	
741.5	0.9	Asphalt.						
740.6	1.8	Aggregate Base.						
5								5
10								10
15		Overburden.						15
20								20
718.5	23.9							
25			SS-1	23.8-23.9		50/0.10'	SPT	25
30		(Bottom of Hole 23.9') (Refusal @ 23.9)						30
35								35
40								40
45								45
50								50
55								55
60								60

Driller's Subsurface Log for B-114 from Phase II Investigation (2022)

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>				
Hole Number <u>B-115</u> Surface Elevation <u>742.5'</u> Total Depth <u>28.8'</u> Location <u>559+99.85 10.0' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Yearry</u>		Start Date <u>05/10/2022</u> End Date <u>05/10/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>				
Hole Type <u>sample</u> Rig Number <u>03-D50</u>								
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)
741.5	1.0	Asphalt.						
740.2	2.3	Aggregate Base.						
5								
10								
15		Overburden.						Difficult drilling @ 10.5-11.8
20								
25								Difficult drilling @ 20.3-22.1
713.7	28.8							
30			SS-1	28.7-28.8		50/0.10'	SPT	Difficult drilling, possible boulder @ 27.5-28.7
35		(Bottom of Hole 28.8') (Refusal @ 28.8)						
40								
45								
50								
55								
60								

Driller's Subsurface Log for B-115 from Phase II Investigation (2022)

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u>	
Item Number: <u>10-00172.00</u>		Project Manager: <u>  </u>			
Hole Number <u>B-116</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/11/2022</u>	
Surface Elevation <u>742.6'</u>		Static Water Depth <u>NA</u>		End Date <u>05/11/2022</u>	
Total Depth <u>37.4'</u>		Driller <u>Grant Yeary</u>		Latitude(83) <u>  </u>	
Location <u>559+79.82 9.5' Lt.</u>				Longitude(83) <u>  </u>	
Hole Type <u>sample</u>		Rig Number <u>03-D50</u>			

  

Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
741.5	1.1	Asphalt.							
740.5	2.1	Aggregate Base.							
5									
10									
15									Difficult drilling @ 12.7-13.4
20		Overburden.							Difficult drilling @ 17.2-17.9
25									
30									
35									
705.4	37.2								
705.2	37.4	Weathered shale.	SS-1	37.2-37.4		50/0.20'	SPT		
40		(Bottom of Hole 37.4') (Refusal @ 37.4)							
45									
50									
55									
60									

Driller's Subsurface Log for B-116 from Phase II Investigation (2022)

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>					
Hole Number <u>B-117</u> Surface Elevation <u>742.7'</u> Total Depth <u>50.6'</u> Location <u>559+59.84 8.9' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Yeary</u>		Start Date <u>05/11/2022</u> End Date <u>05/11/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>					
Hole Type <u>sample</u> Rig Number <u>03-D50</u>									
Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
741.8	0.9	Asphalt.							
740.9	1.8	Aggregate Base.							
5									5
10									10
15									15
20									20
25		Overburden.							25
30									30
35									35
40									40
45									45
50	692.2	50.5							50
55				SS-1	50.5-50.6		50/0.10'	SPT	55
60		(Bottom of Hole 50.6') (Refusal @ 50.6)							60

Driller's Subsurface Log for B-117 from Phase II Investigation (2022)

# DRILLER'S SUBSURFACE LOG

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Project ID: <u>M-003-2022</u> Item Number: <u>10-00172.00</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>		Project Type: <u>Miscellaneous Dam</u> Project Manager: <u>  </u>				
Hole Number <u>B-118</u> Surface Elevation <u>743.1'</u> Total Depth <u>33.1'</u> Location <u>559+19.89 7.3' Lt.</u>		Immediate Water Depth <u>NA</u> Static Water Depth <u>NA</u> Driller <u>Grant Horn</u>		Start Date <u>05/12/2022</u> End Date <u>05/12/2022</u> Latitude(83) <u>  </u> Longitude(83) <u>  </u>				
Hole Type <u>sample</u> Rig Number <u>90-D120</u>								
Lithology		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Description	Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)
741.9	1.2	Asphalt.						
740.6	2.5	Aggregate Base.						
5								5
10								10
15								15
20		Overburden.						20
25								25
30								30
711.1	32.0							
710.0	33.1	Boulders.						
35			SS-1	33.0-33.1		50/0.10'	SPT	Difficult drilling, possible boulder @ 32-33.1
40		(Bottom of Hole 33.1') (Refusal @ 33.1)						40
45								45
50								50
55								55
60								60

Driller's Subsurface Log for B-118 from Phase II Investigation (2022)

Special Note for Steel  
Sheet Pile Cutoff Wall

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Project ID: <u>M-003-2022</u>		<u>Breathitt - KY-15 MP 13.8-14.6</u>				Project Type: <u>Miscellaneous Dam</u>				
Item Number: <u>10-00172.00</u>						Project Manager: <u>  </u>				
Hole Number <u>B-121</u>		Immediate Water Depth <u>NA</u>		Start Date <u>05/12/2022</u>		Hole Type <u>core and sample</u>				
Surface Elevation <u>743.3'</u>		Static Water Depth <u>NA</u>		End Date <u>05/12/2022</u>		Rig Number <u>03-D50</u>				
Total Depth <u>15.5'</u>		Driller <u>Grant Yeary</u>		Latitude(83) <u>  </u>						
Location <u>557+90.00 6.3' Rt.</u>				Longitude(83) <u>  </u>						
Lithology		Description		Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth			Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
742.1	1.2	Asphalt.								
741.0	2.3	Aggregate Base.								
737.8	5.5	Overburden.		(Begin Core)						
		Gray sandstone with interbedded shale.		SS-1	5.5-5.5	2.4	50/0.01'	SPT		8.0
	16 / -			2.5	0.9	30		11.0		
				30 / -	3.0	4.4	98			
727.8	15.5			76 / -	4.5					15.5
		(Bottom of Hole 15.5')								



# **Special Note for Steel Sheet Pile Cutoff Wall**

## **Appendix C – Quality Control Inspection**

### ***KY Highway 15 – Panbowl Lake Dam (Item # 10-172.00)***

This Special Note is in addition to the requirements set forth in Section 113 of the Standard Specifications for Road and Bridge Construction, current edition.

#### **1.0 DESCRIPTION**

This work consists of developing, furnishing, executing, and maintaining a Quality Control Plan (QCP) for the inspection of the steel sheet pile cutoff wall. QC personnel will answer directly to the Department's Section Engineer. The work includes but is not limited to inspecting, testing, and ensuring conformance to the contract. The QCP subcontractor is responsible for executing the QCP, which includes checking and tracking material shipments, construction inspection, and on-site materials testing pertaining to predrilling and installation of steel sheet pile cutoff wall and instrumentation. This includes ensuring conformance with all sections and Appendices of the Special Note for Steel Sheet Pile Cutoff Wall.

The Department will be responsible for quality assurance, any off-site material testing, and inspection of all other items in the contract.

#### **2.0 QUALITY CONTROL PLAN (QCP) PERSONNEL**

In addition to conforming to Subsection 113.03 of the Standard Specifications for Road and Bridge Construction, conform to the following requirements.

The QCP personnel's sole duty on the project will be implementing the QCP. Provide a QCP organization to be on-site at all times during the progress of work on the specified bid items, with complete authority to take any action necessary to ensure compliance with the Contract. These individuals must not be responsible for the production of the project and may not be directly employed by the general contractor, specialty subcontractor, or any other subcontractor responsible for any construction activities on the project.

The size and composition of the QCP organization may vary as the job progresses but at all times must be compatible with the level of effort and capability required by the Contract requirements.

##### **2.1 QCP Personnel:**

As part of the QCP organization, provide a QCP Manager and specialized inspection personnel to assist and be responsible to the QCP Manager and to be physically present at the construction site during all activities covered by the QCP. Provide a QCP organization with a minimum of four (4) persons, as follows:

- 1 QCP Manager and 1 Alternate QCP Manager.
- 1 Lead Inspector and 1 Alternate Lead Inspector.

The QCP subcontractor may determine the need for an Assistant Inspector(s)

based on the project size, complexity, and schedule. If the need is identified by the QCP subcontractor, submit a minimum of two (2) persons for the role of Assistant Inspector in addition to the four (4) persons listed above for QCP Manager and Lead Inspector.

Provide personnel with the experience and credentials below. For lead and assistant inspectors, education may be substituted for experience as follows:

- A Bachelors Degree in Engineering, Engineering Technology, Surveying, Construction Management, Geology, or other related technical field (at the discretion of the Department), will count for two (2) years of experience.
- An Associates Degree in Engineering Technology, Surveying, Construction Management or other related technical field (at the discretion of the Department), will count for one (1) year of experience.

#### **2.1.1 QCP Manager and Alternate QCP Manager(s):**

- Licensed Professional Engineer with a minimum of five (5) years of engineering experience in one or more of the following areas: construction, materials, geotechnical, or structure design. A Master's Degree in Engineering will count for one (1) year of experience.
- Experience on a minimum of three (3) projects involving the installation of temporary and/or permanent steel sheet pile walls; and experience on a minimum of two (2) projects involving the installation of sheet piling of similar size and complexity.
- Field construction engineering and/or inspection experience on a minimum of three (3) geotechnical-related projects and two (2) earthen or rockfill dam projects.

#### **2.1.2 Lead Inspector and Alternate Lead Inspector(s):**

- A minimum of five (5) years of construction and/or materials inspection experience showing evidence of supervisory experience on geotechnical-related projects with at least one (1) earthen or rockfill dam project.
- Construction and/or inspection experience on a minimum of two (2) projects involving the installation of temporary and/or permanent steel sheet pile walls; and experience on a minimum of one (1) project involving the installation of sheet piling of similar size and complexity.

#### **2.1.3 Assistant Inspectors:**

- A minimum of two (2) years of construction and/or materials inspection experience on geotechnical-related projects.
- Construction and/or inspection experience on a minimum of two (2) projects involving the installation of temporary and/or permanent steel sheet pile walls.

### **2.2 QCP Personnel Duties:** Duties for the QCP personnel include but are not limited to the duties described below.

#### **2.2.1 QCP Manager and Alternate QCP Manager(s):**

The QCP Manager must be available during construction activities as indicated on

the QCP Plan. The QCP Manager may be removed from the project for noncompliance of quality products. Identify an Alternate QCP Manager in the QCP Plan to manage the QCP effort during the QCP Manager's absence. In no instance may the QCP Manager be absent and the Alternate QCP Manager serve for more than a 2-week period without written permission from the Engineer.

The QCP Manager must visit the project site at least one time during the first two (2) weeks of activities covered by the QCP. The QCP Manager and/or Alternate QCP Manager must review all QCP reports and documentation and submit letters to the Section Engineer documenting that they have done such.

#### **2.2.2 Lead Inspector:**

The Lead Inspector or Alternate Lead Inspector must be present during all activities covered by the QCP. The Lead Inspector or Alternate Lead Inspector may request prior verbal approval for short absences from the Section Engineer or authorized representative. Approval will be subject to the experience and competency of the Assistant Inspector(s) on the project.

The Lead Inspector or Alternate Lead Inspector must review and sign all QCP reports and documentation prior to submittal to the Department.

### **3.0 QCP ORGANIZATION AND PROCEDURES**

The QCP must include the following:

- 3.1** A description of the quality control organization, including an organizational chart showing lines of authority and acknowledgment that the QCP staff shall implement at least a 3-phase control system for all aspects of work as specified herein. Phase I Preparatory Phase prior to beginning work; Phase II Construction Phase during execution of work; and Phase III Acceptance of Work.
- 3.2** The name, qualifications in resume format, duties responsibilities, authorities and certifications of the QCP Manager, Alternate QCP Manager, Lead Inspector and Alternate Lead Inspector and all other personnel.
- 3.3** A copy of the letter to the QCP Manager, signed by an authorized official of the Contractor which describes the responsibilities and delegates sufficient authority to adequately perform the functions of the QCP Manager, including authority to stop work which is not in compliance with the Contract. The QCP Manager must issue a letter of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Include copies of these letters in the QCP.
- 3.4** Procedures for managing submittals and approvals, including but not limited to, source of materials, shop drawings and subletting requests.
- 3.5** Procedures for tracking construction deficiencies from identification through acceptable corrective action shall be on the QCP. These procedures will establish verifications that identified deficiencies have been corrected. A Non-Conformance Report (NCR) with each item numbered consecutively will be prepared and signed

by the QCP Manager at least weekly with recommended action, action taken and date corrected and filed separately.

- 3.6** The scope of the project, including a list of definable work activities. A definable work activity is separate and distinct from other tasks, requires specific crews or Subcontractors, has different specifications, and has separate control requirements. It could be identified by different crews or Subcontractors, or it could be work performed by the same trade in a different environment. Each activity must have construction tolerances and workmanship standards identified for use by construction crews and sampling/testing frequencies identified for the QCP personnel. This list will be agreed upon during the coordination meeting.

## **4.0 CONTROL**

QCP is the means by which the Contractor ensures, by way of the QCP subcontractor, the quality and construction, to include subcontractors and suppliers, and complies with the requirements of the Contract. At least 3 phases of control must be conducted by the QCP Manager for each definable work activity as follows:

- 4.1 Preparatory Phase:** Perform this phase prior to beginning work in an activity and include:

- 4.1.1** Review all the Contractor's Construction and Materials Submittals (including those required by the Special Note for Steel Sheet Pile Cutoff Walls, steel mill test reports, shop drawings, etc.) and provide written comments signed by the QCP Manager and Lead Inspector, to the Department within 14 calendar days; include specific recommendations for acceptance, acceptance with revisions, or non-acceptance of each submittal.
- 4.1.2** Prior to the start of each work activity, the Contractor and QCP Manager are encouraged to conduct a meeting with each crew to discuss in detail with each crew member the quality standards and workmanship identified in the Preparatory Phase. The importance and role of each crew member in achieving quality should be stressed.
- 4.1.3** A review of each paragraph of applicable specifications and Special Note.
- 4.1.4** A review of Contract and Construction Drawings.
- 4.1.5** A check to assure that all materials and equipment and subletting requests have been submitted, tested and approved.
- 4.1.6** A review of control inspection and testing requirement has been completed.
- 4.1.7** Examination of the work area to assure that all required preliminary work has been completed and complies with the Contract.
- 4.1.8** A physical examination to assure all required materials and equipment are on hand, and conform to approved shop drawings, or submitted data and are properly stored.
- 4.1.9** Notify the Department at least 24 hours prior to beginning grout work.
- 4.1.10** Preparation and approval of QCP staffing plan which corresponds to the working schedule.
- 4.1.11** Discussion of procedures for controlling quality of work, including repetitive deficiencies, with all contractor managers. Assure availability of appropriate documentation.

- 4.2 Construction Phase:** This phase includes the control measures from start to completion of a work activity.
- 4.2.1** Once the work zone has been established, check it to ensure conformance with the Contract requirements.
  - 4.2.2** Monitor the producers' QC testing to ensure specifications and the requirements of the Special Note are being met.
  - 4.2.3** Inspect, test and document in accordance with the Contract requirements to ensure quality standards are being identified, corrective actions taken and documented using the NCR. The Lead Inspector will be responsible for completing a Daily Work Report (DWR) to document each day's activities on the sheet piling wall work. Submit the DWR to the Section Engineer or representative no later than the close of the next workday. Verify quality standards as work progresses and make adjustments to the QCP.
- 4.3 Acceptance Phase:** This phase includes the control measures at the completion of any work activity.
- 4.3.1 Pre-final Inspection:** At the completion of any work activity or any increment thereof, the QCP Manager, Contractor, and Section Engineer (or representative) must conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Include such a list of deficiencies in the QCP documentation as required herein and include the estimated date by which the deficiencies will be corrected. The Contractor must ensure all items on this list have been corrected when the Final Inspection is scheduled.
  - 4.3.2 Final Acceptance Inspection:** Final acceptance and any corrective work will be in accordance with the requirements of Section 105.12 of the Standard Specifications.

## **5.0 QCP SUBMITTAL**

- 5.1 Original Submittal for Approval:** Submit the QCP to the Engineer no later than thirty (30) calendar days after receiving Notice to Begin Work and at least thirty (30) calendar days before beginning a specific work activity. The Department will return the QCP to the Contractor within fourteen (14) calendar days after submittal with requests for changes to be performed by the QCP subcontractor, if applicable. The QCP subcontractor will then have seven (7) calendar days to correct and make changes and resubmit the QCP to the Engineer. Work cannot begin on an activity until after the QCP for that activity has been approved by the Engineer.
- 5.2 Subsequent Approvals:** Once the Contractor begins work under the approved QCP, continuously prosecute the work in accordance with the QCP. Changes must be approved by the Engineer prior to implementation.

## **6.0 DOCUMENTATION**

The Contractor and QCP personnel are advised that any deliberate action to the detriment of the QCP will be grounds for defaulting the Contract. This includes but is not limited to any deliberate omissions, deliberate cover-ups, or attempts by the Contractor to withhold information from the Department. Allow direct communication between QCP personnel

and the Department. The Contractor and any Subcontractor involved in such detrimental action will not be considered for future bids until requalified.

Maintain current records providing factual evidence that required quality control activities and tests have been performed, including the work of subcontractors and suppliers. Submit all records with the last pay estimate, including but not limited to sketch books, and as-built plans. The Department will make the final payment only after all documentation has been submitted.

**7.0 PAYMENT**

The Department will pay for Quality Control at the contract Lump Sum amount. The Department considers payment as full compensation for all labor and costs associated with performing Quality Control. In addition to conforming to Subsection 113.09 of the Standard Specifications for Road and Bridge Construction, there are the following requirements. The Department will include payment for 20 percent Lump Sum for the QCP in the first estimate. The Department will pay the remaining 80 percent based on the percentage of work completed.

Additional payment for the QCP will be made when time or extra work is added according to Subsection 104.03 for the bid items included in the QCP. Additional work added to other parts of the contract will not permit additional payment for the QCP.

<u>Code</u>	<u>Pay Item</u>	<u>Pay Unit</u>
2572	Quality Control	Lump Sum