Andy Beshear
GOVERNOR

TRANSPORTATION CABINET
200 Mero Street
Frankfort, Kentucky 40601

Rebecca Goodman
SECRETARY

May 19, 2026

CALL NO. 100
CONTRACT ID NO. 262198
ADDENDUM # 1

Subject: Nelson County, PROT 5038129
Letting May 21, 2026

(1) Revised – Removed Interim Completion Date – Page 4 of 289
(2) Revised - Special Note – Page 45-51 & 51-207A of 289
(3) Added – Special Note – Pages 207B-207E of 289
(4) Omit - Proposal Page - Page 216 of 289
(5) Revised - Utility & Rail Cert - Pages 238-245A of 289
(6) Revised – Proposal Bid Items – Pages 288 - 289A of 289
(7) Revised - Plans Posted in Project Related Information

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

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

Sincerely,

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

RM:so
Enclosures

ADMINISTRATIVE DISTRICT - 04

CONTRACT ID - 262198

PROT 5038129

COUNTY - NELSON

PCN - MP09000622601
FD52 090 0062 011-013

BOSTON ROAD (US 62) FROM 0.196 MILES EAST OF HUBBARDS LANE EXTENDING EAST TO 380 FEET EAST OF SYMPSON LAKE SPILLWAY BRIDGE, A DISTANCE OF 0.26 MILES.GEOTECHNICAL SYP NO. 04-5013.00.

GEOGRAPHIC COORDINATES LATITUDE 37:48:24.00 LONGITUDE 85:30:36.00

ADT 5,738

COMPLETION DATE(S):

COMPLETED BY 08/01/2027 APPLIES TO ENTIRE CONTRACT

Special Note for Emergency Action Plan

U.S. 62 – Sympson Lake Dam (Item # 04-5013.00)

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This section covers the Emergency Action Plan requirements for the project.

1.2 DESCRIPTION

A. **Dam Name:** Sympson Lake Dam (NID No. KY00045)

B. This construction will take place within the west-bound lane and shoulder of the embankment. The embankment affected by this construction was originally designed and constructed by the Kentucky Transportation Cabinet (KYTC). The purpose of these Special Provisions is:
   1. To identify the submittals required by the Contractor for compliance,
   2. State the limitations on work in the pool/spillway area,
   3. Establish the minimum monitoring requirements,
   4. Establish the emergency response in case of a flood event, and
   5. Establish the restoration requirements for damage to the embankment.

1.3 CONSTRUCTION REQUIREMENTS

A. PREPARATION OF EMERGENCY ACTION PLAN
   1. Pool levels during construction will vary depending on regional precipitation. Prior to construction, the Contractor shall prepare and follow an Emergency Action Plan (EAP) which will address the requirements presented in these special provisions and the procedures for high-water conditions during construction. The EAP shall include emergency contact information, including cell phone numbers of the project manager, project superintendent and foreman. The numbers provided shall be monitored 24 hours a day, 7 days a week.

B. SURVEY
   1. The post-construction survey shall be conducted upon completion of construction. Areas determined to be deficient by KYTC shall be immediately repaired and confirmed by survey.

C. RESTORATION
   1. The KYTC will complete a pre-construction and post-construction inspection of the embankment to identify any observable signs of distress including: rutting, cracks, lack of sod cover, settlement, erosion, or stability issues on the embankment. If the post-construction inspection identifies any observable sign of distress that was the result of the Contractor, the area shall be repaired to pre-construction conditions by the Contractor.

D. MODIFICATIONS
   1. Any modifications to the pre-approved contract documents proposed by the Contractor for construction activities located on the embankment, such as: changes to staging, excavation depths, shoring, haul routes, access, or groundwater dewatering must be submitted to KYTC for approval.

E. LIMITATIONS
   1. The Contractor shall ensure that integrity of the embankment is maintained at all times during construction and that the proposed construction will not involve any additional excavations that may impact the embankment at any time during construction except as shown in the approved contract documents

1.4 SUBMITTALS

A. The following shall be submitted to KYTC (one electronic copy):

1. SD-03 Product Data
2. Emergency Action Plan;
    a. Prior to construction, the Contractor shall prepare and follow an Emergency Action Plan (EAP) which will address the requirements presented in these special provisions and the procedures for high-water conditions during construction. The EAP shall include emergency contact information, including cell phone numbers of the project manager, project superintendent and foreman. The numbers provided shall be monitored 24 hours a day, 7 days a week.
3. Excavation;
    a. Submit a written excavation plan not less than 10 calendar days prior to beginning any excavation. Approval of the detailed plan shall be obtained from KYTC prior to starting the work. If necessary, the plan shall be modified as required to meet field conditions, and the modifications shall be approved prior to use. As a minimum, the plan shall contain the following:
        1) Proposed methods for preventing interference with, or damage to, existing underground or overhead utility lines, trees designated to remain and other man-made facilities or natural features designated to remain within or adjacent to the construction rights-of-way.
        2) Stockpiling plan for embankment material before it is transported to the project site showing locations, stockpile heights, slopes, limits, and drainage around the stockpile areas.
        3) The Contractor's proposed road pattern, and plan for implementing dust control measures.
        4) Proposed backfilling measures in the event of rising flood waters near open excavations.
4. Care of Water

1.5 GENERAL CONDITIONS

A. CONTENT OF EAP
1. The contents of the Contractor’s EAP shall present a detailed staging plan and all provisions in the Contract Documents so that the integrity of the embankment will be maintained throughout the entire duration of construction. A site map shall be provided in the EAP that identifies the location of
    a. Embankment centerline with stationing (provided by the Engineer),
    b. Right of Way area or within the limits of construction shown on the Contract Drawings,
    c. Proposed haul routes, and
    d. Proposed construction within the embankment,
    e. Proposed locations for the storage of equipment and materials.

B. PROCEDURES
1. The following procedures shall be in place to address an emergency situation:
    a. DAILY MONITORING
        1) The water level in the Sympson Lake Dam shall be monitored on a daily basis by the Contractor and recorded in the daily construction log. The extended forecast of future rainfall shall also be monitored and recorded in the daily construction log. The Contractor shall be able to react quickly to the required actions described in this Special Provision.
    b. POOL LOWERING
        ~~1) At the Contractor’s request, KYTC may lower the lake pool elevation at a maximum rate of 0.5 feet per day to a water level determined in coordination with the City. Lowering of the lake level is not guaranteed and is contingent upon the City’s water supply needs. Pumping will not be performed when the spillway is active or during ongoing rainfall events. Any pumping support provided by KYTC does not relieve the contractor of the responsibility to plan for adverse weather. The contractor remains responsible for backfilling open excavations and removing equipment from high-water areas.~~

2) The Contractor shall assume that any rainfall event producing more than 2 inches of rain within 24 hours, or a cumulative total of more than 2 inches within any 4-day period, will result in a lake level rise that places equipment and/or material staged within the upstream reservoir area at risk. The Contractor is responsible for any equipment or material lost or damaged as a result of failure to properly protect and stage such items in response to any actual or forecasted rainfall event of this magnitude or greater.

c. MONITORING AGENCIES
   1) Construction operations near the embankment shall cease in the event that flooding is imminent that will impact the working area upstream of the embankment or an action alarm is reached related to the instrumentation monitoring program, as per the following:
      a) Any excavation on the pool side of the embankment shall cease and the excavation shall be emergency filled.
      b) If excessive seepage or sand boils are observed on the downstream side, then all work shall cease and KYTC shall be notified.
   2) ~~Coordinate with KYTC to determine timing and sequence of activities, as appropriate for returning to work following the lowering of the pool.~~ When the pool level recedes and if repairs are needed, complete repairs, as directed by the Engineer. Remove debris that has been deposited in the work areas.

d. CONSTRUCTION EQUIPMENT
   1) All equipment, construction materials and stockpiled soils on the pool side of the embankment will be removed in the event the pool levels are anticipated to raise to levels above the working area. No equipment, construction materials, or stockpiled materials shall be left that may impact or restrict overflow events.
   2) The Contractor is responsible for monitoring pool conditions while working upstream of the embankment.
   3) In the event of precipitation, KYTC or the City are not responsible for maintaining the construction pool elevation and pool levels may rise until precipitation and spillway flow has ceased.

C. EMERGENCY CONTACT INFORMATION
   1. To Be Determined
   2. Contractor
      a. Provide primary and secondary contact information for project manager, project superintendent, and foreman.

D. METHOD OF MEASUREMENT AND BASIS OF PAYMENT
   1. All costs for complying with this special provision including the preparation of the EAP, inclusion of submittals with the EAP, project coordination, monitoring, emergency actions, and any other item associated with implementation of the EAP shall be considered incidental to the project. No separate payment will be made.

E. CONTRACTOR'S EMERGENCY ACTION PLAN TEMPLATE
   1. The following is a template for the Contractor's Emergency Action Plan. The word file is available upon request.

EMERGENCY ACTION PLAN

For Construction Work for the US 62 - Sympson Lake Dam Cutoff Wall Project in Bardstown, KY

Date:

Prepared by: Contractor Name

Introduction
The purpose of this plan is to describe the actions which will be taken by the Contractor in the event of rising waters or flooding during construction of the US 62 - Sympson Lake Dam Cutoff Wall Project.

_____ is the Contractor for the US 62 - Sympson Lake Dam Cutoff Wall Project. The Contractor has taken into account the potential for a flooding event in planning, scheduling, and selecting the means and methods for the elements of the project within the pool area.

Overview of Construction Planned within the Pool Area
The Project in Bardstown, Kentucky consists of constructing a cutoff wall through the existing embankment, as well as construction of a filter diaphragm around the existing reinforced concrete box culvert and 14-inch water line and rehabilitation of the low-level outlet works (by others) with the following features.

- Install a new secant shaft cutoff wall through the embankment along the westbound shoulder of US 62. This secant pile cutoff wall will be approximately 1000 feet in length from STA 102+14 to STA 111+89. The cutoff wall is anticipated to be built from the crest to a maximum termination at elevation 440.0 feet. Additional geotechnical investigations are being performed to evaluate the required depth of the cutoff wall to the west of the spillway. During construction of the cutoff wall, access to the intake tower must be coordinated with the City of Bardstown and provided as required for water quality testing. The cutoff wall should be constructed in accordance with the Drawings and Secant Shaft Cutoff Wall Special Note.
- Install a granular filter diaphragm around the downstream end of the existing 4-foot by 4-foot reinforced concrete box culvert and concrete encased 14-inch water line. Excavation around the culvert and wingwalls shall be performed carefully to prevent damage to the structures. The filter diaphragm shall be constructed to the limits shown on the Drawings using KYTC concrete sand, KYTC #8 aggregate, and class II channel lining. Dewatering around the box culvert may be required to construct the filter diaphragm in the dry.

Schedule and Duration of Construction Activities Within the Levee Critical Area
Work is scheduled to commence after _____upon approval of this Emergency Action Plan. Refer to Attachment D for the construction schedule.

Monitoring for Rising Pool Levels or Flooding Situations
The following procedures will be in place to monitor for and be prepared for an emergency situation regarding high water levels in Sympson Lake:

1. Emergency contact information for _____Construction is listed below. In the event of an emergency on the embankment in the area of the project, the following should be contacted:

   _____, Superintendent, Cell:

   _____, Project Manager, Cell:

   Office No. _____

   These are phone numbers that should be reachable 24 HRS a day, seven days a week.

2. The lake levels will be monitored and recorded on a daily basis by _____.

3. Lake levels and weather forecasts will be used to evaluate the need for contingency measures to be implemented for work conducted in the Pool/Spillway Area. Excavated material will be stockpiled immediately adjacent to the excavation, to be available if needed for immediate backfilling.

4. Equipment on site will include:
    a. _____
    b. _____
    c. _____
    d. _____
    e. _____

    Additional equipment listed in Attachment E is available within _ hour(s) for delivery to the site if needed to assist in emergency actions.

5. The Contractor will notify KYTC as soon as possible if the Contractor decides to cease construction operations due to an emergency or high pool level situation. The Contractor will also then notify KYTC prior to resuming the construction operations.

Actions to Be Taken in Rising Pool Levels or Flooding Situations.

Emergency actions, depending on the situation and anticipated rate of rise of pool levels, as directed by KYTC may include:

1) Ceasing Operation for Excavations Within the Pool/Spillway Area:
    a. Construction operations located in and around the spillway or pool area will cease in the event that pool levels are expected to rise above the top of temporary casing or activate the spillway.
    b. Contractor will evaluate pool levels, weather forecasts, and refill curves to mitigate the risk of unfinished shafts or construction equipment being exposed to flood waters. The Contractor shall assume that any rainfall event producing more than 2 inches of rain within 24 hours, or a cumulative total of more than 2 inches within any 4-day period, will result in a lake level rise that places equipment and/or material staged within the poll area at risk. Unfinished shafts may require emergency backfilling if rising pool levels threaten to overtop the excavation.
    c. The Contractor must remove all construction equipment and materials from the pool/spillway area if rising pool levels are anticipated to trigger the spillway.
2) Ceasing Operation for Excavations of Filter Diaphragm:
    a. Construction operations located around the existing 4-foot by 4-foot box culvert and within the vicinity of Buffalo Creek near the toe of the dam will cease in the event that forecasted precipitation may cause tailwater at the dam to rise above the working area.
    b. Contractor will evaluate tailwater conditions, weather forecasts, and Beech Fork River gage levels to mitigate the risk of unfilled excavations or construction equipment being exposed to flooding. The Contractor shall monitor weather forecasts and monitor Buffalo Creek levels while work is being performed in the area. Equipment and/or material staged may be at risk and any unfinished work within excavations may be required to be emergency backfilled until flood waters have receded.

Returning to Work within the Pool/Spillway Area
The Contractor will coordinate with KYTC to determine the timing and sequence of activities as appropriate for returning to work within the pool/spillway area following the receding of flood waters and lake drawdown.

Emergency Contact Information

Contractor Contact:

Superintendent:_____
Cell:_____

Contractor Contact:

Project Manager:_____
Phone:_____
Cell:_____
Email:_____

KYTC PM _____
Phone: _____
Cell: _____
Email: _____

Project Engineer: _____
Phone: _____
Cell: _____
Email: _____

Resident Project Representative:_____
Cell:_____
E-mail:_____

List of Attachments to this EAP:

A. Project Location Figure
B. Dewatering Plan
C. Excavation and Cutoff Wall Plan
D. Construction Schedule
E. Contractor's Equipment List and Locations
F. Pre-Construction Survey

Special Note for Secant Shaft Cutoff Wall

U.S. 62 – Sympson Lake Dam (Item # 04-5013.00)

1.0 DESCRIPTION

1.1 This work is for the construction of a permanent “Secant Shaft Cutoff Wall” that will serve as a seepage cutoff wall at Sympson Lake Dam. Work is to be performed by an approved 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 perform the work required by this Special Note.

1.2 The Department will conduct a mandatory pre-bid conference for the Sympson Lake Dam project. Any Company that is interested in bidding on the Sympson Lake Dam Project shall be represented at the conference and field review. The purpose of the conference is to familiarize all prospective bidders and specialty contractors with the contract requirements within the scope of the contract.

1.3 Subsurface data from the geotechnical exploration(s) are included in the Construction Plans and this Special Note with Appendices. Rock cores from 2026 geotechnical exploration are available for viewing at the KYTC Bardstown Section Office. Contractors must call the Geotechnical Services Branch (Christian Wallover: 502-564-2374) 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.

1.4 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 secant shaft cutoff wall. Sympson Lake Dam is known to be constructed from embankment fill material consisting of clays and sandy clayey silts for the inner core with outer shell embankment made up of clays, silts, cobbles and boulders. Available subsurface information, including driller’s subsurface logs and limited laboratory testing results, can be found on the Geotechnical Sheets of the Construction Drawings and in Appendix B of this Special Note. Additionally, the Construction Drawings include an assumed and extrapolated bedrock line along the cutoff wall alignment based on the project borings (both core and sample types). Subsurface conditions, including bedrock elevations and composition of embankment fill, may likely vary at locations between borings or at locations where borings were not performed. Failure to inspect the project site and view the available rock cores and review other geotechnical data at the time of mandatory pre-bid meeting will result in the forfeiture of the right to file a claim based on site conditions and may result in disqualification from the project. Sign in sheets will be required to be signed at both the pre-bid site visit and rock core viewing locations.

2.0 SCOPE OF WORK

2.1 Definitions:

- Primary Shafts: Initial unreinforced vertical shafts typically constructed using rotary drilling methods, at prescribed intervals.
- Secondary Shafts: Unreinforced vertical shafts installed in between and slightly into primary shafts to a specified overlap.
- Hard/Hard Secant Shafts: The concrete in each primary and secondary shaft has the same compressive strength, which is a higher strength structural grade concrete. For this project, all primary and secondary shafts will be unreinforced. A select number of secondary shafts will include a non-structural steel cage to allow for Crosshole Sonic Logging (CSL) Testing.

2.2 The contract item ~~"Secant Shaft" and "Secant Shaft With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" includes furnishing materials, labor, tools, equipment, and other incidental items required for the construction and testing of permanent hard/hard secant shafts as described herein. See the Construction Plans for an overview of the secant shaft cutoff wall.

2.3 Secant shaft cutoff wall construction includes drilling continuous overlapping shafts; and providing and backfilling the excavation created by drilling with concrete.

2.4 Secant shaft 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.*** For example, special care should include, but is not limited to, limiting temporary surcharge loads from stockpiled material (e.g., drill spoils) or equipment and not utilizing downhole pressurized drilling methods to advance the secant shafts. The submittal Section (4.2) of this Special Note requires detailed information on staging, sequencing, and equipment related to the construction of the cutoff wall. The Contractor should take into account any special care required to perform work within an embankment dam 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 secant shaft 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 secant shaft 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 hard/hard secant shafts. Refer to the Appendix or Appendices for any project specific requirements.

2.8 Construction Plans are defined as plans prepared by the Contractor containing the secant shaft wall profile and layout, details, subsurface data, etc., to be used to construct the wall. These plans will be submitted for approval by the Department.

2.9 References to the “Department” refer to the Kentucky Department of Highways and/or consultants acting on behalf of the Department.

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. AASHTO Standard Specifications for Highway Bridges, Current Edition, with all interims.
9. 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.
10. FHWA Publication FHWA-NHI 18-024, “Drilled Shafts: Construction Procedures and Design Methods” (NHI Course No. 132014), September 2018.
11. Virginia Tech, “Soil-Bentonite Cutoff Walls: Hydraulic Conductivity and Contaminant Transport”, by Jeremy P. Britton, August 8, 2001.

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 secant shaft 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 secant shafts 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 Josh Hornbeck at the following email address:** Josh.Hornbeck@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 secant shaft diameter and overlap.
5. The maximum shaft depth.
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 secant shaft 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 secant shafts 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 Secant Shaft 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 secant shaft 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 secant shafts 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 Secant Shaft 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 fourteen (14) calendar days after receiving Notice to Begin Work.**

1. Finalized detailed Drawings for the work to be performed at the site. The Drawings shall include details for constructing the cutoff wall around the spillway area, cutoff wall around the existing 4-foot by 4-foot box culvert and 14-inch pipe.
2. 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 hard/hard secant shaft installation plan, including the installation sequence, and tip elevation of each shaft. The plan should refer to each secant shaft by the numeric designations develop by the Contractor within the shop drawings.
   c. Drawings (e.g., plans, elevations, section views, etc.), methods, and sequencing to describe the various activities required to complete the permanent guide wall, including dimensions, concrete strength, reinforcement, and formwork, in accordance with this Special Note. Identify the materials and material sources for use in the construction of the guide wall.

d. The Drawings shall include details for constructing the cutoff wall around the spillway area, cutoff wall around the existing 4-foot by 4-foot box culvert and 14-inch pipe.
e. Proposed methods and equipment for drilling, including the type of equipment, manufacturer, and model number.
f. Proposed plan to confirm secant shafts are seated the required depth into bedrock. Additionally, include equipment and methods for verifying the cleanliness of the shaft bottoms prior to concrete placement.
g. Proposed verticality measurement methods and devices, including the identification of procedures and/or equipment for measuring effective shaft overlap, wall thickness, and continuity with depth to the required tolerances and capable of identifying locations of deviations. The methods should include both a measurement device in the excavation equipment and a secondary device approved by the Engineer. The devices may include internal inclinometers, sonic imaging devices, gyroscopic tracking, accelerometers, ultrasonic drilling monitors, pendulum measurements or an alternate method approved by the Engineer. All devices should have a horizontal accuracy of 2 inches of better. Include descriptions, photographs, manufacturer's information and accuracy range, schedule of measurements, calibrations, and data format to be provided. This should include the equipment necessary to process, record and transmit data for rendering and identifications of deviations.
h. Proposed method and equipment for backfilling excavation created from the drilling, including placing concrete. This should include data on conveying equipment and methods for depositing concrete in the shafts.
i. The name of the independent vibration consultant responsible for monitoring services over the duration of shaft installation, along with a list of at least three previously completed projects of similar scope and purpose. The vibration consultant must have minimum of five years of experience in vibration monitoring.
j. Information on provisions for working in the proximity of both overhead and underground facilities or utilities.
k. Information on methods to be used for cold and hot weather concrete placement and protection.

3. Provide a list and calibration schedule for all equipment, devices, instrumentation, and sensors that require initial or continuing calibration by the manufacturer or are otherwise necessary to maintain tolerances. Include information on the accuracy of the test and frequency of calibration. Provide calibration reports for the equipment and devices used to execute the work described in this Special Note.

4. A plan that includes a description of the personnel, equipment and testing procedures to be used for the verification testing work required by this Special Note. The plan shall include the testing firm proposed for each verification testing operation and include a description of their qualifications

and experience in performing that operation. Additionally, include a description, details, and data on the proposed method of drilling and sampling including drilling equipment to be used for performing the verification cores. Provide a description, details, and data on the proposed equipment and methods of both water pressure and falling head (permeability) testing and grouting the verification holes, which includes calibration requirements and certificates applicable to the equipment. Include a schematic of the pressure test setup showing the layout of the equipment and illustrating how all equipment is arranged in the core hole. Include procedures for establishing the maximum test pressures based on test depth.

5. Plan for correcting out-of-tolerance secant shafts.

6. Certification of land surveyor to be utilized for specified portions of the secant shaft work.

7. Product technical data including:
   a. Acknowledgement that products submitted meet the requirements of standards referenced.
   b. Manufacturer's installation instructions.

8. Submit as-built drawings for the secant shafts showing completed dimensions and details, as well as the installation sequence and location.

9. Concrete submittal, for both conventional and light weight, including:
   a. type of mixer or batch plant;
   b. water/cement ratio;
   c. type of additives;
   d. type of cement;
   e. unit weight;
   f. mix design;
   g. design strength;
   h. slump;
   i. air content;
   j. permeability (lightweight concrete only); and
   k. mix verification testing.

10. Shaft installation records as required by this Special Note, including a summary of location coordinates, vertical deviation reports, and hole deviation plots of in-place secant shafts.

11. 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 Secant Shaft Cutoff Wall Pre-Construction Meeting: A Pre-Construction Meeting to discuss the secant shaft cutoff wall construction will be required. This meeting will be held after all secant shaft wall submittals in Section 4.1 and 4.2 have been received, reviewed, and accepted by the Department, and at least five (5) working days prior to the beginning of secant shaft 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, Subcontractor Representative, Project Engineer, and On-Site Supervisor. Also, representatives of the Surveyor, if different than the Secant Shaft Cutoff Wall Contractor.
- Representing the Department – Section Engineer, Central Office Construction Engineer, Geotechnical Branches Representative, and others as deemed appropriate by the Section Engineer.

If the cutoff wall Contractor's key personnel change or if the Contractor proposes a significant revision to secant shaft 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 Concrete: A mixture of cement, water, and aggregate.

5.1.1 Conventional for Secant Shaft Backfill:

1. Conventional, or normal, weight concrete shall conform to Section 601 of the Standard Construction Specifications for Class A Modified, unless indicated elsewhere in this Special Note.
2. Type I cement conforming to Section 801 of the Standard Construction Specifications and ASTM C 150.
3. Minimum 28-day compressive strength of 3,500 pounds per square inch (psi) when tested using applicable portions of ASTM C-39.
4. Slump between 7 and 9-inches as determined in accordance with ASTM C143.
5. Admixtures such as retarders and water reducers may be used.

6. Fly ash Class F may be used.

5.1.2 Lightweight Concrete for Secant Shaft Backfill Adjacent to and Above Existing Reinforced Concrete Box Culvert (RCBC) and existing, abandoned concrete encased 14-inch raw water intake:

1. Uniformly pre-saturate lightweight aggregate and allow to drain before use. At the time of use, ensure that the aggregates are in a saturated surface dry condition to minimize water absorption.
2. Provide lightweight aggregate conforming to AASHTO M 195, with the following additions:
   a. Produce aggregate by fusing raw shale, slate, or clay in a rotary kiln;
   b. Minimum durability factor of 90% when tested in accordance with AASHTO T 161; and
   c. Coarse aggregate shall conform to the gradation requirements for size 3/4 inch to No. 4, as shown in Table 1 of AASHTO M 195.
3. Coarse Aggregate:
   a. Maximum Sodium Sulfate Soundness Loss (AASHTO T 104): 9%
   b. Maximum L A Abrasion (AASHTO T 96): 40%
   c. Maximum Absorption (AASHTO T 85): 10%
4. Fine Aggregate:
   a. Maximum Sodium Sulfate Soundness Loss (AASHTO T 104): 10%
   b. Maximum L A Abrasion (AASHTO T 96): 40%
5. Minimum 28-day compressive strength of 4,000 pounds per square inch (psi) when tested using applicable portions of ASTM C-39.
6. Minimum Cement Content of 620 pounds per cubic yard.
7. Maximum Water/Cement Ratio of 0.40 pound per pound.
8. Slump between 7 and 9-inches as determined in accordance with ASTM C143.
9. Permeability less than or equal to $1x10^{-6}$ cm/s when determined in accordance with ASTM D5084 (Falling Head).
10. Maximum unit weight of 115 pounds per cubic foot (pcf) when determined in accordance with KM 64-324 / ASTM C567.
11. Air content between 4.5 and 7.5 percent tested in accordance with KM 64-303.
12. Admixtures such as retarders and water reducers may be used.
13. Fly ash Class F may be used.

5.1.3 Guide wall

1. Permanent Portion of Guide wall: Conventional, or normal, weight concrete conforming to Section 601 of the Standard Construction Specifications for Class B or equivalent with approval from the Engineer. Concrete shall have a minimum 28-day compressive strength of 2,500 psi.
2. Temporary Portion of Guide Wall (Blockouts): Flowable fill conforming to Section 601.03.03 of the Standard Construction Specifications or Alternative Mixture approved by the Engineer.

5.2 Material Delivery, Handling, and Storage:
Comply with the Standard Specifications.

5.3 Delivery and Storage:
Ready mix trucks shall be used to deliver concrete in accordance with Standard Specifications.

6.0 MATERIALS TESTING AND ACCEPTANCE

6.1 Materials Sampling and Testing shall 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 Conventional weight concrete sampling and testing will be performed by the Department at the minimum frequencies indicated in the Manual of Field Sampling and Testing Practices or as necessary to determine the quality. Concrete will be sampled and tested for air content, slump, and temperature. Casting of cylinders will occur every 100 cubic yards placed, or daily, whichever is greater. The tests shall 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.

6.3 Use only materials accepted by the Department. The Engineer may suspend work on the cutoff 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 Concrete mix designs and aggregate sources shall be approved prior to use.

6.5 An independent testing firm shall sample and test the lightweight concrete utilized as backfill for secant shafts located adjacent to the existing RCBC and 14-inch raw water intake. The testing firm shall not be comprised of individuals responsible for the production of the cutoff wall and may not be directly employed by the cutoff wall Contractor, or any other subcontractor responsible for any construction activities on the cutoff wall.

Prior to use of lightweight concrete, a trial batch shall be mixed per the Standard Specifications and according to the approved proportions, including any admixtures. Gradations and specific gravities for aggregates used in the trial batch shall reflect the characteristics of the stockpiles to be used in the production mix. Trial batch concrete specimens shall be tested for compressive strength and unit weight according to ASTM C 39 and KM 64-324, respectively. Test trial concrete

specimens for permeability in accordance with ASTM D5084, Method B (Falling Head). Certified tests reports shall be submitted to the Engineer for review and approval prior to use for secant shaft backfill.

Production sampling and testing of lightweight concrete shall be performed by the independent testing firm in accordance with the frequency and methods presented in Subsections 6.1 and 6.2. In addition to the tests required by these subsections, test the lightweight concrete for unit weight in accordance with KM 64-324.

7.0 CONSTRUCTION

Construct the permanent hard/hard secant shafts according to the Construction Plans, the Standard Specifications, and the requirements below in a manner that creates a continuous 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.

7.1 Preconstruction Condition Survey:

1. Perform preconstruction condition survey of structures, embankment slopes, and utilities within 300 feet of the secant shaft installation operations.
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 secant shaft installation.

11. The Contractor accepts responsibility for damages to existing adjacent or adjoining structures created by secant shaft work and repair any damages to these structures without cost to the owner/Department.

7.2 Vibration Control:

1. Perform vibration monitoring during the secant shaft installation operations.
2. 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. 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.
3. Perform vibration monitoring using seismographs and geophones within 300 feet from the secant shaft installation activity at locations identified by the independent vibration consultant.
4. Do not begin the secant shaft installation before baseline readings of ambient vibrations are collected.
5. The vibration during the secant shaft installation activities must be limited to a peak particle velocity of not more than 2 inches per seconds.
6. During secant shaft installation activities, monitor the vibrations to ensure the limits are not exceeded.
7. If the limits are exceeded, cease the secant shaft 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 secant shafts.
8. The Contractor is responsible for all damages resulting from the secant shaft 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 secant shaft installation until the earthwork in the area where secant shafts are to be 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 secant shaft record for each shaft installed.
2. Indicate on the installation record: installation dates and times, total drilling time, dimensions of casing used, shaft location, top of bedrock elevations, tip elevations, ground elevations, and quantity of concrete placed.

3. Document and report on biaxial vertical deviation readings for each secant shafts, as required by this Note.
4. Record any unusual problems during installation.
5. Submit complete records to Engineer.

7.5 Location and Placement:

1. Install secant shafts straight and plumb to the dimensions shown on the Construction Plans. Ensure the wall is in accordance with the horizontal and vertical alignment indicated in the Construction Plans and this Special Note.
2. Prior to installation, construct a permanent guide wall to ensure the secant shafts are placed and installed to the correct alignment shown in the Construction Plans. The guide wall should have vertical sides that aid in installing plumb shafts to the tolerances of this Special Note. If required, provide other temporary means such as wales, templates, or guide structures, to ensure that the secant shafts are properly installed.
3. The design and construction of the permanent guide wall is the responsibility of the Contractor. Provide guide wall submittals, including drawings, required by Section 4.2 of this Note to the Engineer for review and approval. Do not begin construction of the guide wall without approval by the Engineer. The design and construction methods shall be site specific and based on the anticipated site and subsurface conditions, as well as the installation equipment. The methods shall ensure stability and limit under-cutting into the existing embankment.
4. The guide wall should be designed and constructed to resist loading from secant shaft installation and other site activities that could result in damage. Positive drainage of surface water away from the guide wall should be provided.
5. The permanent guide wall shall be constructed to the minimum dimensions shown on the Construction Plans. At a minimum, the guide wall should extend 2.5 feet below the top elevation of the secant shafts and should be at least 8 feet wide (i.e, at least 2-feet beyond the shafts on each side of the wall).
6. Concrete meeting the minimum strength requirement of this Special Note should be utilized for the outside (i.e., permanent) part of guide wall surrounding the secant shafts. The temporary portion of the guide wall should include overlapping inner secant shaft footprints. The shaft footprints should be infilled with flowable fill, or other approved alternative mixture, that is penetrable by secant shaft installation equipment. Where used, flowable fill shall meet the requirements of Section 601.03.03 of the Standard Construction Specifications. The guide wall shall remain in place upon completion of the secant shaft cutoff wall.
7. If site conditions allow, the guide wall shall be constructed in its entirety prior to the installation of secant shafts. At a minimum, the guide wall shall be in place at least 40 feet both up- and down-station from the location of shaft installation and the guide wall concrete shall have achieved a minimum compressive strength of 1,000 psi.

7.6 Secant Shaft Installation:

1. Provide equipment and methods required to construct the secant shaft cutoff wall to a depth at least 10 vertical feet lower than the lowest shaft tip elevation shown on the Construction Plans.
2. Secant shafts shall be plumb (i.e., vertical) with out-of-plumbness not to exceed 0.4% verticality (e.g., 2.4-inches for a 50-foot shaft), except for specific instances noted in this Note or if a more stringent tolerance is required to maintain wall continuity. The top elevation of the shafts must be within 1/2 inch horizontally and 2 inches vertically of the location indicated in the Construction Plans. The Contractor shall submit final shop drawings with the necessary overlap to maintain a minimum of 12-inches of continuous wall thickness as discussed below. Correct any deviations exceeding the required tolerance. Approval by the engineer is required for secant shafts installed out-of-tolerance but that still maintain the required effective wall thickness along the entire secant shafts. Overlapping shafts that do not satisfy the requirements of this Note for effective wall thickness will be rejected, regardless of whether they satisfy the above requirements for verticality and location.
3. During drilling or excavation of the shafts, make frequent inspections on the plumbness and alignment of the shafts. The verticality of each secant shaft shall be measured using a sensor or measuring device installed directly on the excavation equipment. The sensor should be capable of providing biaxial deviations along the entire length of the secant shafts. In addition, an ultrasonic drilling monitor or other secondary measuring device approved by the engineer shall be used on every tenth shaft installed to verify plumbness in addition to the sensor installed on the equipment. The secondary equipment should be capable of measurements to the required tolerances and identifying deviations.
4. Plumbness, or verticality, must be maintained, measured, and documented prior to placing concrete.
5. In addition to limiting out-of-plumbness to 0.4%, secant shafts shall meet the minimum effective wall thickness shown in Figure A below. The as-constructed effective wall thickness shall be a minimum of 12-inches through the full depth of the cutoff wall. An as-constructed joint overlap of at least 1.5-inches is required to maintain the minimum effective wall thickness.

Minimum Requirements for Joint Overlap and Effective Wall Thickness

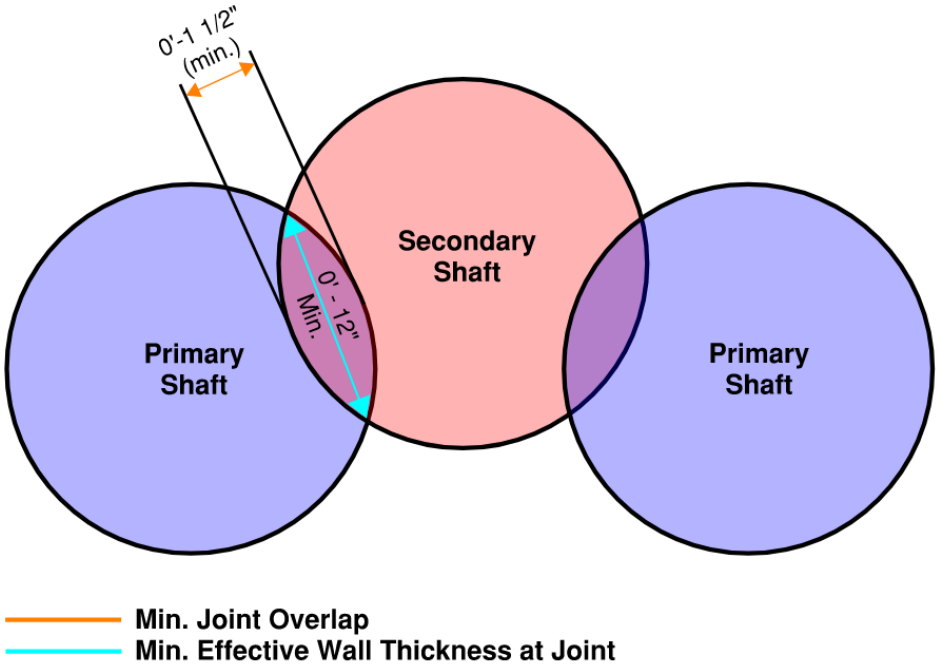

Figure A: Minimum Joint Overlap and Effective Wall Thickness for Out-of-Plumb Shafts

6. Provide equipment of a design, type, size, capacity, and mechanical condition to effectively construct the secant shaft cutoff wall to the required depth, elevation, tolerance, and dimension that is also capable of excavating into adjacent concrete to effectively form water-tight joints.
7. Use methods to install secant shafts that will not cause damage to nearby buildings, structures, or embankments.
8. Do not disturb or alter the existing 4'x4' RCBC and concrete encased 14-inch pipe through the embankment during installation of the secant shafts. Both protection of and damage to the existing RCBC or 14-inch pipe during construction of the secant shafts is the responsibility of the cutoff wall Contractor. Repair of any damage resulting from shaft installation shall be performed without additional costs to the Department and with no extension of contract time. The use of lightweight concrete backfill is required for secant shafts located above and immediately adjacent to the existing RCBC and 14-inch pipe in order to reduce loads on the structures side walls and roof (See Subsection 7.7.3).
9. Use rotary drive equipment with sufficient torque to advance temporary steel casing as required by this Note and the Construction Plans. Temporary steel casing shall extend marginally into the top of bedrock to confirm the full diameter of the secant shaft is filled with concrete and there are no inclusions of soil reducing overlap. The temporary steel casing shall be advanced concurrent with drilling.
10. Do not use installation methods that may result in hydro-fracturing or erosion of the embankment, foundation soils or non-rock intervals.
11. Maintain the stability of the secant shafts using temporary, purpose-built flush joint steel casing that is reasonably watertight. During drilling, provide positive protection against cave-in, displacement, or loss of surrounding

ground into or adjacent to the shafts. Casings must be of sufficient strength to resist drilling torque and the earth and groundwater pressures without distortion. The outside diameter (OD) of the temporary casing shall be at least the required size of the secant shafts.

12. Do not perform casing installation or secant shaft excavation operations within a clear distance of three shaft diameters of a newly poured secant shaft where concrete was placed within the previous 24 hours or until the concrete has reached a minimum compressive strength of 1,000 psi. To be constructed on the same day, the minimum difference between the secant shafts shall be five shafts (e.g., Shaft “6” - Shaft “1”). In specific instances and with approval from the Engineer, secant shafts may be installed closer to newly poured shafts if there are previously completed shafts between the newly poured shaft and on-going casing installation/excavation operations.
13. Before excavating secondary shafts, both adjacent primary shafts shall have attained a minimum unconfined compressive strength of 1,000 psi. Variance in these restrictions requires approval by the Engineer. Any variance should demonstrate the proposed distances and concrete compressive strengths satisfy criteria and tolerances of this special note.
14. Install secant shafts into competent bedrock to the depths shown on the Construction Plans, or as directed by the Engineer. Estimated shaft tip elevations are shown in the Construction Plans, based on previously taken soil and core borings. Contact the Engineer should any secant shaft encounter bedrock, or equipment refusal, at elevations 3-feet or more above, or below, the estimated tip elevations shown in the Construction Plans. Do not continue the installation of subsequent secant shafts until directed by the Engineer.
15. If at any time during drilling a secant shaft is found to be out-of-tolerance, the secant shaft must be re-aligned and/or re-drilled to the requirements of this Special Note. In specific instances and with approval from the Engineer, secant shafts may be installed out-of-tolerance if the adjacent shafts are determined to be within-tolerance to the extent that overlap and the required minimum effective wall thickness are maintained along the entire length of all secant shafts. In no instances shall the effective width be less than the requirement of this Special Note and the Construction Plans.
16. Drilling should be performed in a manner that eliminates obstructions including but not limited to boulders, rocks, rubble, existing foundations, or timbers that may prevent the installation of shafts into bedrock, threaten shaft damage or cause shafts to drift from the required location.
17. Obstructions restricting installation of secant shafts to the specified shaft tip elevation must be removed.
18. Shafts must extend up to the elevation indicated in the Construction Plans. A tolerance of up to 2 inches above the indicated top of shaft elevation will be permitted. No point should the top of shafts be below elevation 519.5.

7.7 Concrete Placement

1. Prior to concrete placement, clean the bottom of each shaft with a muck bucket or other approved method. Continue cleaning until all loose soil, debris, cobbles, and other deleterious material have been removed.
2. Do not start concrete placement until verification measurements (i.e, final

depth sounding and verticality measurement), bottom cleaning, and quality confirmation have been completed, and the Engineer has accepted the shaft for concrete placement. Concrete shall be placed within 3 hours after reaching the required tip elevation to ensure proper depth and cleanliness unless otherwise directed by the Engineer. If the concrete cannot be (or is not) placed within the allotted time, the secant shaft must be re-inspected and reapproved by the Engineer prior to the placement of concrete.

3. Use lightweight concrete backfill to construct secant shafts located above and immediately adjacent to the existing 4'x4' RCBC through the embankment. The lightweight concrete mix shall be approved based on trial batch tests performed prior to use and shall meet requirements of this Special Note for unit weight and permeability. Protection of the existing RCBC shall be provided as necessary to prevent damage during the installation of secant shafts located adjacent to and above the RCBC. Any damage to the existing RCBC during construction of the secant shafts is the responsibility of the cutoff wall Specialty Contractor. Repair of any damage shall be performed without additional costs to the Department and with no extension of contract time.
4. Remove or reduce all cement balls or other improperly mixed concrete consisting of round lumps of cement, sand, and coarse aggregate as they exit the discharge chute of the mixer truck. A screen or other similar device may be required to capture or reduce the size of the cement balls. All cement balls greater than 3-inches in diameter shall be reduced or wasted.
5. Concrete shall be placed using tremie or free-fall methods. The method used to place concrete shall be determined based on the groundwater conditions present in secant shaft. If more than three inches of water is present at the bottom of the shaft, the tremie method shall be used. If less than three inches of water is present at the bottom of the shaft, either tremie or free-fall methods can be used, provided flow rates are satisfactory, as discussed below. Shafts containing less than three inches of water in the bottom prior to concrete placement are considered "dry". The flow of water into the shaft must be less than 12 inches per hour to use the free-fall method (See Item 6 below for details on testing flow rate into the shaft).
6. Visually inspect drill spoils during installation for the presence of excess water or moisture. Upon completion, use a flashlight or other high beam light capable of illuminating the bottom of the shaft to visibly confirm the presence of water. If visual inspection indicates the presence of water in the bottom of the shaft upon completion of drilling, a weighted tape should be used to measure the depth of water. If the bottom of the shaft is not visible from the surface, measure the depth of water using an electronic water level indicator. The in-flow rate and water level should be checked between hole completion and immediately prior to concrete placement. In-flow rates should be determined over a known time interval using water depths determined from either a weighted tape or electronic water level indicator.
7. Dewater secant shafts for free-fall concrete placement using drill buckets, water pumps, or other methods approved by the Engineer if more than 3-inches of water is present upon drill completion. Measure the depth of water and in-flow rate as required by this Special Note to confirm the secant shaft is "dry" prior to concrete placement.

8. Do not place concrete using the free-fall method without approval from Engineer or Inspector.
9. The flow of concrete shall be directed to the center of the shaft with a drop chute, funnel, or other approved centralizing device to keep the concrete from hitting the side of the shaft if free-fall method is used. A discharge deflector shall be used if required by the Engineer. Place concrete continuously to ensure no cold joints form.
10. A funnel and solid steel sections of pipe shall be used during concrete placement if the tremie method is required. Place the tremie pipe within 2 feet of the bottom of the secant shaft at the start of concrete placement. Always maintain a minimum of 10 feet of concrete above the bottom of the tremie pipe during placement. A sacrificial plug shall be used at the end of tremie pipe when inserting the pipe into water or concrete.
11. When using the tremie method, place concrete to the top of the casing and continue placement until all ground water and laitance is expelled. Once the casing is removed and there is no longer groundwater, concrete may be placed to the top of the secant shaft using the free-fall method.
12. A funnel-shaped hopper is required at the top of tremie pipes of a size capable of receiving and passing the concrete into the pipe at the capacity rate of the batching, mixing, and conveying equipment. The hopper shall not be made of aluminum.
13. Use a tremie pipe of a sufficient diameter to allow the free flow of concrete. The pipe should have a minimum nominal diameter of 10 inches or as approved by the Engineer.
14. Tremie pipe shall be made of steel and have watertight joints. Each section of pipe shall have threaded or gasketed slip coupled connections. For coupled connections, additional external rubber seals shall be provided around the coupling.
15. The tremie pipe and hopper shall be supported by means of a platform with bracing support to hold the pipe securely in place. Vertical movement should only occur when sections of pipe are removed to adjust the embedment depth. Means for lifting the pipe shall be stable and not allow the pipe to bounce. Horizontal movement of the tremie pipe will not be permitted.
16. Concrete shall be kept a minimum of 10 feet above the bottom of the temporary casing during extraction to ensure that concrete backfills the annular space created by the casing. A weighted tape should be used to confirm the required concrete head is maintained throughout placement.
17. Place concrete continuously without significant interruptions or delays.
18. Do not perform troweling, or other specialty concrete finishes, on the exposed top surface of completed secant shafts. A roughened finish should be used to promote a proper interface bond between the top of the secant shaft and the overlying road bed material.
19. Immediately after placement, concrete shall be protected from premature drying, extremes in temperature, rapid temperature change, and mechanical damage. Materials and equipment needed for adequate curing and protection shall be available prior to concrete placement.
20. Cover the tops of freshly poured secant shafts with insulated concrete blankets if the temperature drops below 40° F. Once the required minimum 28-day compressive strength has been attained and confirmed with

appropriate testing, concrete blankets are no longer required. If cold or hot weather concrete curing is not required, cover the top of the secant shafts with plywood sheeting for at least 24-hours following concrete placement.

21. Concrete shall be protected from damaging effects of rain for at least 12 hours and from flowing water or other fluids for at least 14 days. No excessive heat including welding, equipment exhaust, or heaters shall be permitted near concrete or concrete embedment's at any time.

7.8 Inspection of Shaft Installation:

1. Perform continuous inspection during secant shaft installation.
2. Visually inspect drill spoils to confirm the presence of competent rock, make note of rock depths on shaft logs.
3. Inspect all secant shaft verticality reports for compliance with tolerance requirements established in these Special Notes.

7.9 Survey Data:

1. Submit an as-built survey showing actual location and top elevation of each secant shaft within 7 calendar days of completing the wall installation. Do not proceed with placing roadway surface or rock roadbed 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 shaft to nearest half inch. Survey must be prepared and certified by a land surveyor licensed in the state of Kentucky.

7.10 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.

7.11 Verification Testing:

Perform verification testing on secant shafts according to the Construction Plans, the Standard Specifications, and the requirements below. In all cases, provide personnel and methods consistent with the approved testing plan submittal required by this Special Note. The testing locations for each core, water pressure test, falling head test, and CSL test will be determined by the Engineer. Up to ten verification testing locations will be selected by the Engineer. The results of water pressure tests will not be used as an acceptance criterion for the secant shafts but will be a supplemental in-situ test performed for information only. In addition, the Department may elect to perform other supplemental tests including, but not limited to, laboratory permeability tests on cores and closed-circuit television (CCTV) video camera inspections of core holes. CCTV inspections will allow the Department to visually assess the quality of

concrete along the hole sidewalls and the integrity of the interface joints. Construction operations shall not impede the Department's ability to perform any supplemental tests properly and safely. Aid the Department, as needed, to allow for all Department performed supplemental tests beyond those specified in this Special Note. Shaft excavation is not permitted within 50 feet of the verification testing. All verification tests and associated core holes shall be accessible to the Engineer.

1. Secant Shaft Concrete Core Holes:

   Approximately ten (10) secant shafts shall be cored full depth through the center of the shaft extending five (5) feet into bedrock. The center core hole plan locations ~~shall be submitted for approval prior to beginning drilling~~ will be determined by the Engineer. Concrete shall reach a minimum strength of 1500 psi before coring. Cores shall be extracted in up to 10-foot sections (maximum) or as practical, inspected, photographed, and logged in standard KYTC core boxes. Logging, handling, and storage of cores shall be performed in accordance with KYTC's current *Geotechnical Guidance Manual*. Core holes shall be NQ-3 (1.775" diameter) sized and performed in the center of the secant shaft. All holes shall remain open until the concrete cores have been accepted by the Engineer. If core holes are to remain open overnight, install a removable water-tight cap on the top of the holes.

   Core holes shall be tremie backfilled with a neat cement grout mix, batched on-site, consisting of a mixture approximately of 7 gallons of water to 94 lbs. of portland cement. The tremie pipe should be inserted to full depth of the verification core hole. When grout vents at the surface, the tremie shall be gradually withdrawn, maintaining grout in the pipe until completely removed. The top of the hardened grout shall be flush with the permanent guide wall or adjacent surface. Continued backfilling of the core holes may be required if settlement of the grout is observed at any point over the contract time.

   The concrete cores should be free of voids, inclusions of entrapped material, open or in-filled cracks, honeycombing, cold joints, uncemented aggregates, and open or in-filled concrete-rock contact. The verification cores should demonstrate continuity and cleanliness at the bedrock foundation contact. Contact the Engineer should any of these defects be encountered during verification coring or if a single core run has a recovery of less than 95%.

2. Water Pressure Tests in Core Holes:

   Approximately two (2) secant shafts shall be cored along the interface joint and have single-packer water pressure test(s) performed within the core hole. The water pressure test locations ~~shall be submitted for approval prior to the beginning of drilling~~ will be determined by the engineer. Cores shall be extracted in up to 5-foot sections (maximum) or as practical, inspected, photographed, and logged in standard KYTC core boxes. Logging, handling, and storage of cores shall be performed as discussed above. Core holes shall

be PQ-3 (3.270” core diameter) sized and performed along joint interface of the primary and secondary secant shafts. Reverse rotary drilling should be considered to produce a cleaner core hole that may be less suspectable to packer leakage. As noted above, the results of these tests will not be used as an acceptance criterion but will be a supplemental in-situ test performed for information only.

Each 5-foot core section shall be visually inspected upon recovery to ensure the core remains on the interface joint. Immediately terminate coring, regardless of depth, if a recovered core section no longer contains the interface joint. The Contractor or its subcontractor performing the water pressure tests shall note any core runs that depart from the interface joint. The Contractor or its subcontractor shall note the joint location being cored (i.e. Shaft 3 - Shaft 4 Interface) and the depth/elevation where the core run departed from the interface joint. Single-packer water pressure tests shall be performed at interval lengths not exceeding 10-feet as coring advances, which allows for the detection of localized high- or low-permeability zones along the interface joint. All permeability test cores shall terminate at a maximum depth of 5 feet above the bottom of concrete (shaft tip).

A single-packer system shall be used to estimate the in-situ permeability along the interface joint. Perform in-situ permeability tests in accordance with the U.S. Army Corps of Engineers (USACE), 1980, Standard RTH 381-80, “Suggested Method for In Situ Determination of Rock Mass Permeability Using Water Pressure Tests”. The maximum test pressure shall be based on the guidance of RTH 381-80 and should not exceed 0.5 psi per foot of depth (measured from the top of the shaft to the middle of the test interval) to prevent damage to the concrete and interface joint but should not be less than 0.4 psi per foot to account for the water pressure head expected during a flood event. For intervals at greater depths, the test pressure should not exceed 17.5 psi based on the maximum anticipated hydraulic loading conditions at the embankment dam. A minimum of three tests, each at an increased pressure, are required for each test interval. Procedures for establishing test pressures shall be submitted prior to construction as required by this Special Note.

The maximum interface joint permeability shall not exceed $1x10^{-6}$ cm/sec. Contact the Engineer should the estimated permeability exceed $1x10^{-6}$ cm/sec.

The packer system and test pressure shall be chosen by the testing firm to minimize or eliminate packer leakage during testing. All packers shall be at least 18-inches long, but longer packers are desired (greater than 3 to 4 feet). Longer packers provide additional bond length for successful seating against the core hole sidewalls. The packer sleeves shall have an allowable working

pressure of at least 500 psi to help prevent water leakage. Prior to pressure testing, surge the core hole with water to remove cuttings, dust, and concrete fragments that may inhibit a proper seal of the packer against the sidewall. If leakage is noted with the approved packer, the testing firm shall be prepared to perform the tests with sliding-end pneumatic, cup leather or mechanical packers in attempt to minimize leakage. To ensure the best possible seal, additional inflation (or tightening) of packers should be accomplished under each test pressure.

All core holes required for permeability tests shall remain open until the tests have been accepted by the Engineer. If holes are to remain open overnight, install a removable water-tight cap on the top of the holes. Core holes shall be tremie backfilled as described above for the verification concrete cores.

3. 24-Hour Falling Head Permeability Tests in Core Holes

Approximately two (2) secant shafts shall be cored along the interface joint and have a 24-hour falling head permeability test performed within the core hole. The 24-hour falling head permeability test locations ~~shall be submitted for approval prior to the beginning of drilling~~ will be determined by the engineer. Cores shall be performed, extracted, logged, and terminated as discussed above for the water pressure tests. Falling head tests should be performed on the entire core interval, and not on 10-foot interval lengths (max.) as required for the pressure tests.

Other requirements of the water pressure test, including the maximum joint permeability, hole protection, and grouting, apply to the falling head permeability test. The maximum interface joint permeability shall not exceed $1x10^{-6}$ cm/sec. Contact the Engineer should the estimated permeability exceed $1x10^{-6}$ cm/sec.

Execute the falling head test as follows. The test data should be reduced as shown in this Section. The methods presented below are based on pilot-scale evaluations of cutoff walls performed at Virginia Polytechnic Institute and State University (Virginia Tech) and documented in "*Soil-Bentonite Cutoff Walls: Hydraulic Conductivity and Contaminant Transport*" prepared by Jeremy P. Britton (August 8, 2001). The hydraulic conductivity should be estimated using the Hvorslev (1951) method which is provided below as Formula 1 and in Chapter 2 (p. 13) of the referenced guidance as Eq. 2-8. This method incorporates a 2D shape factor that accounts for the finite width of the cutoff wall and the proximity of the test core hole to the secant shaft walls. The 2D shape factors for use with the Hvorslev method are based on the width of the cutoff wall, B, and the test hole diameter, D. Shape factors are provided below as Figure 1 and were adapted from Figure 5-16a in Chapter 5 of the referenced guidance. Figure 1 omits shape factors that

consider the influence of filter cakes because this is not a soil-bentonite cutoff wall.

a) After completion of the core hole, install an automated water level recorder in the core hole. Allow the water level in the hole introduced by coring operations to stabilize. A stable water level is defined as a water level that is constant or rising at a rate less than 5 inches per hour. The stable water level shall be used as the initial water level for permeability measurement and subsequent calculations.
b) Record the water level prior to filling the core hole and initiate the falling head test by filling the hole with clean water to the top of the hole corresponding to the of the wall template/guide wall. Begin taking and recording readings in accordance with the approved testing plan.
c) Collect readings until ninety (90%) percent of the water head above the previously identified stable water level is reached or twenty-four (24) hours has passed, whichever comes first. The test duration shall not be less than 4 hours.
d) Calculate permeability using the following formula. Example calculations are shown below.

$$\mathrm{K\ (cm/sec)} = \frac{0.508 * \mathrm{A} * \ln(\mathrm{H1/H2})}{\mathrm{F(t2 - t1)}} \qquad \textbf{[Formula 1]}$$

Where:
K = hydraulic conductivity (permeability), cm/seconds;

A = cross sectional area of the test core hole, ft^2;

t = elapsed time, minutes;

H2 = head at time t2, ft;

H1 = head at time t1, ft;

F = Shape factor determined from Figure 1 below; and

On Figure 1 below:
L = length of test core hole (i.e., depth of core), ft;

B = element thickness (i.e., effective wall thickness) measured perpendicular to the wall axis at the verification hole location, ft; and

D = diameter of test hole, ft.

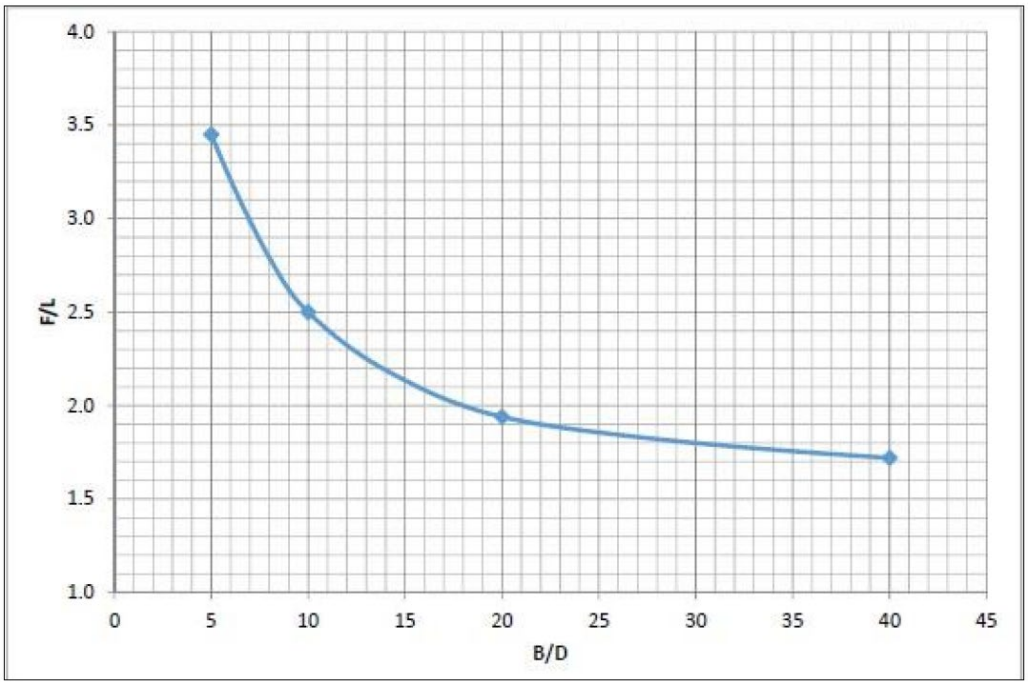

Figure 1. Secant Shaft Cutoff Wall Shape Factor for Core Hole Falling Head Permeability Test with Long Screened Interval Compared to Hole Diameter

(Adapted from "*Soil-Bentonite Cutoff Walls: Hydraulic Conductivity and Contaminant Transport",* Chapter 5, Figure 5-16a, page 132)

Example Calculations:

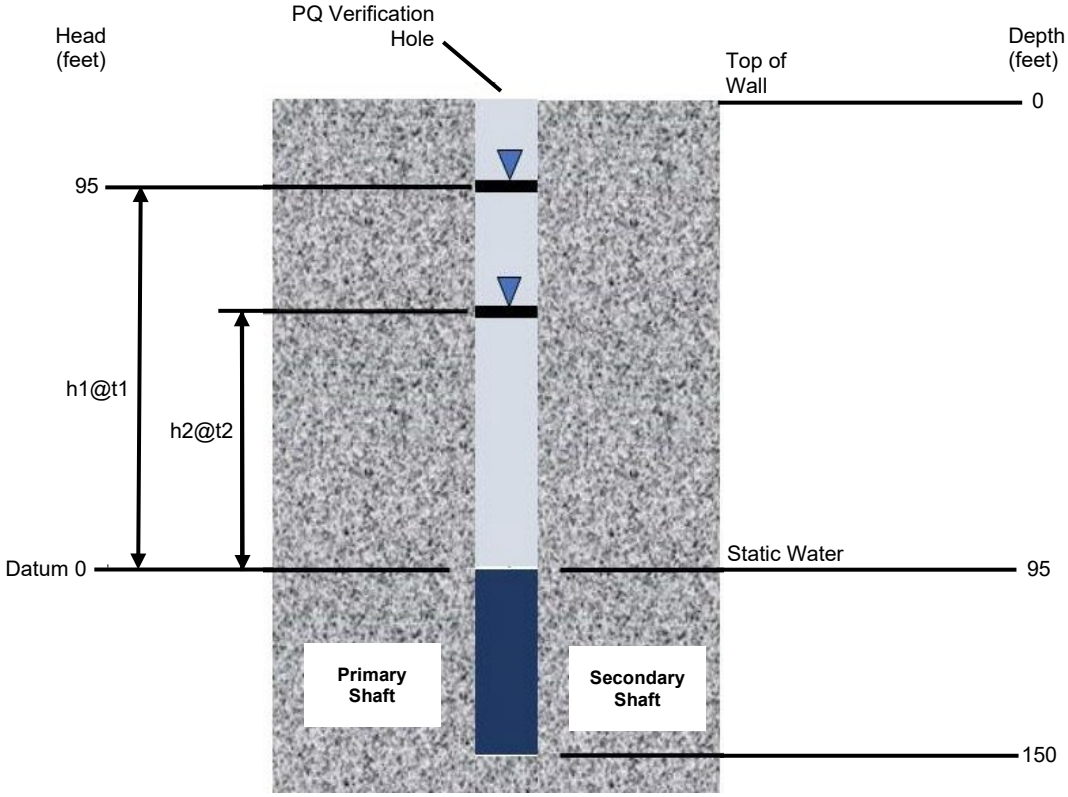

Figure 2: Core Hole Configuration for Falling Head Permeability Test Example Calculation

Assume the following (See Figures 1 to 3):

- Depth to Static Water Level = 95 feet
- Length of Core Hole, L = 150 feet
- Core Hole Diameter, D = 0.4025 feet (PQ-Sized)
- Core Hole Area, A = 0.127 ft^2
- Effective Wall Thickness, B = 2 feet
- B/D = 4.97 (~5) –
  - From Figure 1, F/L = 3.45

  Therefore,

  F = 3.45*L

  = 3.45*150 feet

  F = 517.5 feet

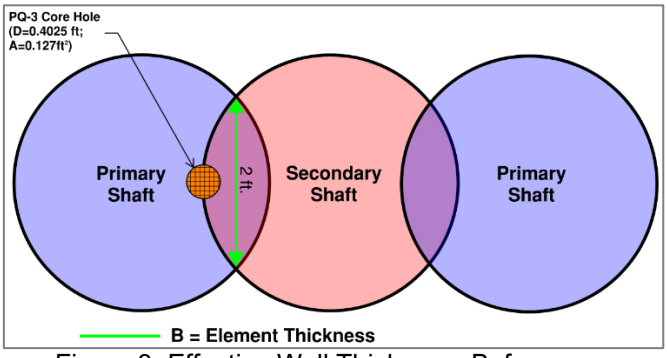

Figure 3: Effective Wall Thickness, B, for Falling Head Permeability Test Example

Times			Water Levels					
Interval No.	t1 (min)	t2 (min)	Initial (feet)	Final (feet)	h1 (feet)	h2 (feet)	k (ft/min)	k (cm/sec)
1	0.00	0.50	0.00	0.53	95.00	94.47	2.75E-06	1.39E-06
2	0.50	1.00	0.53	1.15	94.47	93.85	3.23E-06	1.64E-06
3	1.00	2.00	1.15	2.14	93.85	92.86	2.60E-06	1.32E-06
4	2.00	3.00	2.14	2.97	92.86	92.03	2.20E-06	1.12E-06
5	3.00	4.00	2.97	3.64	92.03	91.36	1.79E-06	9.11E-07
6	4.00	5.00	3.64	4.24	91.36	90.76	1.62E-06	8.21E-07
7	5.00	10.00	4.24	5.53	90.76	89.47	7.03E-07	3.57E-07
8	10.00	15.00	5.53	5.95	89.47	89.05	2.31E-07	1.17E-07
9	15.00	20.00	5.95	6.39	89.05	88.61	2.43E-07	1.24E-07
10	20.00	30.00	6.39	7.11	88.61	87.89	2.00E-07	1.02E-07
11	30.00	40.00	7.11	7.79	87.89	87.21	1.91E-07	9.68E-08
12	40.00	60.00	7.79	8.89	87.21	86.11	1.56E-07	7.91E-08
13	60.00	80.00	8.89	9.91	86.11	85.09	1.46E-07	7.43E-08
14	80.00	100.00	9.91	10.97	85.09	84.03	1.54E-07	7.81E-08
Total Test Duration	0.00	100.00	0.00	10.97	95.00	84.03	3.01E-07*	1.53E-07*

* Calculated using water level measurements over the entire test duration (i.e., from t1 = 0 min to t2 = 100 min).

4. Cross-Hole Sonic Logging (CSL) Testing:

   CSL testing shall be performed within ten (10) secondary secant shafts. CSL testing locations shall be submitted for approval prior to the beginning of drilling. Perform tests in accordance with the Special Note for Non-Destructive Testing in Secant Shafts included as Appendix C.

5. Supplemental Cores:

   Supplemental cores may be required when a defect has been encountered during verification testing or where deviation from the approved installation methods lead the Engineer to suspect other defects may be present. Locations of supplemental cores shall be determined by the Engineer. Drill and log the supplemental cores in the same manner as all standard verification cores unless otherwise directed by the Engineer. Supplemental cores are to be performed at no additional cost to the Department.

8.0 ACCEPTANCE REQUIREMENTS

8.1 Acceptance Criteria:

The secant shaft cutoff wall shall function as a long term, durable barrier against detrimental seepage flow and soil transport. The Department will evaluate the severity, frequency, and extent of defects to assess the cutoff wall elements. A secant shaft is considered acceptable when the following criteria are met:

1. The secant shaft is installed to the tip elevation into competent bedrock as shown in the Construction Plans.
2. The secant shaft satisfies the placement and installation criteria of Section 7.0 of this Special Note, including requirements for plumbness (verticality), joint overlap, effective wall thickness, and horizontal alignment established in Section 7.6.
3. Material tests, including but not limited to concrete tests, satisfy the material requirements of this Special Note established in Section 5.0.
4. The results of the verification testing program detailed in Section 7.11 do not indicate secants shaft defects, abnormalities, or in-situ falling head permeabilities greater than those required by this Special Note (See Section 7.11.3). The results of the water pressure tests are not included as part of the acceptance criterion.

8.2 Secant Shaft Rejection:

If a secant shaft 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 secant shafts, installation methods, and/or materials that do not satisfy the requirements of this Special Note. The Contractor shall propose alternative methods and/or materials for both a replacement and subsequent shafts. Upon receiving approval from the Engineer, install the replacement secant shafts as described by this Special Note or the approved alternative method. Methods of modifying completed shafts in lieu of replacement may be presented for review by the Engineer. Install replacement secant shafts or modify completed shafts at no additional cost to the Department and with no extension of contract time.
2. Contractor modifications may include but are not limited to; modifying the installation methods; modifying the installation equipment; and/or drilling additional secant shafts. Any modifications to the installation method and/or equipment must be approved by the Engineer prior to implementing. The secant shafts may not be shortened beyond the lengths shown in the Construction Plans, including the required bedrock embedment.

9.0 RECORDS

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

1. As-built drawings showing:
   a. The actual location of the secant shafts, including any deviation from specified tolerances and Contract location.
   b. The actual shaft tip and top elevation for each secant shaft.
   c. The diameter, overlap, and effective wall thickness of each secant shaft.
   d. The locations of any instrumentation installed and any required instrumentation records.
   e. The actual location of the permanent guide wall.
   f. Finished ground line elevations along the wall alignment.
   g. Type and location of any remedial work.
2. Other records as required by Section 106 of the Standard Specifications.
3. Construction Records including:
   a. Contractor’s name.
   b. Drill rig operator's name.
   c. Date and time of start and finish of installation for each shaft.
   d. Description of soils and rock encountered including upper and lower elevations and boundaries of each material type.
   e. Installation difficulties, unusual conditions, and/or subsurface anomalies.
   f. Deviations, quality issues, failing verification tests and corrective actions.
   g. Groundwater conditions, if encountered.
   h. Concrete records including: date, time and method concrete was placed; mix design and volume of concrete placed v. theoretical volume.
   i. Verticality reports reporting shaft deviation in two directions. Provide labels, units, and orientation. Include hole deviation plots at the base of the wall (shaft tips) showing deviations measured perpendicular and parallel to wall alignment, effective wall thickness, and shaft overlap.
   j. Other raw and processed data used to analyze excavations.
4. Verification testing reports including:
   a. Drill logs, concrete core logging, pictures of concrete cores.
   b. In-situ permeability test data and results with calculations.

10.0 MEASUREMENT AND PAYMENT

10.1 The Department will pay for the accepted quantities of ~~"Secant Shafts"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" ~~and "Secant Shafts With Lightweight Concrete"~~ at the contract unit bid price per ~~"Linear Foot"~~ "Square Foot" of secant shaft installed 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 secant shaft cutoff wall as described herein and shown in the Construction Plans. This may include but is not limited to the following items: ~~installing a permanent concrete guide wall (including overlap flowable fill),~~ drilling shafts, measuring verticality, placing concrete (either normal weight or lightweight), removing temporary casing, all required submittals and records, and other incidental items necessary to provide a complete permanent secant shaft cutoff wall. Earth moving, drainage, and any other earthwork necessary to complete this wall and not included in other bid items, is included as an incidental part of this work.

10.2 Additional areas and lengths 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 ~~linear~~ square feet of secant shafts is required, subject to acceptance by the Department, payment will be reduced due to the decrease in the ~~linear~~ square feet drilled.

10.3 All measurement will be based on plan dimensions or dimensions as ordered in writing.

10.4 Refer to Appendix A of this Special Note for Project Specific Measurement and Payment information.

Special Note for Secant Shaft Cutoff Wall
Appendix A – Project Specific Requirements

U.S. 62 – Sympson Lake Dam (Item # 04-5013.00)

A1.0 SECANT SHAFT CUTOFF WALL CONTRACTOR REQUIREMENTS

The requirements for the Secant Shaft Cutoff Wall Contractor are defined in Section 4 of this Note. Submit applicable documentation, including references, that the secant shaft cutoff wall contractor is pre-qualified by the Department for "Grouting for Ground Improvements" (Work Item I39) OR "Jet Grouting" (Work Item J20).

A2.0 SUBSURFACE CONDITIONS

The boring logs from drilling performed in 1976, 2024, and 2026 are presented on the Soil Profile Sheets in the Construction Plans. Subsurface conditions may vary between boring locations. Boulders and cobbles may be present within the dam embankment fill and may be encountered during secant shaft cutoff wall installation.

A3.0 ADDITIONAL CORE BORINGS

Contact the Engineer to request additional core borings if required to better characterize the bedrock surface along the secant shaft cutoff wall. A request does not guarantee approval for additional core borings. Additional core borings will only be approved if it is deemed that insufficient geotechnical data exists at select locations of the secant shaft cutoff wall. If approved, additional core borings will be performed by the Department's Geotechnical Services Branch. 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 performed in most of the borings along the secant shaft cutoff wall to confirm bedrock conditions.

A4.0 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 survey data and 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 secant shafts.

The existing highway plans are Drawing No. F 196(12) of State Project No. 90-305-8 dated 08-24-1962. The existing plans for U.S. 62 - Sympson Lake Dam contain limited alignment and section information. Plans for information only are accessible on the Department's Construction Procurement webpage, along with other project related information including the Geotechnical and Geophysical Reports.

A5.0 STAGING AREA

The location selection for the secant shaft cutoff wall 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, a 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.

A6.0 DRILLING WITHIN EMBANKMENT DAMS

Drilling is required to install the cutoff wall to the elevations shown on the Construction Plans. Exercise extreme care while drilling and backfilling within the embankment. Drilling shall be performed by rotary drilling techniques using temporary steel casing, soil and/or rock augers, and core barrels. Under no circumstances shall drilling be performed with the aid of water, air, or other downhole pressurized methods. Concrete backfilling of the shaft and annular space created by drilling shall be performed through temporary steel casing by the free-fall, tremie method or other approved non-*pressurized* method. Drill holes shall not be left unsupported at any point during construction and should always either be cased or backfilled. Temporary casing required by this Note shall only be extracted once concrete placement has commenced and a minimum of 10 feet of concrete is maintained above the tip of the casing. 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 bedrock elevations provided in the Construction Plans are based on the subsurface investigations performed in 1976, 2024, and 2026. Variations in the bedrock surface 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. The bedrock depths shown on the Plan are considered an estimate and will depend on the exact subsurface conditions along the entire cutoff wall alignment.

A7.0 GROUNDWATER CONTROL

Groundwater measurements were collected during the subsurface investigation at the time of drilling. Measured groundwater elevations within the borings drilled at the crest ranged from approximately 517.7 to 482.7 feet, with multiple borings not encountering an immediate groundwater table at the time of drilling. The groundwater elevation is expected to be greatly influenced by the water elevation in Sympson Lake. The Contractor shall be prepared for encountering groundwater during drilling and providing any necessary measures to control the groundwater.

A8.0 SITE INSPECTIONS

During construction, inspect the conditions of both the up- and downstream embankment slopes 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 secant shaft construction and requires corrective action, immediately take corrective actions necessary to stop the movement or perform repairs at no additional cost to the Department.

A9.0 FIELD ADJUSTMENTS AND CONSTRUCTION TOLERANCES

Field adjustments of individual shaft 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. Secant shafts that deviate from the Construction Plans shall be approved by the Engineer prior to installation.

A10.0 CONSTRUCTION SEQUENCE

The Contractor shall begin construction of the secant shaft cutoff wall at a station located to the left of the spillway (looking downstream). This location shall be submitted for approval and acceptance at least 14 days prior to beginning drilling. Shafts shall be sequenced to maximize drilling uptime and target areas that result in reduced seepage losses.

A11.0 SECANT SHAFT DEMONSTRATION PROGRAM

A secant shaft demonstration program shall be executed on the first 5 shafts, to confirm the approved materials and installation procedures can produce a continuous, hydraulic barrier through Sympson Lake Dam to the required depths shown on the Plans. Conduct the demonstration program using production secant shafts and do not construct sacrificial, test shafts. The demonstration program shall include the installation, verification testing, and acceptance of the first 5 shafts in accordance with this Special Note and the Construction Plans. Shafts constructed and tested as part of the program will be evaluated utilizing the acceptance requirements in Section 8.0 of the main body of this Special Note.

Verification testing required along this wall interval shall include a center concrete core, a CSL Test, and an interface joint concrete core with a 24-hour falling head permeability test. Submit the location of the proposed testing on the Construction Plans for each verification test type at least 14 days prior to beginning drilling. Do not continue the installation of subsequent shafts until verification test reports have been submitted, reviewed, and approved by the Engineer. Submitted verification test reports will be reviewed and returned to the Contractor within 5 working days. The demonstration program is incidental to bid items for ~~"Secant Shafts" and "Secant Shafts With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock". No additional compensation or extension of contract time will be made for the demonstration test program.

A12.0 PROVISIONS FOR WALL INSTALLATION AT THE EXISTING RCBC

An abbreviated construction sequence for installing lightweight secant shafts above and adjacent to the existing RCBC through the embankment shall be submitted as part of the Construction Plans. After acceptance of the plan by KYTC Division of Construction and Geotechnical Services Branch, deviation from the general progression of this sequence is not permitted except by formal approval. Certain ancillary aspects of the construction sequence may only be altered with written approval from the Engineer.

Secant shafts constructed over and immediately beside the RCBC shall be constructed using lightweight concrete in accordance with this Special Note. Lightweight concrete is required at these locations to minimize both lateral and compressive loads on the existing RCBC from the new cutoff wall.

A13.0 SUMMARY OF SPT SAMPLE AND CORE BORINGS

The 2024 Geotechnical Investigation consisted of performing 10 continuous Standard Penetration Test (SPT) and Shelby Tube (ST) sample borings with rock coring in October and November of 2024 along the crest of Sympson Lake Dam embankment. An additional two (2) SPT and Shelby Tube (ST) sample borings with rock coring were performed along the toe of the embankment in November of 2024.

Additional geotechnical explorations were performed in 2026 at the project site to collect additional rock information. A total of eight (8) primary (required) and two (2) secondary (optional) borings were performed as part of this investigation. Boring 1017P is the only boring anticipated to have SPT samples collected, the rest of the borings were advanced to the top of bedrock where rock coring was performed to the target elevation of 430.0 ft.

Bedrock depths and core recovery/RQD values are provided in the table below. The Contractor shall use the information provided in the table below to verify the estimated bedrock line shown on the Construction Plans, as well as to identify appropriate methods for installing the shafts that meets the requirements of this Special Note.

Hole No.	Latitude (ft)	Longitude (ft)	Elev. (ft)	Bedrock Depth (ft.)	Bedrock Core		
					Sample Depth (ft.)	RQD (%)	REC (%)
B-1001	37.806675	-85.510236	533.6	66.3	66.3’ - 69.8’	0	86
					69.8’ - 74.8’	62	100
					74.8’ - 79.8’	94	100
					79.8’ - 84.8’	92	100
					84.8’ - 87.1’	91	100
B-1002	37.806630	-85.509810	529.9	72.5	72.5’ - 75.0’	36	64
					75.0’ - 80.0’	76	100
					80.0’ - 85.0’	82	100
					85.0’ - 90.0’	96	98
					90.0’ - 93.7’	59	97
B-1003	37.806578	-85.509383	528.7	72.3	72.3’ - 74.3’	35	50
					74.3’ - 79.3’	62	98
					79.3’ - 84.3’	84	100
					84.3’ - 89.3’	70	94
					89.3’ - 94.3’	88	100
B-1004	37.806515	-85.508904	529.2	67.3	67.3’ - 70.0’	56	89
					70.0’ - 75.0’	76	98
					75.0’ - 80.0’	78	92
					80.0’ - 85.0’	92	100
					85.0’ - 88.0’	90	100
B-1005	37.806461	-85.508476	529.8	35.9	35.9’ - 37.3’	29	100
					37.3’ - 42.3’	0	84
					42.3’ - 47.3’	78	100
					47.3’ - 52.3’	32	56
					52.3’ - 56.0’	0	62
					56.0’ - 62.3’	24	65
					62.3’ - 67.3’	-	100
B-1006	37.806408	-85.508074	529.8	16.4	16.4’ - 20.7’	65	95
					20.7’ - 25.7’	66	100
					25.7’ - 30.7’	80	100
					30.7’ - 35.7’	56	94
B-1007	37.806533	-85.409827	530.3	72.9	72.9’ - 78.0’	75	100
B-1008	37.806413	-85.508857	529.4	68.0	68.0’ - 74.0’	8	55
					74.0’ - 79.0’	88	100
B-1009	37.805963	-85.508953	469.0	14.3	14.3’ - 19.3’	84	100
B-1010	37.806373	-85.508518	529.7	50.2	50.2’ - 55.2’	50	100
B-1011	37.805911	-85.508636	469.1	14.5	14.5’ - 20.3’	40	100

Hole No.	Latitude (ft)	Longitude (ft)	Elev. (ft)	Bedrock Depth (ft.)	Bedrock Core		
					Sample Depth (ft.)	RQD (%)	REC (%)
B-1012	37.806290	-85.507838	530.1	16.0	16.0’ - 21.0’	62	100
B-1013P	37.8067713	-85.5109548	541.9	49.0	49.0’ - 53.8’	100	100
					53.8’ - 59.0’	96	96
					59.0’ - 64.0’	100	100
					64.0’ - 69.0’	92	100
					69.0’ - 74.1’	100	100
					74.1’ - 79.1’	92	100
					79.1’ - 84.0’	100	100
					84.0’ - 89.0’	100	100
					89.0’ - 94.0’	98	98
					94.0’ - 99.0’	100	100
					99.0’ - 104.0’	100	100
					104.0’ - 109.0’	100	100
					109.0’ - 112.0’	96	96
B-1014P	37.8067323	-85.5106815	538.4	55.0	55.0’ - 59.1’	65	100
					59.1’ - 64.1’	100	100
					64.1’ - 69.1’	92	100
					69.1’ - 74.1’	90	100
					74.1’ - 79.1’	100	100
					79.1’ - 84.1’	100	100
					84.1’ - 89.1’	92	100
					89.1’ - 94.1’	100	100
					94.1’ - 99.1’	100	100
					99.1’ - 104.1’	100	100
					104.1’ - 109.1’	100	100
B-1015P	37.8066979	-85.5103905	535.0	63.5	63.5’ - 64.6’	77	100
					64.6’ - 69.4’	89	100
					69.4’ - 74.4’	86	100
					74.4’ - 79.4’	100	100
					79.4’ - 84.4’	90	100
					84.4’ - 89.4’	100	100
					89.4’ - 94.4’	100	100
					94.4’ - 99.4’	100	100
					99.4’ - 104.4’	100	100
					104.4’ - 107.8’	100	100

Hole No.	Latitude (ft)	Longitude (ft)	Elev. (ft)	Bedrock Depth (ft.)	Bedrock Core		
					Sample Depth (ft.)	RQD (%)	REC (%)
B-1016P	37.8066627	-85.5100995	532.2	75.5	75.2’ - 79.0’	53	100
					79.0’ - 84.0’	86	100
					84.0’ - 89.0’	98	100
					89.0’ - 94.2’	100	100
					94.2’ - 99.0’	100	100
					99.0’ - 100.1’	73	100
B-1017P	37.8064642	-85.5085092	529.7	44.5	44.4’ - 48.8’	11	100
					48.8’ - 53.8’	86	100
					53.8’ - 58.8’	52	100
					58.8’ - 63.8’	80	100
					63.8’ - 68.8’	94	100
					68.8’ - 73.8’	100	100
					73.8’ - 78.8’	100	100
					78.8’ - 83.8’	96	100
					83.8’ - 88.8’	100	100
					88.8’ - 93.8’	100	100
					93.8’ - 98.8’	94	98
					98.8’ - 103.9’	100	100
B-1018P	37.8064282	-85.5082199	529.8	24.5	24.5’ - 29.5’	40	90
					29.5’ - 34.5’	76	100
					34.5’ - 39.5’	82	100
					39.5’ - 44.5’	92	98
					44.5’ - 49.5’	92	100
					49.5’ - 54.5’	100	100
					54.5’ - 59.5’	100	100
					59.5’ - 64.5’	92	100
					64.5’ - 69.5’	70	100
					69.5’ - 74.5’	92	100
					74.5’ - 79.5’	100	100
					79.5’ - 84.5’	94	100
					84.5’ - 89.5’	100	100
					89.5’ - 94.5’	100	100
					94.5’ - 99.5’	88	100
					99.5’ - 104.5’	100	100

Hole No.	Latitude (ft)	Longitude (ft)	Elev. (ft)	Bedrock Depth (ft.)	Bedrock Core		
					Sample Depth (ft.)	RQD (%)	REC (%)
B-1019P	37.8063988	-85.5079625	529.5	13.6	10.5’ - 13.6’	0	0
					13.6’ - 18.6’	96	96
					18.6’ - 23.6’	100	100
					23.6’ - 28.6’	100	100
					28.6’ - 33.6’	90	100
					33.6’ - 38.6’	100	100
					38.6’ - 43.6’	96	98
					43.6’ - 48.6’	98	100
					48.6’ - 53.6’	100	100
					53.6’ - 58.6’	100	100
					58.6’ - 63.6’	92	100
					63.6’ - 68.6’	92	100
					68.6’ - 73.6’	100	100
					73.6’ - 78.6’	100	100
					78.6’ - 83.6’	96	100
					83.6’ - 88.6’	100	100
					88.6’ - 93.6’	100	100
					93.6’ - 98.6’	100	100
					98.6’ - 103.0’	98	98
B-1020P	37.8063667	-85.5077061	530.2	5.5	5.5’ - 9.4’	79	97
					9.4’ - 14.2’	94	100
					14.2’ - 19.2’	92	100
					19.2’ - 24.4’	96	100
					24.4’ - 29.4’	100	100
					29.4’ - 34.4’	100	100
					34.4’ - 39.1’	100	100
					39.1’ - 44.1’	96	100
					44.1’ - 49.1’	98	100
					49.1’ - 54.1’	100	100
					54.1’ - 58.9’	100	100
					58.9’ - 63.9’	96	100
					63.9’ - 68.9’	98	100
					68.9’ - 73.9’	98	98
					73.9’ - 78.9’	100	100
					78.9’ - 83.9’	94	100

Hole No.	Latitude (ft)	Longitude (ft)	Elev. (ft)	Bedrock Depth (ft.)	Bedrock Core		
					Sample Depth (ft.)	RQD (%)	REC (%)
					83.9’ - 88.9’	100	100
					88.9’ - 93.9’	100	100
					93.9’ - 98.9’	90	100
					98.9’ - 103.9’	100	100
B-1021S	37.8068093	-85.5112603	546.7	39.0	39.0’ - 39.3’	0	100
					39.3’ - 44.3’	94	100
					44.3’ - 49.3’	100	100
					49.3’ - 54.3’	74	82
					54.3’ - 59.3’	100	100
					59.3’ - 64.3’	98	100
					64.3’ - 69.3’	100	100
					69.3’ - 74.3’	100	100
					74.3’ - 79.3’	100	100
					79.3’ - 84.3’	100	100
					84.3’ - 89.3’	100	100
					89.3’ - 94.3’	100	100
					94.3’ - 99.3’	98	100
					99.3’ - 104.3’	100	100
					104.3’ - 109.3’	100	100
					109.3’ - 114.3’	92	100
					114.3’ - 119.3’	100	100
B-1023S	37.8063346	-85.5074497	531.7	4.0	4.0’ - 9.0’	100	100
					9.0’ - 14.0’	86	100
					14.0’ - 19.2’	98	100
					19.2’ - 24.2’	100	100
					24.2’ - 29.1’	100	100
					29.1’ - 34.1’	100	100
					34.1’ - 39.0’	98	100
					39.0’ - 44.0’	100	100
					44.0’ - 49.0’	92	98
					49.0’ - 54.0’	100	100
					54.0’ - 59.0’	100	100
					59.0’ - 64.0’	94	100
					64.0’ - 69.0’	90	100
					69.0’ - 74.0’	100	100

Hole No.	Latitude (ft)	Longitude (ft)	Elev. (ft)	Bedrock Depth (ft.)	Bedrock Core		
					Sample Depth (ft.)	RQD (%)	REC (%)
					74.0’ - 79.0’	100	100
					79.0’ - 84.0’	92	100
					84.0’ - 89.2’	96	100
					89.2’ - 94.0’	94	100
					94.0’ - 99.1’	96	100
					99.1’ - 104.1’	98	100

Notes:
(1) All locations surveyed in NAD 83 datum.

A14.0 TOP OF BEDROCK ELEVATIONS

The 2024 geotechnical exploration for this project consisted of continuous SPT and Shelby Tube sample borings with rock coring performed at various lengths for each boring. The 2026 geotechnical exploration consisted of rock coring performed at various lengths for each boring. Sample locations and intervals are shown on the Driller’s and/or Geologist’s Subsurface Log in Appendix B. The embankment is known to be constructed as a zoned embankment with a rock fill shell consisting of shot rock, boulders, cobbles, and varying amounts of rock fragments, as well as a clay core with varying sand content. The bedrock depths presented in A13.0 are based on the Geologist or Engineer’s evaluation of rock core specimens obtained from the rock core borings.

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 secant shafts shall be installed to the tip elevations shown on the Construction Plans. 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.

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

A15.0 PIEZOMETERS

KYTC’s Geotechnical Services Branch has installed vibrating wire piezometers at borings on the south side of U.S. 62 performed as part of the 2024 geotechnical investigation. The Contractor and their subcontractors shall maintain access to the data collection boxes located on the south side of U.S. 62 at all times.

Data cables for piezometers within Borings B-1007 and B-1012 are buried along the East-bound shoulder of U.S. 62. The data cables run parallel to the guardrail and are located approximately three feet North of the existing guardrail and buried at a depth of 12 to 18 inches below the ground surface.

Vibrating wire piezometers at Sympson Lake Dam are not expected to be impacted by the installation of the cutoff wall, however required widening of the east-bound lane for the Maintenance of Traffic will require excavations that ~~could~~ will impact the piezometer cables. Before any excavation is performed in this area contact the KYTC's Geotechnical Services Branch. KYTC will remove the cables at the data collectors prior to roadway excavation within the eastbound lane to prevent damage to the instruments. Upon completion of excavation and prior to backfilling to the required roadway section, the Contractor shall notify the KYTC's Geotechnical Branch to allow for splicing, rerouting, and reinstallation of the cables beneath the new roadway section. Piezometers will be used to monitor piezometric readings within the embankment during construction. Instrumentation destroyed by the Contractor or any subcontractors shall be replaced at the Contractor's expense.

A16.0 SECANT SHAFT GUIDE WALL AND APPURTENANT STRUCTURE RESTORATION

Portions of the existing reinforced concrete wing walls (upstream) and associated chain link fence shall be removed as necessary to permit construction of the secant shaft guide wall and/or secant shaft as shown in the Construction Drawings. Removal operations shall be conducted in a manner that prevents damage to adjacent structures and remaining portions of the wing wall and fence system.

After completion of the secant shaft guide wall and secant wall, the removed portions of the reinforced concrete wing wall shall be reconstructed in kind to match the existing dimensions, reinforcing steel configuration, concrete finish, and alignment.

All reinforcing steel removed or damaged during construction shall be replaced with new reinforcing steel of equivalent size, grade, spacing, and development. Doweling and anchorage into the remaining existing concrete shall be provided as necessary to achieve structural continuity.

The existing chain link fence, including posts, rails, fabric, fittings, and appurtenances removed or damaged during construction, shall be replaced in kind to match the existing fence alignment, height, and configuration.

The Contractor shall provide all labor, materials, excavation, forming, temporary support, reinforcing steel, dowels, drilling, concrete removal, fence removal, disposal, concrete placement, fence reinstallation, finishing, curing, and incidentals necessary to complete the work. Payment for this work shall be made under the respective bid items shown in the Contract Drawings, including Remove Concrete Masonry, Concrete Class A, Steel Reinforcement, and Remove and Replace Fence.

A16.0 MEASUREMENT AND PAYMENT

A16.1 The Department will measure and pay for the accepted quantity of ~~"Secant Shafts" and "Secant Shafts With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" as described in the Construction Plans, Section 10 of this Special Note, and below, at the contract unit bid price per ~~Linear~~ Square Foot of secant shaft. The Department considers payment as full compensation for all costs and delays associated with secant shafts including but not limited to all materials, concrete, handling, storing, labor, equipment, tools, demonstration program, and incidentals necessary to complete the work as necessary by this Special Note.

A16.2 Measurement of ~~"Secant Shafts" and "Secant Shafts With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" will be in ~~linear~~ square foot drilled, to the nearest square foot, from the shaft tip to the top elevation and horizontal limits shown on the Construction Plans. Waste spoil generated by the removal of the secant shaft overlaps will not result in a deduction in payment. Secant shafts extending above the top elevation and beyond the horizontal limits shown on the Constructions Plans will be considered as waste. Payment will not be made for rejected secant shafts or secant shafts classified as waste by the Engineer. For secant shafts directed to be terminated before reaching the estimated tip elevation shown in the Construction Plans, the payment reduction will be measured as the difference between the total ~~length~~ area of shaft shown on the plans for that location and the ~~length~~ area of shaft installed below the plan top elevation.

A16.3 The ~~"Secant Shafts" and "Secant Shafts With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" 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 locations. The ~~"Secant Shafts" and "Secant Shafts With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" quantities shown in the Construction Plans shall therefore be considered an estimate and may fluctuate based on the exact subsurface conditions along secant shaft element of the cutoff wall.

A16.4 Adjustment of base bid unit quantities for ~~"Secant Shafts" and "Secant Shafts With Lightweight Concrete"~~ "Secant Shaft-Common", "Secant Shaft-Solid Rock", "Secant Shaft W/LT WT Concrete-Common", and "Secant Shaft W/LT WT Concrete-Solid Rock" shall be made in accordance with contract unit prices. Adjustment will be made on the total ~~linear~~ square foot of each item performed. In the event a decrease in quantity of secant shafts is required, subject to acceptance by the Department, payment will be reduced in accordance with the contract unit prices. Additional areas of secant shafts required where the bedrock surface and boulder/obstruction fields differ from those shown in the Construction Plans or for other unforeseen conditions, will be paid at the contract unit prices.

A16.5 The Department will pay for cutoff wall verification tests at the contract unit bid prices for "Secant Shafts Concrete Cores", "24-Hour Falling Head Tests in Cores", and "Water Pressure Tests in Cores (Single Packer)" at the quantities shown in the Construction Plans. It should be assumed that one mobilization will be required per verification test. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for performing secant shaft cores and in-situ permeability tests as described herein and shown in the Construction Plans.

A16.6 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.

A16.7 The Department will measure and pay for the accepted quantity of "Foundation Preparation" required to prepare the area upstream of the spillway for installation of the secant pile cutoff wall. The Department considers payment as full compensation for all costs and delays associated with foundation preparation including but not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note.

A16.8 The Department will measure and pay for the accepted quantity of "Secant Shaft Guide Wall" in Linear Feet. The Department considers payment as full compensation for all costs and delays associated with construction of the secant shaft guide wall, including, but not limited to, all materials, labor, equipment, tools, and incidentals necessary to complete the work as required by this Special Note and the Construction Drawings. This will constitute full compensation for all costs for both reinforced and unreinforced portions of the guide wall and shall include concrete, flowable fill, temporary forming and support, placement, finishing, curing, and all other incidental items required to complete the work as described herein and in the Construction Drawings.

Code	Pay Item	Pay Unit
~~26207ED~~	~~Secant Shafts~~	~~Linear Foot~~
~~26212EC~~	~~Secant Shafts With Lightweight Concrete~~	~~Linear Foot~~
26322ED	Secant Shaft-Common	Square Foot
26323ED	Secant Shaft-Solid Rock	Square Foot
26324ED	Secant Shaft W/LT WT Concrete-Common	Square Foot
26325ED	Secant Shaft W/LT WT Concrete-Solid Rock	Square Foot
26326ED	Secant Shaft Guide Wall	Linear Foot
24550EC	Vibration Monitoring	Lump Sum
26203EC	Secant Shaft Concrete Cores	Each
26202EC	Water Pressure Tests in Cores (Single Packer)	Each
26201EC	24-Hour Falling Head Permeability Tests in Cores	Each
8003	Foundation Preparation	LS

Special Note for Secant Shaft Cutoff Wall
Appendix B – Data from Previous Subsurface Explorations

U.S. 62 – Sympson Lake Dam (Item # 04-5013.00)

Sympson Lake Dam - 2026 Proposed Borings

Legend

- 2026 Proposed Borings (Rock Core)
- 2026 Proposed Borings (Undisturbed Sample & Rock Core)
- 2024 Borings
- 1979 Borings
- 1976 Borings
- Barrier Wall Extents

2026 Proposed Boring Information

Hole ID	Easting	Northing	Approx. Surface Elevation (feet)	Approx Depth to Rock (Feet)	Total Depth (Feet)
1013P	4990307.9	3817422.0	542.3	30	115
1014P	4990386.9	3817408.0	538.9	47	110
1015P	4990471.0	3817395.7	535.1	61	105
1016P	4990555.1	3817383.1	532.5	70	105
1017P	4991014.7	3817312.0	529.8	35	100
1018P	4991098.3	3817299.1	529.9	18	100
1019P	4991172.7	3817288.6	529.8	8	100
1020P	4991246.8	3817277.1	530.2	6	100
1021S	4990219.6	3817435.6	546.9	24	120
1022S	4990966.0	3817318.1	529.9	56	100
1023S	4991320.9	3817265.6	531.8	5	105

P = Primary S = Secondary

*Targeting a final depth of elevation 430'

This drawing was produced in 2026 and contains the locations of the borings performed in 2024 and 2026.

Driller's Subsurface Log for B-1001

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1001***	Immediate Water Depth ***18.0 (10/30/24)***	Start Date ***10/30/2024***	Hole Type ***core and sample***
Surface Elevation ***533.6'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig_Number ***CME 85***
Total Depth ***87.1'***	Driller ***D. Clements***	Latitude(83) ***37.806675***	
Location ***+ 'Lt.***		Longitude(83) ***-85.510236***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
532.9	0.7	Medium stiff, brown, slightly moist, sandy clay with gravel.	SS-01	0.0-1.5	0.8	10-5-4	SPT	
			SS-02	1.5-3.0	1.2	4-6-7	SPT	
5			ST-01	3.0-5.0	1.3		ST	5
			SS-03	5.0-6.5	1.1	14-8-8	SPT	
			SS-04	6.5-8.0	0.5	11-8-7	SPT	
10		Medium stiff to stiff, brown, slightly moist, clay with gravel.	ST-02	8.0-10.0	0.0		ST	10
			SS-05	10.0-11.5	1.2	1-3-6	SPT	
			SS-06	11.5-13.0	1.1	6-6-5	SPT	
15			ST-03	13.0-15.0	0.9		ST	15
			SS-07	15.0-16.5	1.2	3-3-3	SPT	
515.6	18.0		SS-08	16.5-18.0	1.4	2-9-10	SPT	
20			ST-04	18.0-20.0	0.8		ST	20
		Soft to medium stiff, brown, moist to wet, clay with gravel.	SS-09	20.0-21.5	1.5	0-2-2	SPT	
510.6	23.0		SS-10	21.5-23.0	1.1	1-1-6	SPT	
25			ST-05	23.0-25.0	0.6		ST	25
			SS-11	25.0-26.5	0.9	3-6-7	SPT	
		Stiff to very stiff, brown to reddish brown, moist to wet, clay with gravel.	SS-12	26.5-28.0	0.6	7-13-14	SPT	
30			ST-06	28.0-30.0	1.7		ST	30
502.1	31.5		SS-13	30.0-31.5	1.1	1-3-6	SPT	
			SS-14	31.5-33.0	1.0	4-5-5	SPT	
35			ST-07	33.0-35.0	1.7		ST	35
			SS-15	35.0-36.5	1.2	4-6-6	SPT	
			SS-16	36.5-38.0	1.2	5-6-8	SPT	
40			ST-08	38.0-40.0	1.4		ST	40
		Stiff to hard, dark brownish gray, moist to wet, clay with gravel.	SS-17	40.0-41.5	1.3	5-9-11	SPT	
			SS-18	41.5-43.0	1.3	8-15-13	SPT	
45			ST-09	43.0-45.0	1.6		ST	45
			SS-19	45.0-46.5	1.5	6-7-10	SPT	
			SS-20	46.5-48.0	1.5	7-11-11	SPT	
50			ST-10	48.0-50.0	1.2		ST	50

Driller's Subsurface Log for B-1001 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1001***	Immediate Water Depth ***18.0 (10/30/24)***	Start Date ***10/30/2024***	Hole Type ***core and sample***
Surface Elevation ***533.6'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig_Number ***CME 85***
Total Depth ***87.1'***	Driller ***D. Clements***	Latitude(83) ***37.806675***	
Location ***+ 'Lt.***		Longitude(83) ***-85.510236***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden						
		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
		Stiff to hard, dark brownish gray, moist to wet, clay with gravel.	SS-21	50.0-51.5	1.5	8-11-21	SPT	
			SS-22	51.5-53.0	1.1	6-19-19	SPT	
			SS-23	53.0-54.5	1.5	10-10-18	SPT	
55			SS-24	54.5-56.0	1.5	16-14-20	SPT	55
			SS-25	56.0-57.5	1.0	12-16-20	SPT	
			SS-26	57.5-59.0	1.2	10-11-14	SPT	
60			SS-27	59.0-60.5	1.1	16-30-19	SPT	60
			SS-28	60.5-62.0	1.0	7-13-17	SPT	
			SS-29	62.0-63.5	0.2	8-8-20	SPT	
65			SS-30	63.5-65.0	1.5	5-18-22	SPT	65
467.3	66.3	(Begin Core)	SS-31	65.0-66.3	1.3	18-26-50/0.30'	SPT	
465.8	67.8	Gray limestone with shale.	0 / -	3.5	3.0	86		
70 463.3	70.3	Brown clay seam.						69.8 70
			62 / -	5.0	5.0	100		
75								74.8 75
			94 / -	5.0	5.0	100		
80		Gray limestone with shale.						79.8 80
			92 / -	5.0	5.0	100		
85								84.8 85
446.5	87.1		91 / -	2.3	2.3	100		87.1
90		(Bottom of Hole 87.1')						90
95		Backfilled with cement-bentonite grout.						95
100								100

Geologist's Subsurface Log for B-1001

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1001***	Immediate Water Depth ***18.0 (10/30/24)***	Start Date ***10/30/2024***	Hole Type ***core and sample***
Surface Elevation ***533.6'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig Number ***CME 85***
Total Depth ***87.1'***	Driller ***D. Clements***	Latitude(83) ***37.806675***	***GQ-737 Cravens***
Location ***0+01.00 CL***	Geologist	Longitude(83) ***-85.510236***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			SS-01	0.0-1.5	0.8	10-5-4	SPT	
			SS-02	1.5-3.0	1.2	4-6-7	SPT	
5			ST-01	3.0-5.0	1.3		ST	5
			SS-03	5.0-6.5	1.1	14-8-8	SPT	
			SS-04	6.5-8.0	0.5	11-8-7	SPT	
10			ST-02	8.0-10.0	0.0		ST	10
			SS-05	10.0-11.5	1.2	1-3-6	SPT	
			SS-06	11.5-13.0	1.1	6-6-5	SPT	
15			ST-03	13.0-15.0	0.9		ST	15
			SS-07	15.0-16.5	1.2	3-3-3	SPT	
			SS-08	16.5-18.0	1.4	2-9-10	SPT	
20			ST-04	18.0-20.0	0.8		ST	20
			SS-09	20.0-21.5	1.5	0-2-2	SPT	
			SS-10	21.5-23.0	1.1	1-1-6	SPT	
25		**Overburden**.	ST-05	23.0-25.0	0.6		ST	25
			SS-11	25.0-26.5	0.9	3-6-7	SPT	
			SS-12	26.5-28.0	0.6	7-13-14	SPT	
30			ST-06	28.0-30.0	1.7		ST	30
			SS-13	30.0-31.5	1.1	1-3-6	SPT	
			SS-14	31.5-33.0	1.0	4-5-5	SPT	
35			ST-07	33.0-35.0	1.7		ST	35
			SS-15	35.0-36.5	1.2	4-6-6	SPT	
			SS-16	36.5-38.0	1.2	5-6-8	SPT	
40			ST-08	38.0-40.0	1.4		ST	40
			SS-17	40.0-41.5	1.3	5-9-11	SPT	
			SS-18	41.5-43.0	1.3	8-15-13	SPT	
45			ST-09	43.0-45.0	1.6		ST	45
			SS-19	45.0-46.5	1.5	6-7-10	SPT	
			SS-20	46.5-48.0	1.5	7-11-11	SPT	
50			ST-10	48.0-50.0	1.2		ST	50

Top of Rock = 66.3'
Elevation = 467.3'

Base Weathered Rock = 70.7'
Elevation = 462.9'

Drakes Formation
Bardstown Member

Geologist's Subsurface Log for B-1001 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1001***	Immediate Water Depth ***18.0 (10/30/24)***	Start Date ***10/30/2024***	Hole Type ***core and sample***
Surface Elevation ***533.6'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig Number ***CME 85***
Total Depth ***87.1'***	Driller ***D. Clements***	Latitude(83) ***37.806675***	***GQ-737 Cravens***
Location ***0+01.00 CL***	Geologist	Longitude(83) ***-85.510236***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden / Rock Core	Std/Ky RQD					
		Overburden.	SS-21	50.0-51.5	1.5	8-11-21	SPT	
			SS-22	51.5-53.0	1.1	6-19-19	SPT	
			SS-23	53.0-54.5	1.5	10-10-18	SPT	
55			SS-24	54.5-56.0	1.5	16-14-20	SPT	55
			SS-25	56.0-57.5	1.0	12-16-20	SPT	
			SS-26	57.5-59.0	1.2	10-11-14	SPT	
60			SS-27	59.0-60.5	1.1	16-30-19	SPT	60
			SS-28	60.5-62.0	1.0	7-13-17	SPT	
			SS-29	62.0-63.5	0.2	8-8-20	SPT	
65			SS-30	63.5-65.0	1.5	5-18-22	SPT	65
467.3	66.3	(Begin Core)	SS-31	65.0-66.3	1.3	18-26-50/0.30'	SPT	
465.8	67.8	**Limestone**: *Greenish-gray, moderately weathered, argillaceous.*	0 / 0	3.5	3.0	86		
70 463.3	70.3	**Cored Overburden**: *Brown, clay seam.*						69.8 70
461.4	72.2	**Limestone**: *Light gray, moderately weathered, clastic with dark gray shale wisps, thinly bedded.*	62 / 26	5.0	5.0	100		
75								74.8 75
			94 / 84	5.0	5.0	100		
80		**Limestone**: *Greenish-gray, dolomitic, highly weathered, fresh below 74.0', silty, argillaceous, laminated to thickly bedded, sparsely fossiliferous.*						79.8 80
			92 / 80	5.0	5.0	100		
85								84.8 85
446.5	87.1		91 / 91	2.3	2.3	100		87.1
90		(Bottom of Hole 87.1')						90
95								95
100								100

Top of Rock = 66.3' Elevation = 467.3'
Base Weathered Rock = 70.7' Elevation = 462.9'
Drakes Formation Bardstown Member

Geologist's Subsurface Log for B-1001 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1001 - Box 1 of 2

1001 - Box 2 of 2

Driller's Subsurface Log for B-1002

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1002***	Immediate Water Depth ***12.2 (10/28/24)***	Start Date ***10/25/2024***	Hole Type ***core and sample***
Surface Elevation ***529.9'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig_Number ***CME 85***
Total Depth ***93.7'***	Driller ***D. Clements***	Latitude(83) ***37.806630***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509810***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
529.4	0.5	Stiff, brown, slightly moist, clay (with rock debris).	SS-01	0.0-1.5	1.5	7-10-5	SPT	
			SS-02	1.5-3.0	0.6	2-3-16	SPT	
5			ST-01	3.0-5.0	0.6		ST	5
			SS-03	5.0-6.5	0.6	6-4-3	SPT	
			SS-04	6.5-8.0	0.9	10-10-8	SPT	
10			ST-02	8.0-10.0	0.4		ST	10
			SS-05	10.0-11.5	1.3	6-4-4	SPT	
			SS-06	11.5-13.0	1.5	4-6-6	SPT	
15			ST-03	13.0-15.0	0.8		ST	15
			SS-07	15.0-16.5	0.6	2-17-5	SPT	
			SS-08	16.5-18.0	1.2	3-3-3	SPT	
20			ST-04	18.0-20.0	1.2		ST	20
			SS-09	20.0-21.5	1.5	1-3-2	SPT	**Soft zone encountered from 20.0 feet to 21.5 feet @ 20**
			SS-10	21.5-23.0	1.5	2-2-7	SPT	
25		Medium stiff to very stiff, brown to gray, slightly moist to wet, clay with gravel.	ST-05	23.0-25.0	0.5		ST	25
			SS-11	25.0-26.5	1.3	5-7-12	SPT	
			SS-12	26.5-28.0	1.0	7-11-13	SPT	
30			ST-06	28.0-30.0	2.0		ST	30
			SS-13	30.0-31.5	1.5	7-11-12	SPT	
			SS-14	31.5-33.0	1.5	5-7-7	SPT	
35			ST-07	33.0-35.0	1.8		ST	35
			SS-15	35.0-36.5	1.5	6-9-13	SPT	
			SS-16	36.5-38.0	1.0	5-6-23	SPT	
40			ST-08	38.0-40.0	1.5		ST	40
			SS-17	40.0-41.5	1.5	6-13-15	SPT	
			SS-18	41.5-43.0	1.5	7-8-11	SPT	
45			ST-09	43.0-45.0	1.0		ST	45
			SS-19	45.0-46.5	1.5	7-10-11	SPT	
			SS-20	46.5-48.0	1.5	10-17-17	SPT	
50			ST-10	48.0-50.0	1.5		ST	50

Driller's Subsurface Log for B-1002 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1002***	Immediate Water Depth ***12.2 (10/28/24)***	Start Date ***10/25/2024***	Hole Type ***core and sample***
Surface Elevation ***529.9'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig_Number ***CME 85***
Total Depth ***93.7'***	Driller ***D. Clements***	Latitude(83) ***37.806630***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509810***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
		Rock Core						
		Medium stiff to very stiff, brown to gray, slightly moist to wet, clay with gravel.	SS-21	50.0-51.5	1.2	6-10-12	SPT	
476.9	53.0		SS-22	51.5-53.0	1.3	28-23-18	SPT	
			ST-11	53.0-53.5	0.5		ST	
55			SS-23	53.5-55.0	1.5	11-20-23	SPT	55
			SS-24	55.0-56.5	1.5	9-15-36	SPT	
			SS-25	56.5-58.0	1.5	10-13-15	SPT	
			SS-26	58.0-59.5	0.3	9-16-22	SPT	
60			SS-27	59.5-61.0	1.5	11-17-22	SPT	60
		Very stiff to hard, brown, moist to wet, sandy clay with gravel.	SS-28	61.0-62.5	1.5	9-20-27	SPT	
			SS-29	62.5-64.0	1.5	3-9-35	SPT	
65			SS-30	64.0-65.5	1.5	5-16-24	SPT	65
			SS-31	65.5-67.0	1.3	30-20-16	SPT	
			SS-32	67.0-68.5	1.2	8-10-12	SPT	
70			SS-33	68.5-70.0	1.3	11-14-16	SPT	70
			SS-34	70.0-71.5	1.2	12-12-12	SPT	
458.1	71.8							
457.4	72.5	Hard, gray, slightly moist, limestone. (Begin Core)	SS-35	71.5-71.8	0.3	50/0.30'	SPT	
75			36 / -	2.5	1.6	64		75.0 75
			76 / -	5.0	5.0	100		
80								80.0 80
		Gray limestone with shale.	82 / -	5.0	5.0	100		
85								85.0 85
			96 / -	5.0	4.9	98		
90								90.0 90
			59 / -	3.7	3.6	97		
436.2	93.7							93.7
95								95
		(Bottom of Hole 93.7')						
100								100

Driller's Subsurface Log for B-1002 (Cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1002***	Immediate Water Depth ***12.2 (10/28/24)***	Start Date ***10/25/2024***	Hole Type ***core and sample***
Surface Elevation ***529.9'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig_Number ***CME 85***
Total Depth ***93.7'***	Driller ***D. Clements***	Latitude(83) ***37.806630***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509810***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
105		Backfilled with cement-bentonite grout and 6 buckets of bentonite pellets.						105
110								110
115								115
120								120
125								125
130								130
135								135
140								140
145								145
150								150

Geologist's Subsurface Log for B-1002

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1002***	Immediate Water Depth ***12.2 (10/28/24)***	Start Date ***10/25/2024***	Hole Type ***core and sample***
Surface Elevation ***529.9'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig Number ***CME 85***
Total Depth ***93.7'***	Driller ***D. Clements***	Latitude(83) ***37.806630***	***GQ-737 Cravens***
Location ***0+02.00 CL***	Geologist	Longitude(83) ***-85.509810***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
				SS-01	0.0-1.5	1.5	7-10-5	SPT	
				SS-02	1.5-3.0	0.6	2-3-16	SPT	
5				ST-01	3.0-5.0	0.6		ST	5
				SS-03	5.0-6.5	0.6	6-4-3	SPT	
				SS-04	6.5-8.0	0.9	10-10-8	SPT	
10				ST-02	8.0-10.0	0.4		ST	10
				SS-05	10.0-11.5	1.3	6-4-4	SPT	
				SS-06	11.5-13.0	1.5	4-6-6	SPT	
15				ST-03	13.0-15.0	0.8		ST	15
				SS-07	15.0-16.5	0.6	2-17-5	SPT	
				SS-08	16.5-18.0	1.2	3-3-3	SPT	
20				ST-04	18.0-20.0	1.2		ST	20
				SS-09	20.0-21.5	1.5	1-3-2	SPT	
				SS-10	21.5-23.0	1.5	2-2-7	SPT	
25		**Overburden**.		ST-05	23.0-25.0	0.5		ST	25
				SS-11	25.0-26.5	1.3	5-7-12	SPT	
				SS-12	26.5-28.0	1.0	7-11-13	SPT	
30				ST-06	28.0-30.0	2.0		ST	30
				SS-13	30.0-31.5	1.5	7-11-12	SPT	
				SS-14	31.5-33.0	1.5	5-7-7	SPT	
35				ST-07	33.0-35.0	1.8		ST	35
				SS-15	35.0-36.5	1.5	6-9-13	SPT	
				SS-16	36.5-38.0	1.0	5-6-23	SPT	
40				ST-08	38.0-40.0	1.5		ST	40
				SS-17	40.0-41.5	1.5	6-13-15	SPT	
				SS-18	41.5-43.0	1.5	7-8-11	SPT	
45				ST-09	43.0-45.0	1.0		ST	45
				SS-19	45.0-46.5	1.5	7-10-11	SPT	
				SS-20	46.5-48.0	1.5	10-17-17	SPT	
50				ST-10	48.0-50.0	1.5		ST	50

Top of Rock = 72.5'
Elevation = 457.4'

Base Weathered Rock = 75.1'
Elevation = 454.8'

Drakes Formation
Rowland Member

Geologist's Subsurface Log for B-1002 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1002***	Immediate Water Depth ***12.2 (10/28/24)***	Start Date ***10/25/2024***	Hole Type ***core and sample***
Surface Elevation ***529.9'***	Static Water Depth ***NA***	End Date ***10/30/2024***	Rig_Number ***CME 85***
Total Depth ***93.7'***	Driller ***D. Clements***	Latitude(83) ***37.806630***	***GQ-737 Cravens***
Location ***0+02.00 CL***	Geologist ___	Longitude(83) ***-85.509810***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
				SS-21	50.0-51.5	1.2	6-10-12	SPT	
				SS-22	51.5-53.0	1.3	28-23-18	SPT	
				ST-11	53.0-53.5	0.5		ST	
55				SS-23	53.5-55.0	1.5	11-20-23	SPT	55
				SS-24	55.0-56.5	1.5	9-15-36	SPT	
				SS-25	56.5-58.0	1.5	10-13-15	SPT	
60				SS-26	58.0-59.5	0.3	9-16-22	SPT	60
				SS-27	59.5-61.0	1.5	11-17-22	SPT	
		Overburden.		SS-28	61.0-62.5	1.5	9-20-27	SPT	
				SS-29	62.5-64.0	1.5	3-9-35	SPT	
65				SS-30	64.0-65.5	1.5	5-16-24	SPT	65
				SS-31	65.5-67.0	1.3	30-20-16	SPT	
				SS-32	67.0-68.5	1.2	8-10-12	SPT	
70				SS-33	68.5-70.0	1.3	11-14-16	SPT	70
				SS-34	70.0-71.5	1.2	12-12-12	SPT	
457.4	72.5		(Begin Core)	SS-35	71.5-71.8	0.3	50/0.30'	SPT	
75				36 / 0	2.5	1.6	64		75.0 75
				76 / 68	5.0	5.0	100		
80									80.0 80
		Limestone: *Dark gray, weathers tan-brown, mostly fresh below 75.0', argillaceous with coarse fossil beds, thinly bedded.*		82 / 68	5.0	5.0	100		
85									85.0 85
				96 / 86	5.0	4.9	98		
90									90.0 90
				59 / 50	3.7	3.6	97		
436.2	93.7								93.7
95									95
		(Bottom of Hole 93.7')							
100									100

Top of Rock = 72.5' Elevation = 457.4'
Base Weathered Rock = 75.1' Elevation = 454.8'
Drakes Formation Rowland Member

Geologist's Subsurface Log for B-1002 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1002 - Box 1 of 2

1002 - Box 2 of 2

Driller's Subsurface Log for B-1003

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1003***	Immediate Water Depth ***NA***	Start Date ***10/22/2024***	Hole Type ***core and sample***
Surface Elevation ***528.7'***	Static Water Depth ***NA***	End Date ***10/24/2024***	Rig_Number ***CME 85***
Total Depth ***94.3'***	Driller ***D. Clements***	Latitude(83) ***37.806578***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509383***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden / Rock Core	Std/Ky RQD					
527.7	1.0	Very stiff, brown, slightly moist, clay with gravel.	SS-01	0.0-1.5	1.5	8-11-8	SPT	
			SS-02	1.5-3.0	1.5	1-3-6	SPT	
5			ST-01	3.0-5.0	0.6		ST	5
			SS-03	5.0-6.5	0.7	5-3-2	SPT	
			SS-04	6.5-8.0	1.0	0-1-0	SPT	
10			ST-02	8.0-10.0	1.5		ST	10
		Soft to medium stiff, brown, slightly moist, clay with gravel.	SS-05	10.0-11.5	1.2	2-3-2	SPT	
			SS-06	11.5-13.0	1.3	2-3-3	SPT	
15			ST-03	13.0-15.0	1.5		ST	15
			SS-07	15.0-16.5	0.6	1-1-1	SPT	
			SS-08	16.5-18.0	0.8	1-1-2	SPT	
20			ST-04	18.0-20.0	1.4		ST	20
507.2	21.5		SS-09	20.0-21.5	0.5	4-4-4	SPT	
			SS-10	21.5-23.0	1.5	4-8-9	SPT	
25			ST-05	23.0-25.0	1.5		ST	25
			SS-11	25.0-26.5	1.5	3-6-9	SPT	
			SS-12	26.5-28.0	1.5	8-11-14	SPT	
30			ST-06	28.0-30.0	2.0		ST	30
			SS-13	30.0-31.5	1.2	4-8-12	SPT	
			SS-14	31.5-33.0	1.5	10-9-14	SPT	
35			ST-07	33.0-35.0	1.6		ST	35
		Medium stiff to very stiff, dark brown to gray, slightly moist, clay with gravel.	SS-15	35.0-36.5	1.3	5-12-16	SPT	
			SS-16	36.5-38.0	1.5	11-14-16	SPT	
40			ST-08	38.0-40.0	1.7		ST	40
			SS-17	40.0-41.5	1.4	5-9-10	SPT	
			SS-18	41.5-43.0	1.5	11-11-11	SPT	
45			ST-09	43.0-45.0	1.9		ST	45
			SS-19	45.0-46.5	1.5	4-6-12	SPT	
			SS-20	46.5-48.0	1.5	11-15-17	SPT	
50			ST-10	48.0-50.0	1.9		ST	50

Driller's Subsurface Log for B-1003 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1003***	Immediate Water Depth ***NA***	Start Date ***10/22/2024***	Hole Type ***core and sample***
Surface Elevation ***528.7'***	Static Water Depth ***NA***	End Date ***10/24/2024***	Rig_Number ***CME 85***
Total Depth ***94.3'***	Driller ***D. Clements***	Latitude(83) ***37.806578***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509383***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows Sample Type	Remarks
		Overburden	SS-21	50.0-51.5	1.5	9-11-16 SPT	
			SS-22	51.5-53.0	1.5	8-15-22 SPT	
55			ST-11	53.0-55.0	1.1	ST	55
			SS-23	55.0-56.5	1.5	13-16-20 SPT	
			SS-24	56.5-58.0	0.8	12-14-26 SPT	
60			ST-12	58.0-60.0	1.1	ST	60
		Medium stiff to very stiff, dark brown to gray, slightly moist, clay with gravel.	SS-25	60.0-61.5	1.5	10-9-11 SPT	
			SS-26	61.5-63.0	1.5	18-22-22 SPT	
65			ST-13	63.0-65.0	1.3	ST	65
			SS-27	65.0-66.5	1.5	11-19-20 SPT	
			SS-28	66.5-68.0	1.5	18-22-24 SPT	
			SS-29	68.0-69.5	1.5	7-12-10 SPT	
70			SS-30	69.5-71.0	1.5	18-16-14 SPT	70
456.4	72.3	Rock Core	SS-31	71.0-72.1	1.1	6-40-50/0.10' SPT	
		Hard, gray, slightly moist, limestone. (Begin Core)	35 / -	2.0	1.0	50	74.3
75			62 / -	5.0	4.9	98	75
							79.3
80			84 / -	5.0	5.0	100	80
		Gray limestone with shale.					84.3
85			70 / -	5.0	4.7	94	85
							89.3
90			88 / -	5.0	5.0	100	90
434.4	94.3						94.3
95							95
		(Bottom of Hole 94.3')					
100							100

Driller's Subsurface Log for B-1003 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1003***	Immediate Water Depth ***NA***	Start Date ***10/22/2024***	Hole Type ***core and sample***
Surface Elevation ***528.7'***	Static Water Depth ***NA***	End Date ***10/24/2024***	Rig_Number ***CME 85***
Total Depth ***94.3'***	Driller ***D. Clements***	Latitude(83) ***37.806578***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509383***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
105		Backfilled with cement-bentonite grout and 1 bucket of bentonite pellets.						105
110								110
115								115
120								120
125								125
130								130
135								135
140								140
145								145
150								150

Geologist's Subsurface Log for B-1003

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager:

Hole Number ***1003***	Immediate Water Depth ***NA***	Start Date ***10/22/2024***	Hole Type ***core and sample***
Surface Elevation ***528.7'***	Static Water Depth ***NA***	End Date ***10/24/2024***	Rig Number ***CME 85***
Total Depth ***94.3'***	Driller ***D. Clements***	Latitude(83) ***37.806578***	***GQ-737 Cravens***
Location ***0+03.00 CL***	Geologist	Longitude(83) ***-85.509383***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
					Std/Ky RQD				
				SS-01	0.0-1.5	1.5	8-11-8	SPT	
				SS-02	1.5-3.0	1.5	1-3-6	SPT	
5				ST-01	3.0-5.0	0.6		ST	5
				SS-03	5.0-6.5	0.7	5-3-2	SPT	
				SS-04	6.5-8.0	1.0	0-1-0	SPT	
10				ST-02	8.0-10.0	1.5		ST	10
				SS-05	10.0-11.5	1.2	2-3-2	SPT	
				SS-06	11.5-13.0	1.3	2-3-3	SPT	
15				ST-03	13.0-15.0	1.5		ST	15
				SS-07	15.0-16.5	0.6	1-1-1	SPT	
				SS-08	16.5-18.0	0.8	1-1-2	SPT	
20				ST-04	18.0-20.0	1.4		ST	20
				SS-09	20.0-21.5	0.5	4-4-4	SPT	
				SS-10	21.5-23.0	1.5	4-8-9	SPT	
25		**Overburden**.		ST-05	23.0-25.0	1.5		ST	25
				SS-11	25.0-26.5	1.5	3-6-9	SPT	
				SS-12	26.5-28.0	1.5	8-11-14	SPT	
30				ST-06	28.0-30.0	2.0		ST	30
				SS-13	30.0-31.5	1.2	4-8-12	SPT	
				SS-14	31.5-33.0	1.5	10-9-14	SPT	
35				ST-07	33.0-35.0	1.6		ST	35
				SS-15	35.0-36.5	1.3	5-12-16	SPT	
				SS-16	36.5-38.0	1.5	11-14-16	SPT	
40				ST-08	38.0-40.0	1.7		ST	40
				SS-17	40.0-41.5	1.4	5-9-10	SPT	
				SS-18	41.5-43.0	1.5	11-11-11	SPT	
45				ST-09	43.0-45.0	1.9		ST	45
				SS-19	45.0-46.5	1.5	4-6-12	SPT	
				SS-20	46.5-48.0	1.5	11-15-17	SPT	
50				ST-10	48.0-50.0	1.9		ST	50

Top of Rock = 72.3'
Elevation = 456.4'

Base Weathered Rock = 72.4'
Elevation = 456.3'

Drakes Formation
Rowland Member

Geologist's Subsurface Log for B-1003 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1003***	Immediate Water Depth ***NA***	Start Date ***10/22/2024***	Hole Type ***core and sample***
Surface Elevation ***528.7'***	Static Water Depth ***NA***	End Date ***10/24/2024***	Rig_Number ***CME 85***
Total Depth ***94.3'***	Driller ***D. Clements***	Latitude(83) ***37.806578***	***GQ-737 Cravens***
Location ***0+03.00 CL***	Geologist ___	Longitude(83) ***-85.509383***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows Sample Type	Remarks
		Overburden / Rock Core	Std/Ky RQD			SDI (JS)	
55		**Overburden**.	SS-21	50.0-51.5	1.5	9-11-16 SPT	55
			SS-22	51.5-53.0	1.5	8-15-22 SPT	
			ST-11	53.0-55.0	1.1	ST	
			SS-23	55.0-56.5	1.5	13-16-20 SPT	
60			SS-24	56.5-58.0	0.8	12-14-26 SPT	60
			ST-12	58.0-60.0	1.1	ST	
			SS-25	60.0-61.5	1.5	10-9-11 SPT	
			SS-26	61.5-63.0	1.5	18-22-22 SPT	
65			ST-13	63.0-65.0	1.3	ST	65
			SS-27	65.0-66.5	1.5	11-19-20 SPT	
			SS-28	66.5-68.0	1.5	18-22-24 SPT	
			SS-29	68.0-69.5	1.5	7-12-10 SPT	
70			SS-30	69.5-71.0	1.5	18-16-14 SPT	70
456.4	72.3	(Begin Core)	SS-31	71.0-72.1	1.1	6-40-50/0.10' SPT	
75		**Limestone**: *Dark gray, weathers brown, slightly weathered to fresh, mostly argillaceous with few light gray coarsely fossiliferous beds, thin to medium bedded.*	35 / 30	2.0	1.0	50	74.3 75
			62 / 50	5.0	4.9	98	
80							79.3 80
			84 / 68	5.0	5.0	100	
85							84.3 85
			70 / 52	5.0	4.7	94	
90							89.3 90
			88 / 56	5.0	5.0	100	
434.4	94.3						94.3
95		(Bottom of Hole 94.3')					95
100							100

Top of Rock = 72.3' Elevation = 456.4'
Base Weathered Rock = 72.4' Elevation = 456.3'
Drakes Formation Rowland Member

Geologist's Subsurface Log for B-1003 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1003 - Box 1 of 2

1003 - Box 2 of 2

Driller's Subsurface Log for B-1004

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1004***	Immediate Water Depth ***11.5 (10/21/24)***	Start Date ***10/17/2024***	Hole Type ***core and sample***
Surface Elevation ***529.2'***	Static Water Depth ***NA***	End Date ***10/22/2024***	Rig_Number ***CME 85***
Total Depth ***88.0'***	Driller ***D. Clements***	Latitude(83) ***37.806515***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508904***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			Std/Ky RQD					
528.7	0.5	Medium dense, gray, slightly moist, gravel.	SS-01	0.0-1.5	1.5	12-7-5	SPT	
			SS-02	1.5-3.0	0.9	1-3-3	SPT	
5			ST-01	3.0-5.0	0.8		ST	5
		Medium stiff, brown, slightly moist, clay with gravel.	SS-03	5.0-6.5	1.0	6-5-4	SPT	
			SS-04	6.5-8.0	1.3	6-4-5	SPT	
			ST-02	8.0-8.7	0.7		ST	
10 519.2	10.0							Boulder encountered from 8.7 feet to 10.0 feet @ 8.7 10
			SS-05	10.0-11.5	0.4	3-4-14	SPT	
		Medium stiff to stiff, brown, wet, clay with gravel.	SS-06	11.5-13.0	0.6	0-3-5	SPT	
15 514.2	15.0		ST-03	13.0-15.0	1.5		ST	15
			SS-07	15.0-16.5	0.8	3-5-6	SPT	
			SS-08	16.5-18.0	0.6	2-3-4	SPT	
20		Medium stiff to stiff, dark brown, moist, clay with sand and gravel.	ST-04	18.0-20.0	1.0		ST	20
			SS-09	20.0-21.5	1.2	2-4-5	SPT	
			SS-10	21.5-23.0	1.0	3-5-8	SPT	
505.2	24.0		ST-05	23.0-25.0	1.6		ST	
25 504.1	25.1	Very stiff, gray, moist, clay with gravel.						25
502.2	27.0	Stiff, dark brown, moist, clay with gravel.	SS-11	25.0-26.5	1.5	6-11-14	SPT	
			SS-12	26.5-28.0	1.5	2-5-7	SPT	
30			ST-06	28.0-30.0	1.9		ST	30
		Stiff, brown, moist, clay with gravel.	SS-13	30.0-31.5	1.5	7-8-11	SPT	
			SS-14	31.5-33.0	1.5	12-14-17	SPT	
35 494.2	35.0		ST-07	33.0-35.0	1.9		ST	35
			SS-15	35.0-36.5	1.5	3-6-11	SPT	
			SS-16	36.5-38.0	1.5	10-13-16	SPT	
40			ST-08	38.0-40.0	1.2		ST	40
			SS-17	40.0-41.5	1.2	14-8-7	SPT	
		Stiff to hard, gray, moist, clay.	SS-18	41.5-43.0	1.3	8-12-13	SPT	
45			ST-09	43.0-45.0	0.7		ST	45
			SS-19	45.0-46.5	1.5	14-15-15	SPT	
			SS-20	46.5-48.0	1.5	9-14-14	SPT	
50			ST-10	48.0-50.0	1.5		ST	50

Driller's Subsurface Log for B-1004 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1004***	Immediate Water Depth ***11.5 (10/21/24)***	Start Date ***10/17/2024***	Hole Type ***core and sample***
Surface Elevation ***529.2'***	Static Water Depth ***NA***	End Date ***10/22/2024***	Rig_Number ***CME 85***
Total Depth ***88.0'***	Driller ***D. Clements***	Latitude(83) ***37.806515***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508904***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
				SS-21	50.0-51.5	1.4	4-7-12	SPT	
				SS-22	51.5-53.0	1.3	6-12-14	SPT	
55				ST-11	53.0-55.0	1.4		ST	55
				SS-23	55.0-56.5	1.5	3-5-8	SPT	
				SS-24	56.5-58.0	1.5	2-11-14	SPT	
		Stiff to hard, gray, moist, clay.		ST-12	58.0-60.0	1.4		ST	
60				SS-25	60.0-61.5	0.8	3-6-8	SPT	60
				SS-26	61.5-63.0	1.3	7-8-9	SPT	
				ST-13	63.0-64.3	1.3		ST	
65				SS-27	64.5-66.0	1.5	11-33-26	SPT	65
461.9	67.3		(Begin Core)	SS-28	66.0-66.1	0.1	50/0.10'	SPT	
				56 / -	2.7	2.4	89		70.0
70									70
				76 / -	5.0	4.9	98		75.0
75									75
		Gray limestone with shale.		78 / -	5.0	4.6	92		80.0
80									80
				92 / -	5.0	5.0	100		85.0
85									85
441.2	88.0			90 / -	3.0	3.0	100		88.0
90									90
		(Bottom of Hole 88.0')							
95									95
		Backfilled with cement-bentonite grout.							
100									100

Geologist's Subsurface Log for B-1004

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager:

Hole Number ***1004***	Immediate Water Depth ***11.5 (10/21/24)***	Start Date ***10/17/2024***	Hole Type ***core and sample***
Surface Elevation ***529.2'***	Static Water Depth ***NA***	End Date ***10/22/2024***	Rig_Number ***CME 85***
Total Depth ***88.0'***	Driller ***D. Clements***	Latitude(83) ***37.806515***	***GQ-737 Cravens***
Location ***0+04.00 CL***	Geologist	Longitude(83) ***-85.508904***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. (Std/Ky RQD)	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			SS-01	0.0-1.5	1.5	12-7-5	SPT	
			SS-02	1.5-3.0	0.9	1-3-3	SPT	
5			ST-01	3.0-5.0	0.8		ST	5
			SS-03	5.0-6.5	1.0	6-5-4	SPT	
			SS-04	6.5-8.0	1.3	6-4-5	SPT	
			ST-02	8.0-8.7	0.7		ST	
10								10
			SS-05	10.0-11.5	0.4	3-4-14	SPT	
			SS-06	11.5-13.0	0.6	0-3-5	SPT	
15			ST-03	13.0-15.0	1.5		ST	15
			SS-07	15.0-16.5	0.8	3-5-6	SPT	
			SS-08	16.5-18.0	0.6	2-3-4	SPT	
20			ST-04	18.0-20.0	1.0		ST	20
			SS-09	20.0-21.5	1.2	2-4-5	SPT	
			SS-10	21.5-23.0	1.0	3-5-8	SPT	
25		**Overburden**.	ST-05	23.0-25.0	1.6		ST	25
			SS-11	25.0-26.5	1.5	6-11-14	SPT	
			SS-12	26.5-28.0	1.5	2-5-7	SPT	
30			ST-06	28.0-30.0	1.9		ST	30
			SS-13	30.0-31.5	1.5	7-8-11	SPT	
			SS-14	31.5-33.0	1.5	12-14-17	SPT	
35			ST-07	33.0-35.0	1.9		ST	35
			SS-15	35.0-36.5	1.5	3-6-11	SPT	
			SS-16	36.5-38.0	1.5	10-13-16	SPT	
40			ST-08	38.0-40.0	1.2		ST	40
			SS-17	40.0-41.5	1.2	14-8-7	SPT	
			SS-18	41.5-43.0	1.3	8-12-13	SPT	
45			ST-09	43.0-45.0	0.7		ST	45
			SS-19	45.0-46.5	1.5	14-15-15	SPT	
			SS-20	46.5-48.0	1.5	9-14-14	SPT	
50			ST-10	48.0-50.0	1.5		ST	50

Top of Rock = 67.3'
Elevation = 461.9'

Base Weathered Rock = 69.6'
Elevation = 459.6'

Drakes Formation
Bardstown Member

Geologist's Subsurface Log for B-1004 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1004***	Immediate Water Depth ***11.5 (10/21/24)***	Start Date ***10/17/2024***	Hole Type ***core and sample***
Surface Elevation ***529.2'***	Static Water Depth ***NA***	End Date ***10/22/2024***	Rig Number ***CME 85***
Total Depth ***88.0'***	Driller ***D. Clements***	Latitude(83) ***37.806515***	***GQ-737 Cravens***
Location ***0+04.00 CL***	Geologist	Longitude(83) ***-85.508904***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
			SS-21	50.0-51.5	1.4	4-7-12	SPT	
			SS-22	51.5-53.0	1.3	6-12-14	SPT	
55			ST-11	53.0-55.0	1.4		ST	55
			SS-23	55.0-56.5	1.5	3-5-8	SPT	
			SS-24	56.5-58.0	1.5	2-11-14	SPT	
60		**Overburden**.	ST-12	58.0-60.0	1.4		ST	60
			SS-25	60.0-61.5	0.8	3-6-8	SPT	
			SS-26	61.5-63.0	1.3	7-8-9	SPT	
			ST-13	63.0-64.3	1.3		ST	
65			SS-27	64.5-66.0	1.5	11-33-26	SPT	65
461.9	67.3	(Begin Core)	SS-28	66.0-66.1	0.1	50/0.10"	SPT	
459.8	69.4	**Limestone**: *Light gray, moderately weathered, clastic, with dark gray shale wisps, thinly bedded.*	56 / 33	2.7	2.4	89		70.0
70								70
			76 / 44	5.0	4.9	98		75.0
75								75
		Limestone: *Greenish-gray, dolomitic, slightly weathered, silty, argillaceous, with medium to light gray coarse fossil beds, thinly bedded to laminated.*	78 / 76	5.0	4.6	92		80.0
80								80
			92 / 90	5.0	5.0	100		85.0
85								85
441.2	88.0		90 / 83	3.0	3.0	100		88.0
90		(Bottom of Hole 88.0')						90
95								95
100								100

Top of Rock = 67.3' Elevation = 461.9'
Base Weathered Rock = 69.6' Elevation = 459.6'
Drakes Formation Bardstown Member

Geologist's Subsurface Log for B-1004 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

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Driller's Subsurface Log for B-1005

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1005***	Immediate Water Depth ***NA***	Start Date ***10/15/2024***	Hole Type ***core and sample***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***10/17/2024***	Rig_Number ***CME 85***
Total Depth ***67.3'***	Driller ***D. Clements***	Latitude(83) ***37.806461***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508476***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			Std/Ky RQD					
			SS-01	0.0-1.5	1.3	10-10-3	SPT	
			SS-02	1.5-3.0	1.4	3-2-4	SPT	
5			ST-01	3.0-5.0	1.7		ST	5
			SS-03	5.0-6.5	1.3	7-7-6	SPT	
		Medium stiff to stiff, brown, slightly moist, clay with gravel.	SS-04	6.5-8.0	1.4	19-26-2	SPT	
10			ST-02	8.0-10.0	1.5		ST	10
			SS-05	10.0-11.5	0.6	13-4-4	SPT	**Wet zone from 10.0 feet to 13.0 feet @ 10**
			SS-06	11.5-13.0	1.5	4-4-7	SPT	
15	514.8	15.0	ST-03	13.0-15.0	1.3		ST	15
			SS-07	15.0-16.5	1.5	5-6-10	SPT	
			SS-08	16.5-18.0	1.3	7-10-10	SPT	
20			ST-04	18.0-20.0	1.4		ST	20
			SS-09	20.0-21.5	1.4	5-9-13	SPT	
		Stiff to very stiff, brown to gray, slightly moist, clay with gravel.	SS-10	21.5-23.0	0.8	4-7-12	SPT	
25			ST-05	23.0-25.0	1.3		ST	25
			SS-11	25.0-26.5	1.5	5-6-9	SPT	
			SS-12	26.5-28.0	0.9	5-7-9	SPT	
30			ST-06	28.0-30.0	1.4		ST	30
	498.3	31.5	SS-13	30.0-31.5	1.5	8-6-8	SPT	
			SS-14	31.5-33.0	1.5	11-50-50/0.50'	SPT	
		Hard, brown and gray, slightly moist, limestone and shale (severely weathered).	SS-15	33.0-34.4	1.3	30-30-50/0.40'	SPT	
35	493.9	35.9 (Begin Core)	SS-16	34.5-35.4	0.9	17-50/0.40'	SPT	35
	492.5	37.3 Brown shale.	29 / -	1.4	1.4	100		37.3
40			0 / -	5.0	4.2	84		40
		Gray limestone with shale.						42.3
45			78 / -	5.0	5.0	100		45
	481.0	48.8						47.3
50		Brown shale, sandy, (with brown clay seams).	32 / -	5.0	2.8	56		50

Driller's Subsurface Log for B-1005 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1005***	Immediate Water Depth ***NA***	Start Date ***10/15/2024***	Hole Type ***core and sample***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***10/17/2024***	Rig_Number ***CME 85***
Total Depth ***67.3'***	Driller ***D. Clements***	Latitude(83) ***37.806461***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508476***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows Sample Type SDI (JS)	Remarks
			32 / -	5.0	2.8	56	52.3
55		Brown shale, sandy, (with brown clay seams).	0 / -	3.7	2.3	62	55
							56.0
60 470.0	59.8		24 / -	6.3	4.1	65	60
							62.3
65		Gray limestone.	- / -	5.0	5.0	100	65
462.5	67.3						67.3
70		(Bottom of Hole 67.3')					70
75		Backfilled with cement-bentonite grout and 2 buckets of bentonite pellets.					75
80							80
85							85
90							90
95							95
100							100

Geologist's Subsurface Log for B-1005

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1005***	Immediate Water Depth ***NA***	Start Date ***10/15/2024***	Hole Type ***core and sample***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***10/17/2024***	Rig_Number ***CME 85***
Total Depth ***67.3'***	Driller ***D. Clements***	Latitude(83) ***37.806461***	***GQ-737 Cravens***
Location ***0+05.00 CL***	Geologist ___	Longitude(83) ***-85.508476***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden / Rock Core	Std/Ky RQD					
			SS-01	0.0-1.5	1.3	10-10-3	SPT	
			SS-02	1.5-3.0	1.4	3-2-4	SPT	
5			ST-01	3.0-5.0	1.7		ST	5
			SS-03	5.0-6.5	1.3	7-7-6	SPT	
			SS-04	6.5-8.0	1.4	19-26-2	SPT	
10			ST-02	8.0-10.0	1.5		ST	10
			SS-05	10.0-11.5	0.6	13-4-4	SPT	
			SS-06	11.5-13.0	1.5	4-4-7	SPT	
15			ST-03	13.0-15.0	1.3		ST	15
			SS-07	15.0-16.5	1.5	5-6-10	SPT	
			SS-08	16.5-18.0	1.3	7-10-10	SPT	
		Overburden.	ST-04	18.0-20.0	1.4		ST	
20			SS-09	20.0-21.5	1.4	5-9-13	SPT	20
			SS-10	21.5-23.0	0.8	4-7-12	SPT	
			ST-05	23.0-25.0	1.3		ST	
25			SS-11	25.0-26.5	1.5	5-6-9	SPT	25
			SS-12	26.5-28.0	0.9	5-7-9	SPT	
			ST-06	28.0-30.0	1.4		ST	
30			SS-13	30.0-31.5	1.5	8-6-8	SPT	30
			SS-14	31.5-33.0	1.5	11-50-50/0.50'	SPT	
			SS-15	33.0-34.4	1.3	30-30-50/0.40'	SPT	
35			SS-16	34.5-35.4	0.9	17-50/0.40'	SPT	35
493.9	35.9	(Begin Core)						
492.5	37.3	**Dolomite**: *Brown, highly weathered, earthy and fragmented.*	29 / 0	1.4	1.4	100		37.3
40			0 / 0	5.0	4.2	84		40
		Limestone: *Gray, moderately weathered, thinly bedded, fossiliferous.*						42.3
45			78 / 46	5.0	5.0	100		45
								47.3
481.0	48.8		32 / 24	5.0	2.8	56		
50								50

Top of Rock = 35.9' Elevation = 493.9'
Base Weathered Rock = 42.8' Elevation = 487.0'
Drakes Formation
Saluda Dolomite Member

Geologist's Subsurface Log for B-1005 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1005***	Immediate Water Depth ***NA***	Start Date ***10/15/2024***	Hole Type ***core and sample***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***10/17/2024***	Rig_Number ***CME 85***
Total Depth ***67.3'***	Driller ***D. Clements***	Latitude(83) ***37.806461***	***GQ-737 Cravens***
Location ***0+05.00 CL***	Geologist ___	Longitude(83) ***-85.508476***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows Sample Type SDI (JS)	Remarks
			32 / 24	5.0	2.8	56	52.3
55		**Dolomite**: *Brown, moderately weathered, earthy, thinly bedded, argillaceous.*	0 / 0	3.7	2.3	62	55 56.0
60 470.0	59.8		24 / 24	6.3	4.1	65	60
65		**Limestone**: *Gray, slightly weathered to fresh, silty/argillaceous to coarsely fossiliferous, thin to medium bedded.*	70 / 70	5.0	5.0	100	62.3 65
462.5	67.3						67.3
70		(Bottom of Hole 67.3')					70
75							75
80							80
85							85
90							90
95							95
100							100

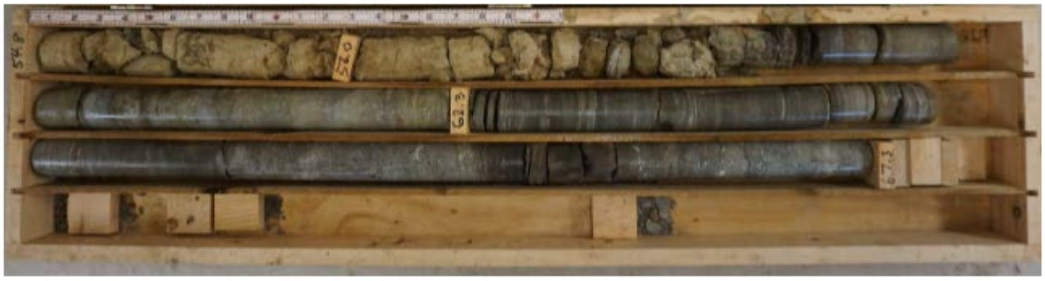
Top of Rock = 35.9' Elevation = 493.9'
Base Weathered Rock = 42.8' Elevation = 487.0'
Drakes Formation
Saluda Dolomite Member

Geologist's Subsurface Log for B-1005 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1005 - Box 1 of 2



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Driller's Subsurface Log for B-1006

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1006***	Immediate Water Depth ***NA***	Start Date ***10/14/2024***	Hole Type ***core and sample***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***10/15/2024***	Rig_Number ***CME 85***
Total Depth ***35.7'***	Driller ***D. Clements***	Latitude(83) ***37.806408***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508074***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (%)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
528.3	1.5	Medium dense, brown, slightly moist, sand with gravel.	SS-01	0.0-1.5	1.5	18-13-4	SPT	
		Medium stiff to hard, brown, slightly moist, clay with gravel.	SS-02	1.5-3.0	0.7	4-4-13	SPT	Encountered rock during ST push; crushed ST - no recovery from 3.0 feet to 5.0 feet @ 3 Soft zone encountered from 6.5 feet to 8.0 feet @ 6.5
			ST-01	3.0-5.0	0.0		ST	
			SS-03	5.0-6.5	1.0	7-18-6	SPT	
			SS-04	6.5-8.0	0.7	1-1-1	SPT	
			ST-02	8.0-10.0	0.6		ST	
			SS-05	10.0-11.5	0.5	4-3-5	SPT	
			SS-06	11.5-13.0	1.3	3-6-7	SPT	
			ST-03	13.0-14.2	1.2		ST	
			SS-07	14.2-15.0	0.8	33-50/0.30'	SPT	
513.4	16.4	(Begin Core)						
		Gray limestone with shale.	65 / -	4.3	4.1	95		20.7
			66 / -	5.0	5.0	100		25.7
			80 / -	5.0	5.0	100		30.7
494.1	35.7		56 / -	5.0	4.7	94		35.7
		(Bottom of Hole 35.7')						
		Backfilled with cement-bentonite grout and 1 bucket of bentonite pellets.						

Geologist's Subsurface Log for B-1006

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1006***	Immediate Water Depth ***NA***	Start Date ***10/14/2024***	Hole Type ***core and sample***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***10/15/2024***	Rig Number ***CME 85***
Total Depth ***35.7'***	Driller ***D. Clements***	Latitude(83) ***37.806408***	***GQ-737 Cravens***
Location ***0+06.00 CL***	Geologist	Longitude(83) ***-85.508074***	

Lithology Elevation	Lithology Depth	Description	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden	SS-01	0.0-1.5	1.5	18-13-4	SPT	
			SS-02	1.5-3.0	0.7	4-4-13	SPT	
5			ST-01	3.0-5.0	0.0		ST	5
			SS-03	5.0-6.5	1.0	7-18-6	SPT	
			SS-04	6.5-8.0	0.7	1-1-1	SPT	
		Overburden.	ST-02	8.0-10.0	0.6		ST	
10			SS-05	10.0-11.5	0.5	4-3-5	SPT	10
			SS-06	11.5-13.0	1.3	3-6-7	SPT	
			ST-03	13.0-14.2	1.2		ST	
15			SS-07	14.2-15.0	0.8	33-50/0.30'	SPT	15
513.4	16.4	Rock Core (Begin Core)						
			65 / 53	4.3	4.1	95		
20								20
								20.7
			66 / 42	5.0	5.0	100		
25		**Dolomite**: *Dark greenish-gray with dolomitic limestone, moderately to slightly weathered, sparsely fossiliferous, few white chert blebs, medium bedded.*						25
								25.7
			80 / 76	5.0	5.0	100		
30								30
								30.7
			56 / 38	5.0	4.7	94		
35								35
494.1	35.7							35.7
40		(Bottom of Hole 35.7')						40
45								45
50								50

Top of Rock = 16.4'
Elevation = 513.4'

Base Weathered Rock = 16.8'
Elevation = 513.0'

Drakes Formation
Saluda Dolomite Member

Geologist's Subsurface Log for B-1006 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

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Driller's Subsurface Log for B-1007

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1007***	Immediate Water Depth ***NA***	Start Date ***11/04/2024***	Hole Type ***core and sample***
Surface Elevation ***530.3'***	Static Water Depth ***NA***	End Date ***11/05/2024***	Rig_Number ***CME 85***
Total Depth ***78.0'***	Driller ***D. Clements***	Latitude(83) ***37.806533***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509827***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows SDI (JS)	Sample Type	Remarks
		Overburden						
		Rock Core	Std/Ky RQD					
530.0	0.3	Loose, gray, slightly moist, gravel.	SS-01	0.0-1.5	0.8	5-4-3	SPT	
			SS-02	1.5-3.0	1.0	6-9-9	SPT	
			SS-03	3.0-4.5	1.1	12-7-28	SPT	
5			SS-04	4.5-6.0	0.9	19-9-10	SPT	5
			SS-05	6.0-7.5	1.0	17-21-13	SPT	
			SS-06	7.5-9.0	1.1	4-5-5	SPT	
10		Medium stiff to very stiff, brown, slightly moist, clay with gravel.	ST-01	9.0-11.0	1.1		ST	10
			SS-07	11.0-12.5	1.5	3-4-6	SPT	
			SS-08	12.5-14.0	1.5	4-5-7	SPT	
15			SS-09	14.0-15.5	1.5	1-3-6	SPT	15
			SS-10	15.5-17.0	1.5	6-10-11	SPT	
			SS-11	17.0-18.5	1.5	3-5-8	SPT	
510.8	19.5		SS-12	18.5-20.0	1.5	4-9-9	SPT	
20			ST-02	20.0-22.0	1.4		ST	20
			SS-13	22.0-23.5	1.5	4-9-12	SPT	
25			SS-14	23.5-25.0	1.5	9-12-18	SPT	25
			SS-15	25.0-26.5	1.5	5-9-13	SPT	
			SS-16	26.5-28.0	1.2	8-11-21	SPT	
			SS-17	28.0-29.5	1.5	4-7-20	SPT	
30			SS-18	29.5-31.0	1.5	9-23-18	SPT	30
			ST-03	31.0-33.0	1.3		ST	
			SS-19	33.0-34.5	1.5	11-7-9	SPT	
35		Stiff to very stiff, dark brown to gray, moist, clay with gravel.	SS-20	34.5-36.0	0.7	7-3-8	SPT	35
			SS-21	36.0-37.5	1.3	9-12-15	SPT	
			SS-22	37.5-39.0	1.4	6-10-15	SPT	
40			SS-23	39.0-40.5	1.2	8-18-21	SPT	40
			SS-24	40.5-42.0	1.3	7-16-19	SPT	
			ST-04	42.0-44.0	0.3		ST	
45			SS-25	44.0-45.5	1.5	15-17-19	SPT	45
			SS-26	45.5-47.0	1.5	3-8-13	SPT	
			SS-27	47.0-48.5	1.5	12-19-19	SPT	
50			SS-28	48.5-50.0	1.5	5-9-11	SPT	50

Driller's Subsurface Log for B-1007 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1007***	Immediate Water Depth ***NA***	Start Date ***11/04/2024***	Hole Type ***core and sample***
Surface Elevation ***530.3'***	Static Water Depth ***NA***	End Date ***11/05/2024***	Rig_Number ***CME 85***
Total Depth ***78.0'***	Driller ***D. Clements***	Latitude(83) ***37.806533***	
Location ***+ 'Lt.***		Longitude(83) ***-85.509827***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
		Stiff to very stiff, dark brown to gray, moist, clay with gravel.	SS-29	50.0-51.5	1.5	9-13-23	SPT	
477.5	52.8		SS-30	51.5-53.0	1.5	12-21-22	SPT	
55			ST-05	53.0-55.0	1.0		ST	55
			SS-31	55.0-56.5	1.5	14-17-19	SPT	
			SS-32	56.5-58.0	1.5	13-19-26	SPT	
			SS-33	58.0-59.5	1.5	11-17-17	SPT	
60			SS-34	59.5-61.0	1.5	15-25-27	SPT	60
		Very stiff to hard, brown, moist, sandy clay with gravel.	SS-35	61.0-62.5	1.0	10-10-15	SPT	
			SS-36	62.5-64.0	1.5	8-16-21	SPT	
65			SS-37	64.0-65.5	1.5	6-10-10	SPT	65
			SS-38	65.5-67.0	1.5	8-19-34	SPT	
			SS-39	67.0-68.5	1.3	42-16-18	SPT	
70 460.3	70.0		SS-40	68.5-70.0	0.3	19-13-9	SPT	70
		Very stiff to hard, brown, moist to wet, sandy clay (wood fragments).	SS-41	70.0-71.5	1.5	13-21-16	SPT	
457.4	72.9	(Begin Core)	SS-42	71.5-72.7	0.7	9-50-50/0.20'	SPT	
75		Gray limestone, (clay seam; some sandy seams).	75 / -	5.1	5.1	100		75
452.3	78.0							78.0
80		(Bottom of Hole 78.0')						80
85		Backfilled with cement-bentonite grout.						85
90								90
95								95
100								100

Geologist's Subsurface Log for B-1007

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1007***	Immediate Water Depth ***NA***	Start Date ***11/04/2024***	Hole Type ***core and sample***
Surface Elevation ***530.3'***	Static Water Depth ***NA***	End Date ***11/05/2024***	Rig Number ***CME 85***
Total Depth ***78.0'***	Driller ***D. Clements***	Latitude(83) ***37.806533***	***GQ-737 Cravens***
Location ***0+07.00 CL***	Geologist	Longitude(83) ***-85.509827***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden / Rock Core	Std/Ky RQD					
			SS-01	0.0-1.5	0.8	5-4-3	SPT	
			SS-02	1.5-3.0	1.0	6-9-9	SPT	
			SS-03	3.0-4.5	1.1	12-7-28	SPT	
5			SS-04	4.5-6.0	0.9	19-9-10	SPT	5
			SS-05	6.0-7.5	1.0	17-21-13	SPT	
			SS-06	7.5-9.0	1.1	4-5-5	SPT	
10			ST-01	9.0-11.0	1.1		ST	10
			SS-07	11.0-12.5	1.5	3-4-6	SPT	
			SS-08	12.5-14.0	1.5	4-5-7	SPT	
15			SS-09	14.0-15.5	1.5	1-3-6	SPT	15
			SS-10	15.5-17.0	1.5	6-10-11	SPT	
			SS-11	17.0-18.5	1.5	3-5-8	SPT	
20			SS-12	18.5-20.0	1.5	4-9-9	SPT	20
			ST-02	20.0-22.0	1.4		ST	
			SS-13	22.0-23.5	1.5	4-9-12	SPT	
25		**Overburden**.	SS-14	23.5-25.0	1.5	9-12-18	SPT	25
			SS-15	25.0-26.5	1.5	5-9-13	SPT	
			SS-16	26.5-28.0	1.2	8-11-21	SPT	
			SS-17	28.0-29.5	1.5	4-7-20	SPT	
30			SS-18	29.5-31.0	1.5	9-23-18	SPT	30
			ST-03	31.0-33.0	1.3		ST	
			SS-19	33.0-34.5	1.5	11-7-9	SPT	
35			SS-20	34.5-36.0	0.7	7-3-8	SPT	35
			SS-21	36.0-37.5	1.3	9-12-15	SPT	
			SS-22	37.5-39.0	1.4	6-10-15	SPT	
40			SS-23	39.0-40.5	1.2	8-18-21	SPT	40
			SS-24	40.5-42.0	1.3	7-16-19	SPT	
			ST-04	42.0-44.0	0.3		ST	
45			SS-25	44.0-45.5	1.5	15-17-19	SPT	45
			SS-26	45.5-47.0	1.5	3-8-13	SPT	
			SS-27	47.0-48.5	1.5	12-19-19	SPT	
50			SS-28	48.5-50.0	1.5	5-9-11	SPT	50

Top of Rock = 72.9'
Elevation = 457.4'

Base Weathered Rock = 73.3'
Elevation = 457.0'

Drakes Formation
Rowland Member

Geologist's Subsurface Log for B-1007 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1007***	Immediate Water Depth ***NA***	Start Date ***11/04/2024***	Hole Type ***core and sample***
Surface Elevation ***530.3'***	Static Water Depth ***NA***	End Date ***11/05/2024***	Rig_Number ***CME 85***
Total Depth ***78.0'***	Driller ***D. Clements***	Latitude(83) ***37.806533***	***GQ-737 Cravens***
Location ***0+07.00 CL***	Geologist ___	Longitude(83) ***-85.509827***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden						
		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
			SS-29	50.0-51.5	1.5	9-13-23	SPT	
			SS-30	51.5-53.0	1.5	12-21-22	SPT	
55			ST-05	53.0-55.0	1.0		ST	55
			SS-31	55.0-56.5	1.5	14-17-19	SPT	
			SS-32	56.5-58.0	1.5	13-19-26	SPT	
60			SS-33	58.0-59.5	1.5	11-17-17	SPT	60
			SS-34	59.5-61.0	1.5	15-25-27	SPT	
		Overburden.	SS-35	61.0-62.5	1.0	10-10-15	SPT	
			SS-36	62.5-64.0	1.5	8-16-21	SPT	
65			SS-37	64.0-65.5	1.5	6-10-10	SPT	65
			SS-38	65.5-67.0	1.5	8-19-34	SPT	
			SS-39	67.0-68.5	1.3	42-16-18	SPT	
70			SS-40	68.5-70.0	0.3	19-13-9	SPT	70
			SS-41	70.0-71.5	1.5	13-21-16	SPT	
457.4	72.9	(Begin Core)	SS-42	71.5-72.7	0.7	9-50-50/0.20'	SPT	
75		**Limestone**: *Greenish-gray, dolomitic, slightly weathered, argillaceous with sparse fossils, medium bedded.*	75 / 61	5.1	5.1	100		**clay seam @ 74.1-74.2** 75
452.3	78.0							78.0
80		(Bottom of Hole 78.0')						80
85								85
90								90
95								95
100								100

Top of Rock = 72.9'
Elevation = 457.4'

Base Weathered Rock = 73.3'
Elevation = 457.0'

Drakes Formation
Rowland Member

Geologist's Subsurface Log for B-1007 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1007 - Box 1 of 1

Driller's Subsurface Log for B-1008

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1008***	Immediate Water Depth ***NA***	Start Date ***11/06/2024***	Hole Type ***core and sample***
Surface Elevation ***529.4'***	Static Water Depth ***NA***	End Date ***11/07/2024***	Rig_Number ***CME 85***
Total Depth ***79.0'***	Driller ***D. Clements***	Latitude(83) ***37.806413***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508857***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			Std/Ky RQD					
529.1	0.3	Loose, gray, slightly moist, gravel.	SS-01	0.0-1.5	1.1	7-3-2	SPT	
			SS-02	1.5-3.0	1.3	2-2-3	SPT	
			SS-03	3.0-4.5	1.5	4-4-4	SPT	
5			SS-04	4.5-6.0	1.5	2-5-3	SPT	5
			SS-05	6.0-7.5	1.5	5-5-6	SPT	
			SS-06	7.5-9.0	0.3	3-5-8	SPT	
10			ST-01	9.0-11.0	0.7		ST	10
			SS-07	11.0-12.5	0.4	15-8-6	SPT	
			SS-08	12.5-14.0	1.5	2-2-3	SPT	
15			SS-09	14.0-15.5	1.0	3-4-8	SPT	15
		Medium stiff to stiff, brown, slightly moist, clay with gravel.	SS-10	15.5-17.0	0.7	6-8-8	SPT	
			SS-11	17.0-18.5	1.5	2-4-6	SPT	
20			SS-12	18.5-20.0	1.5	6-8-9	SPT	20
			ST-02	20.0-22.0	1.6		ST	
			SS-13	22.0-23.5	1.5	2-6-12	SPT	
25			SS-14	23.5-25.0	1.5	4-7-9	SPT	25
			SS-15	25.0-26.5	1.5	4-7-11	SPT	
			SS-16	26.5-28.0	1.5	7-11-13	SPT	
30			SS-17	28.0-29.5	1.5	3-6-10	SPT	30
			SS-18	29.5-31.0	1.5	6-10-13	SPT	
			ST-03	31.0-33.0	1.7		ST	
495.4	34.0		SS-19	33.0-34.5	1.5	7-9-14	SPT	
35		Medium stiff to stiff, brown to gray, slightly moist, clay with gravel.	SS-20	34.5-36.0	1.5	3-4-5	SPT	35
			SS-21	36.0-37.5	1.5	7-11-12	SPT	
491.4	38.0		SS-22	37.5-39.0	1.5	6-7-9	SPT	
40			SS-23	39.0-40.5	1.5	6-12-12	SPT	40
			SS-24	40.5-42.0	1.5	8-13-15	SPT	
			ST-04	42.0-44.0	1.5		ST	
45		Stiff to very stiff, brown, slightly moist, clay with gravel.	SS-25	44.0-45.5	1.5	5-8-12	SPT	45
			SS-26	45.5-47.0	1.5	4-7-9	SPT	
			SS-27	47.0-48.5	1.5	10-13-14	SPT	
50			SS-28	48.5-50.0	1.5	4-5-8	SPT	50

Driller's Subsurface Log for B-1008 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1008***	Immediate Water Depth ***NA***	Start Date ***11/06/2024***	Hole Type ***core and sample***
Surface Elevation ***529.4'***	Static Water Depth ***NA***	End Date ***11/07/2024***	Rig_Number ***CME 85***
Total Depth ***79.0'***	Driller ***D. Clements***	Latitude(83) ***37.806413***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508857***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden						
			SS-29	50.0-51.5	1.5	5-8-10	SPT	
			SS-30	51.5-53.0	1.5	12-16-16	SPT	
55			ST-05	53.0-55.0	1.8		ST	55
		Stiff to very stiff, brown, slightly moist, clay with gravel.	SS-31	55.0-56.5	1.5	8-10-14	SPT	
			SS-32	56.5-58.0	1.5	12-16-17	SPT	
			SS-33	58.0-59.5	1.5	4-5-11	SPT	
60			SS-34	59.5-61.0	1.5	15-19-19	SPT	60
			SS-35	61.0-62.5	1.5	7-11-14	SPT	
466.9	62.5							
~~466.4~~	~~63.0~~	Very stiff, greenish brown, slightly moist, clay with gravel.	SS-36	62.5-64.0	1.0	6-11-14	SPT	
65			ST-06	64.0-66.0	0.8		ST	65
		Hard, brown, moist, clay.	SS-37	66.0-67.4	0.9	15-35-50/0.40'	SPT	
461.4	68.0	(Begin Core)						
70		Gray limestone with shale, (with clay seams and voids).	8 / -	6.0	3.3	55		70
456.2	73.2							74.0
75		Gray limestone.	88 / -	5.0	5.0	100		75
450.4	79.0							79.0
80		(Bottom of Hole 79.0')						80
85		Backfilled with cement-bentonite grout.						85
90								90
95								95
100								100

Geologist's Subsurface Log for B-1008

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager:

Hole Number ***1008***	Immediate Water Depth ***NA***	Start Date ***11/06/2024***	Hole Type ***core and sample***
Surface Elevation ***529.4'***	Static Water Depth ***NA***	End Date ***11/07/2024***	Rig Number ***CME 85***
Total Depth ***79.0'***	Driller ***D. Clements***	Latitude(83) ***37.806413***	***GQ-737 Cravens***
Location ***0+08.00 CL***	Geologist	Longitude(83) ***-85.508857***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden / Rock Core	Std/Ky RQD					
			SS-01	0.0-1.5	1.1	7-3-2	SPT	
			SS-02	1.5-3.0	1.3	2-2-3	SPT	
			SS-03	3.0-4.5	1.5	4-4-4	SPT	
5			SS-04	4.5-6.0	1.5	2-5-3	SPT	5
			SS-05	6.0-7.5	1.5	5-5-6	SPT	
			SS-06	7.5-9.0	0.3	3-5-8	SPT	
10			ST-01	9.0-11.0	0.7		ST	10
			SS-07	11.0-12.5	0.4	15-8-6	SPT	
			SS-08	12.5-14.0	1.5	2-2-3	SPT	
15			SS-09	14.0-15.5	1.0	3-4-8	SPT	15
			SS-10	15.5-17.0	0.7	6-8-8	SPT	
			SS-11	17.0-18.5	1.5	2-4-6	SPT	
20			SS-12	18.5-20.0	1.5	6-8-9	SPT	20
			ST-02	20.0-22.0	1.6		ST	
			SS-13	22.0-23.5	1.5	2-6-12	SPT	
25		**Overburden**.	SS-14	23.5-25.0	1.5	4-7-9	SPT	25
			SS-15	25.0-26.5	1.5	4-7-11	SPT	
			SS-16	26.5-28.0	1.5	7-11-13	SPT	
			SS-17	28.0-29.5	1.5	3-6-10	SPT	
30			SS-18	29.5-31.0	1.5	6-10-13	SPT	30
			ST-03	31.0-33.0	1.7		ST	
			SS-19	33.0-34.5	1.5	7-9-14	SPT	
35			SS-20	34.5-36.0	1.5	3-4-5	SPT	35
			SS-21	36.0-37.5	1.5	7-11-12	SPT	
			SS-22	37.5-39.0	1.5	6-7-9	SPT	
40			SS-23	39.0-40.5	1.5	6-12-12	SPT	40
			SS-24	40.5-42.0	1.5	8-13-15	SPT	
			ST-04	42.0-44.0	1.5		ST	
45			SS-25	44.0-45.5	1.5	5-8-12	SPT	45
			SS-26	45.5-47.0	1.5	4-7-9	SPT	
			SS-27	47.0-48.5	1.5	10-13-14	SPT	
50			SS-28	48.5-50.0	1.5	4-5-8	SPT	50

Top of Rock = 68.0'
Elevation = 461.4'

Base Weathered Rock = 74.0'
Elevation = 455.4'

Drakes Formation
Bardstown Member

Geologist's Subsurface Log for B-1008 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1008***	Immediate Water Depth ***NA***	Start Date ***11/06/2024***	Hole Type ***core and sample***
Surface Elevation ***529.4'***	Static Water Depth ***NA***	End Date ***11/07/2024***	Rig Number ***CME 85***
Total Depth ***79.0'***	Driller ***D. Clements***	Latitude(83) ***37.806413***	***GQ-737 Cravens***
Location ***0+08.00 CL***	Geologist	Longitude(83) ***-85.508857***	

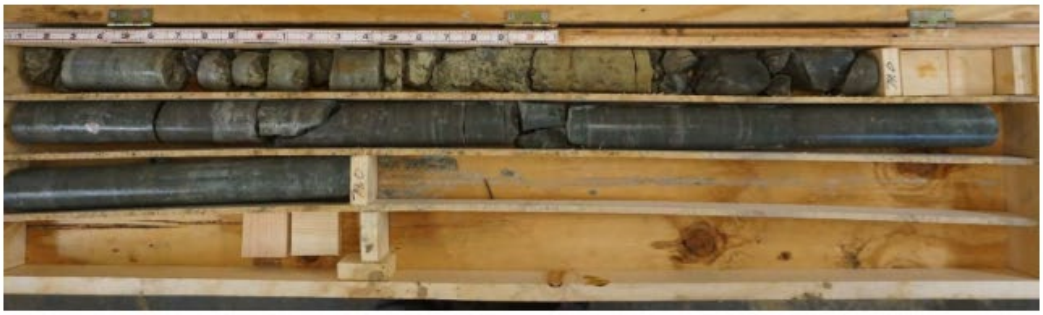
Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			SS-29	50.0-51.5	1.5	5-8-10	SPT	
			SS-30	51.5-53.0	1.5	12-16-16	SPT	
55			ST-05	53.0-55.0	1.8		ST	55
			SS-31	55.0-56.5	1.5	8-10-14	SPT	
			SS-32	56.5-58.0	1.5	12-16-17	SPT	
		Overburden.	SS-33	58.0-59.5	1.5	4-5-11	SPT	
60			SS-34	59.5-61.0	1.5	15-19-19	SPT	60
			SS-35	61.0-62.5	1.5	7-11-14	SPT	
			SS-36	62.5-64.0	1.0	6-11-14	SPT	
65			ST-06	64.0-66.0	0.8		ST	65
461.4	68.0	(Begin Core)	SS-37	66.0-67.4	0.9	15-35-50/0.40'	SPT	
70		**Limestone**: *Light gray, moderately to highly weathered, clastic, thinly bedded with clay seams throughout.*	8 / 7	6.0	3.3	55		70
456.2	73.2							74.0
75		**Limestone**: *Dark greenish-gray, slightly weathered to fresh, argillaceous, medium bedded.*	88 / 76	5.0	5.0	100		75
450.4	79.0							79.0
80		(Bottom of Hole 79.0')						80
85								85
90								90
95								95
100								100

Top of Rock = 68.0' Elevation = 461.4'
Base Weathered Rock = 74.0' Elevation = 455.4'
Drakes Formation
Bardstown Member

Geologist's Subsurface Log for B-1008 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam



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Driller's Subsurface Log for B-1009

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1009***	Immediate Water Depth ***12.0 (11/14/24)***	Start Date ***11/14/2024***	Hole Type ***core and sample***
Surface Elevation ***469.0'***	Static Water Depth ***NA***	End Date ***11/14/2024***	Rig_Number ***CME 85***
Total Depth ***19.3'***	Driller ***D. Clements***	Latitude(83) ***37.805963***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508953***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No.	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows	Sample Type SDI (JS)	Remarks
					Std/Ky RQD				
				ST-01	0.0-2.0	0.8		ST	
				ST-02	2.0-4.0	0.9		ST	
				ST-03	4.0-6.0	1.6		ST	
		Medium stiff to stiff, brown, slightly moist, clay with gravel.		ST-04	6.0-8.0	1.4		ST	
				ST-05	8.0-10.0	1.6		ST	
				ST-06	10.0-12.0	1.9		ST	
455.5	13.5			SS-01	12.0-13.5	0.4	7-6-3	SPT	
454.7	14.3	Medium stiff to hard, brown, moist to wet, clay with gravel.	(Begin Core)	SS-2	13.5-14.2	0.6	4-50/0.20'	SPT	
		Gray limestone.		84 / -	5.0	5.0	100		
449.7	19.3								19.3
		(Bottom of Hole 19.3')							
		Backfilled with cement-bentonite grout.							

Geologist's Subsurface Log for B-1009

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager:

Hole Number ***1009***	Immediate Water Depth ***12.0 (11/14/24)***	Start Date ***11/14/2024***	Hole Type ***core and sample***
Surface Elevation ***469.0'***	Static Water Depth ***NA***	End Date ***11/14/2024***	Rig Number ***CME 85***
Total Depth ***19.3'***	Driller ***D. Clements***	Latitude(83) ***37.805963***	***GQ-737 Cravens***
Location ***0+09.00 CL***	Geologist	Longitude(83) ***-85.508953***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. (Std/Ky RQD)	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows	Sample Type SDI (JS)	Remarks
			ST-01	0.0-2.0	0.8		ST	
			ST-02	2.0-4.0	0.9		ST	
			ST-03	4.0-6.0	1.6		ST	
		Overburden.	ST-04	6.0-8.0	1.4		ST	
			ST-05	8.0-10.0	1.6		ST	
			ST-06	10.0-12.0	1.9		ST	
			SS-01	12.0-13.5	0.4	7-6-3	SPT	
454.7	14.3	(Begin Core)	SS-2	13.5-14.2	0.6	4-50/0.20'	SPT	
		Limestone: *Dark greenish-gray, slightly weathered to fresh, argillaceous, sparsely fossiliferous, medium bedded.*	84 / 78	5.0	5.0	100		
449.7	19.3							19.3
		(Bottom of Hole 19.3')						

Top of Rock = 14.3'
Elevation = 454.7'

Base Weathered Rock = 14.5'
Elevation = 454.5'

Drakes Formation
Rowland Member

Geologist's Subsurface Log for B-1009 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1009 - Box 1 of 1

Driller's Subsurface Log for B-1010

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1010***	Immediate Water Depth ***47.0 (11/11/24)***	Start Date ***11/11/2024***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***11/12/2024***	Rig_Number ***CME 85***
Total Depth ***55.2'***	Driller ***D. Clements***	Latitude(83) ***37.806373***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508518***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			Std/Ky RQD					
528.2	1.5	Medium dense, gray, slightly moist, gravel (FILL).	SS-01	0.0-1.5	1.2	6-6-7	SPT	
526.7	3.0	Stiff, brown, slightly moist, clay (asphalt fragments, FILL).	SS-02	1.5-3.0	1.5	3-3-10	SPT	
525.2	4.5	Medium stiff, brown, slightly moist, clay with gravel (FILL).	SS-03	3.0-4.5	1.1	3-3-3	SPT	
523.7	6.0	Stiff, brown, slightly moist, clay (asphalt fragments, FILL).	SS-04	4.5-6.0	0.8	23-7-3	SPT	
			SS-05	6.0-7.5	1.5	4-4-7	SPT	
			SS-06	7.5-9.0	0.1	5-2-2	SPT	**Soft zone encountered from 7.5 feet to 9.0 feet @ 7.5**
			ST-01	9.0-11.0	0.5		ST	
			SS-07	11.0-12.5	1.5	20-7-9	SPT	
			SS-08	12.5-14.0	1.5	6-5-6	SPT	
			SS-09	14.0-15.5	1.5	4-4-5	SPT	
			SS-10	15.5-17.0	1.5	7-8-10	SPT	
			SS-11	17.0-18.5	1.5	4-6-8	SPT	
			SS-12	18.5-20.0	1.5	6-9-11	SPT	
			ST-02	20.0-22.0	1.4		ST	
			SS-13	22.0-23.5	1.5	5-9-11	SPT	
			SS-14	23.5-25.0	1.5	4-9-12	SPT	
		Medium stiff to stiff, brown, slightly moist, clay with gravel.	SS-15	25.0-26.5	1.5	3-6-8	SPT	
			SS-16	26.5-28.0	1.2	3-7-13	SPT	
			SS-17	28.0-29.5	1.5	5-6-8	SPT	
			SS-18	29.5-31.0	1.5	6-8-11	SPT	
			ST-03	31.0-33.0	1.2		ST	
			SS-19	33.0-34.5	1.5	5-9-13	SPT	
			SS-20	34.5-36.0	1.5	2-5-8	SPT	
			SS-21	36.0-37.5	1.5	8-15-16	SPT	
			SS-22	37.5-39.0	1.5	5-9-13	SPT	
			SS-23	39.0-40.5	1.5	4-6-12	SPT	
			SS-24	40.5-42.0	1.5	10-11-12	SPT	
			SS-25	42.0-43.5	1.5	5-7-9	SPT	
			SS-26	43.5-45.0	1.5	7-11-13	SPT	
482.7	47.0		SS-27	45.0-46.5	1.5	9-13-15	SPT	
			SS-28	46.5-48.0	1.5	8-16-19	SPT	
479.5	50.2	Very stiff to hard, brown to gray, moist to wet, sandy clay with gravel. (Begin Core)	SS-29	48.0-49.5	1.5	6-8-14	SPT	

Driller's Subsurface Log for B-1010 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1010***	Immediate Water Depth ***47.0 (11/11/24)***	Start Date ***11/11/2024***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***11/12/2024***	Rig_Number ***CME 85***
Total Depth ***55.2'***	Driller ***D. Clements***	Latitude(83) ***37.806373***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508518***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
			SS-30	49.5-49.9	0.4	50/0.40'	SPT	
		Brown with gray shale with limestone.	50 / -	5.0	5.0	100		
55 474.5	55.2							55.2 55
60		(Bottom of Hole 55.2')						60
65		Backfilled with cement-bentonite grout.						65
70								70
75								75
80								80
85								85
90								90
95								95
100								100

Geologist's Subsurface Log for B-1010

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1010***	Immediate Water Depth ***47.0 (11/11/24)***	Start Date ***11/11/2024***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***11/12/2024***	Rig_Number ***CME 85***
Total Depth ***55.2'***	Driller ***D. Clements***	Latitude(83) ***37.806373***	***GQ-737 Cravens***
Location ***0+10.00 CL***	Geologist	Longitude(83) ***-85.508518***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No.	Depth (ft) Run	Rec. (ft) Rec	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
				SS-01	0.0-1.5	1.2	6-6-7	SPT	
				SS-02	1.5-3.0	1.5	3-3-10	SPT	
				SS-03	3.0-4.5	1.1	3-3-3	SPT	
5				SS-04	4.5-6.0	0.8	23-7-3	SPT	5
				SS-05	6.0-7.5	1.5	4-4-7	SPT	
				SS-06	7.5-9.0	0.1	5-2-2	SPT	
10				ST-01	9.0-11.0	0.5		ST	10
				SS-07	11.0-12.5	1.5	20-7-9	SPT	
				SS-08	12.5-14.0	1.5	6-5-6	SPT	
15				SS-09	14.0-15.5	1.5	4-4-5	SPT	15
				SS-10	15.5-17.0	1.5	7-8-10	SPT	
				SS-11	17.0-18.5	1.5	4-6-8	SPT	
20				SS-12	18.5-20.0	1.5	6-9-11	SPT	20
				ST-02	20.0-22.0	1.4		ST	
				SS-13	22.0-23.5	1.5	5-9-11	SPT	
25		**Overburden**.		SS-14	23.5-25.0	1.5	4-9-12	SPT	25
				SS-15	25.0-26.5	1.5	3-6-8	SPT	
				SS-16	26.5-28.0	1.2	3-7-13	SPT	
				SS-17	28.0-29.5	1.5	5-6-8	SPT	
30				SS-18	29.5-31.0	1.5	6-8-11	SPT	30
				ST-03	31.0-33.0	1.2		ST	
				SS-19	33.0-34.5	1.5	5-9-13	SPT	
35				SS-20	34.5-36.0	1.5	2-5-8	SPT	35
				SS-21	36.0-37.5	1.5	8-15-16	SPT	
				SS-22	37.5-39.0	1.5	5-9-13	SPT	
40				SS-23	39.0-40.5	1.5	4-6-12	SPT	40
				SS-24	40.5-42.0	1.5	10-11-12	SPT	
				SS-25	42.0-43.5	1.5	5-7-9	SPT	
45				SS-26	43.5-45.0	1.5	7-11-13	SPT	45
				SS-27	45.0-46.5	1.5	9-13-15	SPT	
				SS-28	46.5-48.0	1.5	8-16-19	SPT	
				SS-29	48.0-49.5	1.5	6-8-14	SPT	
50 479.5	50.2		(Begin Core)						50

Top of Rock = 50.2' Elevation = 479.5'
Base Weathered Rock = 55.2' Elevation = 474.5'
Drakes Formation
Saluda Dolomite Member

Geologist's Subsurface Log for B-1010 (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager:

Hole Number ***1010***	Immediate Water Depth ***47.0 (11/11/24)***	Start Date ***11/11/2024***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***11/12/2024***	Rig Number ***CME 85***
Total Depth ***55.2'***	Driller ***D. Clements***	Latitude(83) ***37.806373***	***GQ-737 Cravens***
Location ***0+10.00 CL***	Geologist	Longitude(83) ***-85.508518***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
			SS-30	49.5-49.9	0.4	50/0.40'	SPT	
474.5	55.2	**Dolomite**: *Light brown, moderately to highly weathered, earthy, thin to medium bedded.*	50 / 12	5.0	5.0	100		55.2
		(Bottom of Hole 55.2')						

Top of Rock = 50.2' Elevation = 479.5'
Base Weathered Rock = 55.2' Elevation = 474.5'
Drakes Formation
Saluda Dolomite Member

Geologist's Subsurface Log for B-1010 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1010 - Box 1 of 1

Driller's Subsurface Log for B-1011

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1011***	Immediate Water Depth ***NA***	Start Date ***11/14/2024***	Hole Type ***core and sample***
Surface Elevation ***469.1'***	Static Water Depth ***NA***	End Date ***11/14/2024***	Rig_Number ***CME 85***
Total Depth ***20.3'***	Driller ***D. Clements***	Latitude(83) ***37.805911***	
Location ***+ 'Lt.***		Longitude(83) ***-85.508636***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden	ST-01	0.0-2.0	1.2		ST	
			ST-02	2.0-4.0	0.8		ST	
			ST-03	4.0-6.0	1.2		ST	
		Medium stiff to stiff, brown, slightly moist, clay with gravel.	ST-04	6.0-8.0	1.5		ST	
			ST-05	8.0-10.0	1.3		ST	
			ST-06	10.0-12.0	0.4		ST	
			ST-07	12.0-14.0	1.5		ST	
454.7	14.4	(Begin Core)						
454.6	14.5	Hard, gray, slightly moist, limestone.	SS-01	14.0-14.4	0.4	50/0.40'	SPT	
		Gray limestone, (some shale seams).	40 / -	5.8	5.8	100		
448.8	20.3							20.3
		(Bottom of Hole 20.3')						
		Backfilled with cement-bentonite grout and 1/4 bucket of bentonite pellets.						

Geologist's Subsurface Log for B-1011

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-002-2022*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager:

Hole Number ***1011***	Immediate Water Depth ***NA***	Start Date ***11/14/2024***	Hole Type ***core and sample***
Surface Elevation ***469.1'***	Static Water Depth ***NA***	End Date ***11/14/2024***	Rig Number ***CME 85***
Total Depth ***19.5'***	Driller ***D. Clements***	Latitude(83) ***37.805911***	***GQ-737 Cravens***
Location ***0+11.00 CL***	Geologist	Longitude(83) ***-85.508636***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden	ST-01	0.0-2.0	1.2		ST	
			ST-02	2.0-4.0	0.8		ST	
			ST-03	4.0-6.0	1.2		ST	
		Overburden.	ST-04	6.0-8.0	1.5		ST	
			ST-05	8.0-10.0	1.3		ST	
			ST-06	10.0-12.0	0.4		ST	
			ST-07	12.0-14.0	1.5		ST	
454.6	14.5	(Begin Core)	SS-01	14.0-14.4	0.4	50/0.40'	SPT	
		Limestone: *Dark greenish-gray, weathers dull brown, dolomitic, moderately weathered to fresh, argillaceous, medium bedded.*	40 / 36	5.0	5.0	100		**mechanical breaks @ 16.2-16.9 mechanical breaks @ 18.2-19.5**
449.6	19.5							19.5
		(Bottom of Hole 19.5')						

Top of Rock = 14.5' Elevation = 454.6'
Base Weathered Rock = 15.1' Elevation = 454.0'
Drakes Formation
Rowland Member

Geologist's Subsurface Log for B-1011 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1011 - Box 1 of 1

Driller's Subsurface Log for B-1012

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 18/11/24

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1012***	Immediate Water Depth ***NA***	Start Date ***11/13/2024***	Hole Type ***core and sample***
Surface Elevation ***530.1'***	Static Water Depth ***NA***	End Date ***11/13/2024***	Rig_Number ***CME 85***
Total Depth ***21.0'***	Driller ***D. Clements***	Latitude(83) ***37.806290***	
Location ***+ 'Lt.***		Longitude(83) ***-85.507838***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. (Std/Ky RQD)	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
528.6	1.5	Medium dense, gray, slightly moist, gravel.	SS-01	0.0-1.5	1.5	7-14-10	SPT	
		Medium stiff to stiff, brown, slightly moist, clay with gravel.	SS-02	1.5-3.0	1.0	7-5-5	SPT	
5			SS-03	3.0-4.5	0.9	2-3-3	SPT	5
524.1	6.0		SS-04	4.5-6.0	0.8	2-3-14	SPT	
522.6	7.5	Medium stiff, brown, slightly moist, sandy clay with gravel.	SS-05	6.0-7.5	0.5	8-7-2	SPT	
			SS-06	7.5-9.0	1.5	3-6-17	SPT	
10		Very stiff, brown, slightly moist, sandy clay with gravel.	SS-07	9.0-10.5	1.5	7-11-12	SPT	10
			SS-08	10.5-12.0	1.5	8-11-15	SPT	
516.6	13.5		SS-09	12.0-13.5	1.5	11-14-18	SPT	
15		Hard, brown, slightly moist, clay (highly weathered rock fragments). (Begin Core)	SS-10	13.5-14.9	1.4	13-19-50/0.40'	SPT	15
514.1	16.0							
20		Gray limestone with shale.	62 / -	5.0	5.0	100		20
509.1	21.0							21.0
25		(Bottom of Hole 21.0')						25
		Backfilled with cement-bentonite grout, 1 bag of sand, and 2 buckets of bentonite pellets.						
30								30
35								35
40								40
45								45
50								50

Geologist's Subsurface Log for B-1012

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 3/27/25

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Project ID: ***M-002-2022***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager:

Hole Number ***1012***	Immediate Water Depth ***NA***	Start Date ***11/13/2024***	Hole Type ***core and sample***
Surface Elevation ***530.1'***	Static Water Depth ***NA***	End Date ***11/13/2024***	Rig_Number ***CME 85***
Total Depth ***21.0'***	Driller ***D. Clements***	Latitude(83) ***37.806290***	***GQ-737 Cravens***
Location ***0+12.00 CL***	Geologist	Longitude(83) ***-85.507838***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden	SS-01	0.0-1.5	1.5	7-14-10	SPT	
			SS-02	1.5-3.0	1.0	7-5-5	SPT	
			SS-03	3.0-4.5	0.9	2-3-3	SPT	
5			SS-04	4.5-6.0	0.8	2-3-14	SPT	5
			SS-05	6.0-7.5	0.5	8-7-2	SPT	
		Overburden.	SS-06	7.5-9.0	1.5	3-6-17	SPT	
10			SS-07	9.0-10.5	1.5	7-11-12	SPT	10
			SS-08	10.5-12.0	1.5	8-11-15	SPT	
			SS-09	12.0-13.5	1.5	11-14-18	SPT	
15			SS-10	13.5-14.9	1.4	13-19-50/0.40'	SPT	15
514.1	16.0	Rock Core (Begin Core)	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
20		**Limestone**: *Light gray, dolomitic, moderately weathered, moderately fossiliferous, with thin chert beds, thinly bedded.*	62 / 40	5.0	5.0	100		20
509.1	21.0							21.0
25		(Bottom of Hole 21.0')						25
30								30
35								35
40								40
45								45
50								50

Top of Rock = 16.0'
Elevation = 514.1'

Base Weathered Rock = 16.6'
Elevation = 513.5'

Drakes Formation
Brassfield Dolomite

Geologist's Subsurface Log for B-1012 (cont.)

CORE PHOTOGRAPHIC RECORD

US Highway 62 at Sympson Lake Dam

1012 - Box 1 of 1

Geologist's Subsurface Log for B-1013P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1013***	Immediate Water Depth ***NA***	Start Date ***02/23/2026***	Hole Type ***core***
Surface Elevation ***541.9'***	Static Water Depth ***NA***	End Date ***02/24/2026***	Rig_Number ***55***
Total Depth ***112.0'***	Driller ***Andrew Clements***	Latitude(83) ***37.806771***	***GQ-737 Cravens***
Location ***102+26.00 19.0' Lt.***	Geologist ***Tanner Avery***	Longitude(83) ***-85.510955***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
5								5
10								10
15								15
20								20
25		**Overburden**.						25
30								30
35								35
40								40
45								45
492.9	49.0	(Begin Core)						
50				4.8	4.8	100		50

Top of Rock = 49.0'
Elevation = 492.9'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1013P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1013***	Immediate Water Depth ***NA***	Start Date ***02/23/2026***	Hole Type ***core***
Surface Elevation ***541.9'***	Static Water Depth ***NA***	End Date ***02/24/2026***	Rig_Number ***55***
Total Depth ***112.0'***	Driller ***Andrew Clements***	Latitude(83) ***37.806771***	***GQ-737 Cravens***
Location ***102+26.00 19.0' Lt.***	Geologist ***Tanner Avery***	Longitude(83) ***-85.510955***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
55		**Limestone**: *Alternating bands of dark gray and dark bluish gray, fresh, moderately strong, very slightly fractured, gray limestone is micritic, bluish gray limestone is argillaceous, medium (4"-1') bedded, bedding is wavy (-10°-10°), [52.9 ft. - 53.9 ft. - Irregular shaped bright green shale pockets present, max 2mm thick].*	100 / -	4.8	4.8	100		53.8 **Shale bed @ 52.1-52.18**
483.5	58.4		95 / -	5.2	5.0	96		59.0 **Dark bluish gray, very soft shale bed @ 56.65-57**
60		**Dolostone**: *Interbedded dolostone and mudstone; light gray - light greenish gray; fresh, strong, thinly to medium bedded, bedding is planar and horizontal, 60% dolostone/40% mudstone, unfractured.*	100 / -	5.0	5.0	100		**Dark gray, very soft shale bed @ 58.2-58.4**
477.9	64.0							64.0
65		**Limestone**: *Interbedded limestone and mudstone, light gray to light greenish gray, fresh, strong with thinly bedded planar bedding, 50% limestone (micritic), 50% mudstone, slightly fractured.*	96 / -	5.0	4.8	96		69.0 **No recovery @ 68.8-69**
70			98 / -	5.1	5.1	100		**Dark gray shale, sharp contact, very soft @ 69-69.2**
467.4	74.5							74.1
75		**Limestone**: *Light gray, gradient contact with above unit, fresh, strong, hard, medium to thickly bedded with wavy bedding, green mudstone/shale laminae present (<5%), slightly fractured, moderately strong.*	92 / -	5.0	5.0	100		**Dark gray shale, very soft @ 75.42-75.8**
462.1	79.8							79.1
80		**Limestone**: *Interbedded limestone and mudstone (60/40); light gray to light grayish green, fresh, limestone, mudstone, thinly to medium bedded, planar bedding, trace (3%) fossils, limestone is micritic, unfractured, moderately strong.*	98 / -	4.9	4.9	100		84.0
458.3	83.6							
85		**Limestone (Argillaceous)**: *Greenish gray, thickly to massive bedding, fresh, 4% fossils, unfractured, moderately strong.*	100 / -	5.0	5.0	100		89.0
452.4	89.5							
90		**Limestone & Shale**: *Light to dark gray, fresh, limestone is medium bedded, shale is thinly bedded, bedding is wavy, shale is moderately reactive, unfractured, moderately strong, [93.4 ft. - Shale turns light greenish gray, 50% shale, 50% limestone].*	98 / -	5.0	4.9	98		**No recovery @ 89.6-89.7**
95			100 / -	5.0	5.0	100		94.0
444.9	97.0							
100		**Limestone**: *Dark bluish gray to light gray, fresh weathering, banded, gradational contact in upper unit, thinly to medium bedded, bedding is wavy,*		5.0	5.0	100		99.0

Top of Rock = 49.0'
Elevation = 492.9'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1013P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26
Page 3 of 3

Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1013***	Immediate Water Depth ***NA***	Start Date ***02/23/2026***	Hole Type ***core***
Surface Elevation ***541.9'***	Static Water Depth ***NA***	End Date ***02/24/2026***	Rig_Number ***55***
Total Depth ***112.0'***	Driller ***Andrew Clements***	Latitude(83) ***37.806771***	***GQ-737 Cravens***
Location ***102+26.00 19.0' Lt.***	Geologist ***Tanner Avery***	Longitude(83) ***-85.510955***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
		unfractured, strong.	100 / -	5.0	5.0	100		
105		**Limestone**: *Dark bluish gray to light gray, fresh weathering, banded, gradational contact in upper unit, thinly to medium bedded, bedding is wavy, unfractured, strong.*						104.0 105
433.3	108.6		100 / -	5.0	5.0	100		
110		**Shale (claystone)**: *Dark bluish gray, fresh, thickly bedded, gradational contact with upper unit, unfractured, moderately strong.*						109.0 110
429.9	112.0		97 / -	3.0	2.9	97		112.0 **Thinly bedded limestone present, light gray @ 111.6 No recovery @ 111.9-112**
115		(Bottom of Hole 112.0')						115
120								120
125								125
130								130
135								135
140								140
145								145
150								150

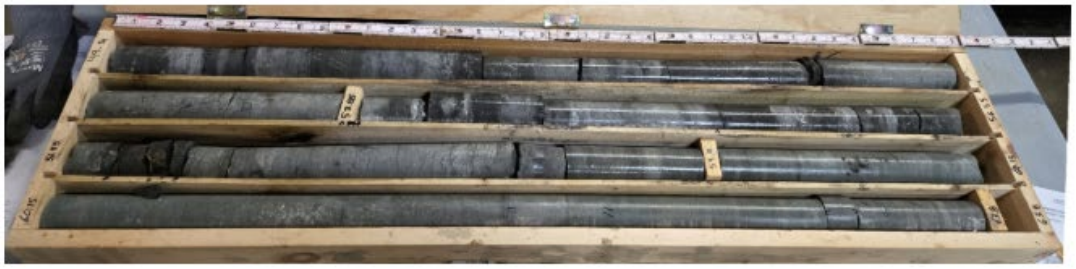
Top of Rock = 49.0'
Elevation = 492.9'

Bardstown Member
Grant Lake Limestone

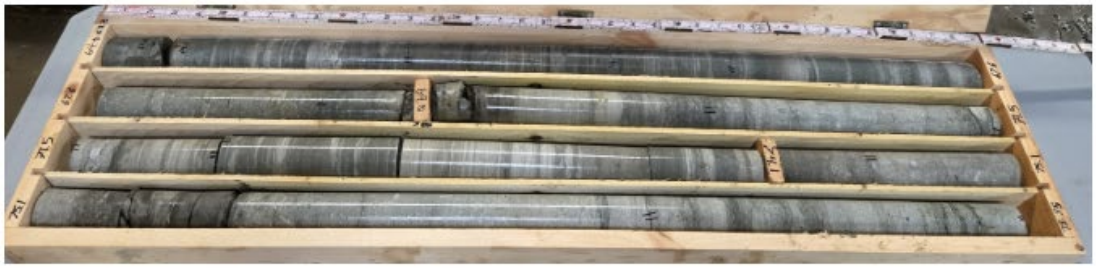
Geologist's Subsurface Log for B-1013P (cont.)

CORE PHOTOGRAPHIC RECORD

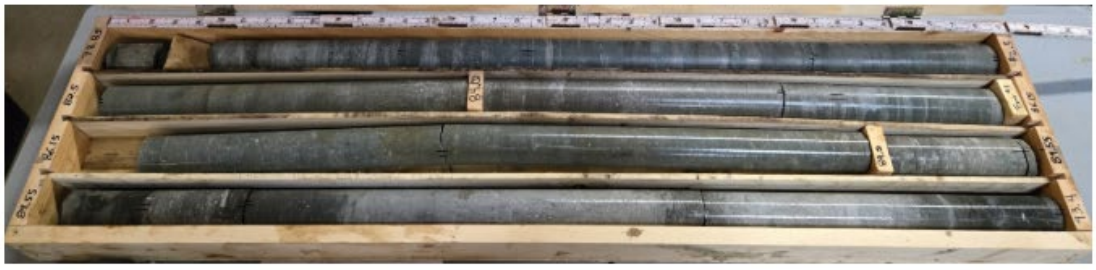
Sympson Lake Dam Cutoff Wall US62 Westbound Lane



1013P - Box 1 of 5



1013P - Box 2 of 5

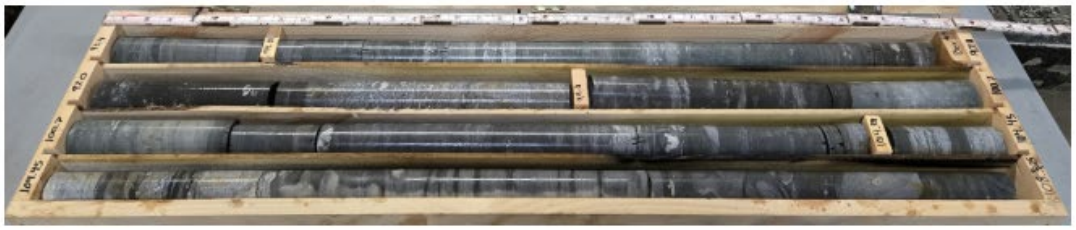


1013P - Box 3 of 5

Geologist's Subsurface Log for B-1013P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane



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1013P - Box 5 of 5

Geologist's Subsurface Log for B-1014P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1014***	Immediate Water Depth ***NA***	Start Date ***02/25/2026***	Hole Type ***core***
Surface Elevation ***538.4'***	Static Water Depth ***NA***	End Date ***02/27/2026***	Rig_Number ***55***
Total Depth ***109.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806732***	***GQ-737 Cravens***
Location ***103+06.00 17.0' Lt.***	Geologist ***Sarah Wiles***	Longitude(83) ***-85.510681***	

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)	
		Overburden.							

Top of Rock = 55.0' Elevation = 483.4'
Base Weathered Rock = 55.9' Elevation = 482.5'
Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1014P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1014***	Immediate Water Depth ***NA***	Start Date ***02/25/2026***	Hole Type ***core***
Surface Elevation ***538.4'***	Static Water Depth ***NA***	End Date ***02/27/2026***	Rig_Number ***55***
Total Depth ***109.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806732***	***GQ-737 Cravens***
Location ***103+06.00 17.0' Lt.***	Geologist ***Sarah Wiles***	Longitude(83) ***-85.510681***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows Sample Type SDI (JS)	Remarks
55 483.4	55.0	**Overburden**. (Begin Core)					
		Dolostone: *Medium gray/green with interbedded light to medium green mudstone, medium bedded, slightly fractured, strong.*	65 / -	4.1	4.1	100	**Moderately weathered @ 55-55.9**
60			100 / -	5.0	5.0	100	59.1
474.1	64.3						64.1
65		**Limestone (Argillaceous)**: *Light gray-green, thinly to medium bedded, very slightly fractured, strong.*	92 / -	5.0	5.0	100	**Weathered shale seam @ 65.9-66.3**
70			90 / -	5.0	5.0	100	69.1
75			100 / -	5.0	5.0	100	**Clay seam @ 72.5-72.6** **Clay seam @ 72.9-73** 74.1
461.9	76.5						79.1
80		**Dolostone**: *Medium gray/green dolostone with interbedded light to medium green mudstone, medium bedded, very slightly fractured, strong.*	100 / -	5.0	5.0	100	84.1
85			92 / -	5.0	5.0	100	**Clay/shale seam @ 86.6-87** 89.1
451.4	87.0						
90		**Limestone**: *Dark gray with light gray banding and fossils, unfractured, very strong.*	100 / -	5.0	5.0	100	94.1
95			100 / -	5.0	5.0	100	99.1
100				5.0	5.0	100	

Top of Rock = 55.0' Elevation = 483.4'
Base Weathered Rock = 55.9' Elevation = 482.5'
Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1014P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1014***	Immediate Water Depth ***NA***	Start Date ***02/25/2026***	Hole Type ***core***
Surface Elevation ***538.4'***	Static Water Depth ***NA***	End Date ***02/27/2026***	Rig_Number ***55***
Total Depth ***109.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806732***	***GQ-737 Cravens***
Location ***103+06.00 17.0' Lt.***	Geologist ***Sarah Wiles***	Longitude(83) ***-85.510681***	

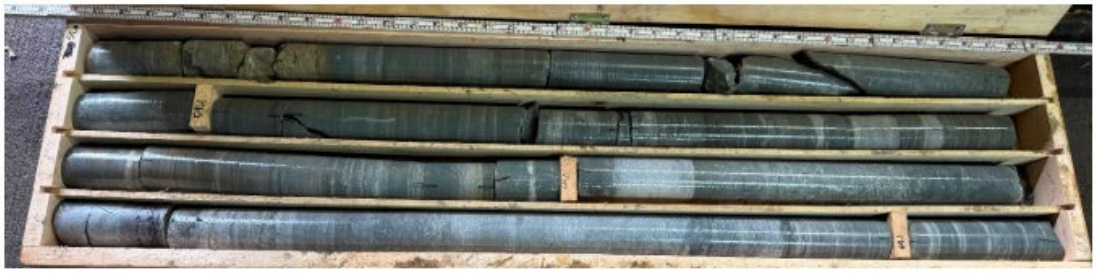
Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows / Sample Type SDI (JS)	Remarks
435.1	103.3	**Limestone**: *Dark gray with light gray banding and fossils, unfractured, very strong.*	100 / -	5.0	5.0	100	
105							104.1 105
		Limestone: *Dark gray-green, massive bedding, unfractured, very strong.*	100 / -	5.0	5.0	100	
430.0	108.4						
429.3	109.1	**Limestone**: *Dark gray with light gray banding and fossils, unfractured, very strong.*					109.1
110		(Bottom of Hole 109.1')					110
115							115
120							120
125							125
130							130
135							135
140							140
145							145
150							150

Top of Rock = 55.0' Elevation = 483.4'
Base Weathered Rock = 55.9' Elevation = 482.5'
Rowland Member
Grant Lake Limestone

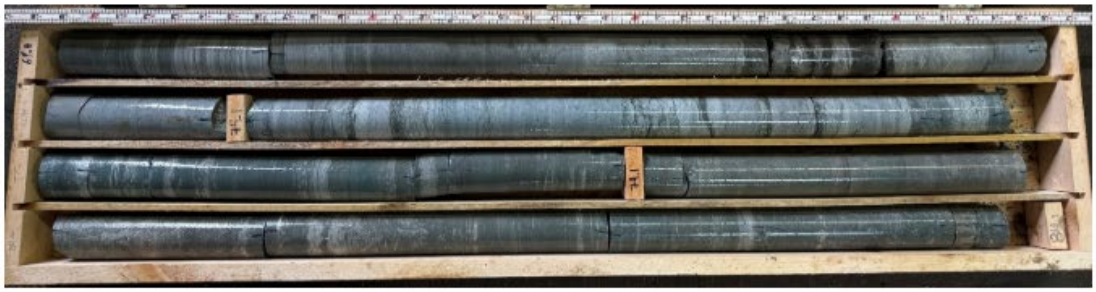
Geologist's Subsurface Log for B-1014P (cont.)

CORE PHOTOGRAPHIC RECORD

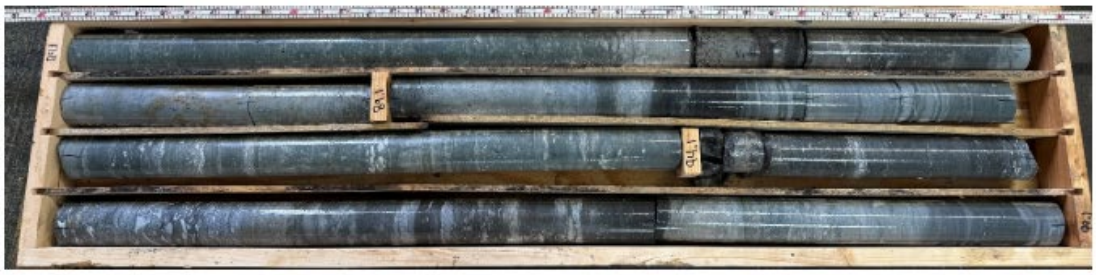
Sympson Lake Dam Cutoff Wall US62 Westbound Lane



1014P - Box 1 of 4



1013P - Box 2 of 4

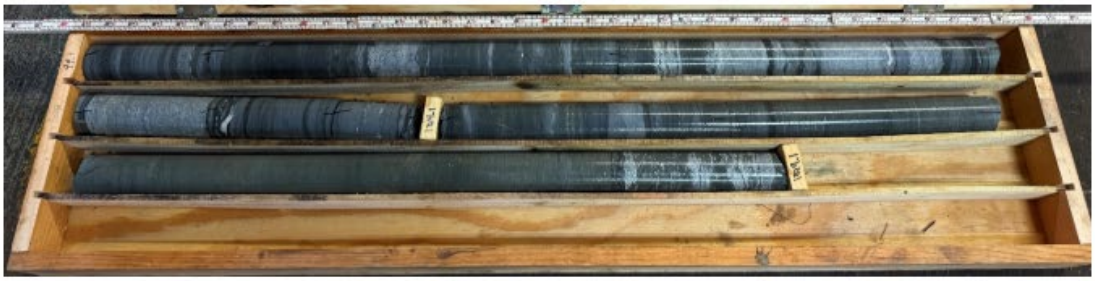


1013P - Box 3 of 4

Geologist's Subsurface Log for B-1014P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane



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Geologist's Subsurface Log for B-1015P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1015***	Immediate Water Depth ***NA***	Start Date ***02/27/2026***	Hole Type ***core***
Surface Elevation ***535.0'***	Static Water Depth ***NA***	End Date ***03/03/2026***	Rig_Number ***55***
Total Depth ***107.8'***	Driller ***Andrew Clements***	Latitude(83) ***37.806698***	***GQ-737 Cravens***
Location ***103+91.00 17.0' Lt.***	Geologist ***Sarah Wiles***	Longitude(83) ***-85.510391***	

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)	
5									5
10									10
15									15
20									20
25		**Overburden**.							25
30									30
35									35
40									40
45									45
50									50

Top of Rock = 63.5'
Elevation = 471.5'

Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1015P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1015***	Immediate Water Depth ***NA***	Start Date ***02/27/2026***	Hole Type ***core***
Surface Elevation ***535.0'***	Static Water Depth ***NA***	End Date ***03/03/2026***	Rig_Number ***55***
Total Depth ***107.8'***	Driller ***Andrew Clements***	Latitude(83) ***37.806698***	***GQ-737 Cravens***
Location ***103+91.00 17.0' Lt.***	Geologist ***Sarah Wiles***	Longitude(83) ***-85.510391***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
55								55
60		**Overburden**.						60
471.5	63.5	(Begin Core)						
65								65
469.3	65.7	**Limestone**: *Medium gray with interbedded light gray to green mudstone, fresh, slightly fractured.*	77 / -	1.1	1.1	100		64.8
468.6	66.4	**Limestone**: *Medium gray with interbedded light gray to green mudstone with increasing dark gray shale banding, slightly fractured.*	90 / -	4.8	4.8	100		
467.7	67.3	**Shale**: *Dark gray shale bed.*						69.4
70		**Limestone**: *Light gray with thin, horizontal shale/mudstone bedding, slightly fractured.*	86 / -	5.0	5.0	100		**Soft, clay seam @ 69.5-69.7 Very soft clay seam @ 69.9-70.1** 70
461.2	73.8							
460.2	74.8	**Limestone**: *Dark gray to dark green, strong.*						74.4
75								75
80		**Limestone**: *Dark gray to dark green, strong, thinly to medium bedded with light gray banding, slightly fractured.*	100 / -	5.0	5.0	100		79.4 80
450.6	84.4		90 / -	5.0	5.0	100		
85								84.4 **Soft clay seam @ 83.9-84.1 Shale seam @ 84.1-84.4** 85
90		**Limestone**: *Medium gray with bands of dark gray shale bedding, limestone is more dark gray and dark green in areas, very slightly fractured.*	100 / -	5.0	5.0	100		89.4 90
95			100 / -	5.0	5.0	100		94.4 95
100 435.2	99.8							99.4 100

Top of Rock = 63.5'
Elevation = 471.5'

Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1015P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1015***	Immediate Water Depth ***NA***	Start Date ***02/27/2026***	Hole Type ***core***
Surface Elevation ***535.0'***	Static Water Depth ***NA***	End Date ***03/03/2026***	Rig_Number ***55***
Total Depth ***107.8'***	Driller ***Andrew Clements***	Latitude(83) ***37.806698***	***GQ-737 Cravens***
Location ***103+91.00 17.0' Lt.***	Geologist ***Sarah Wiles***	Longitude(83) ***-85.510391***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
				5.0	5.0	100		
		Limestone: *Medium gray, thick bedded, unfractured, strong to very strong.*	100 / -	5.0	5.0	100		
429.1	105.9							104.4
			100 / -	3.4	3.4	100		
427.2	107.8	**Limestone**: *Dark gray with light gray banding, fossils present, unfractured.*						107.8
		(Bottom of Hole 107.8')						

Top of Rock = 63.5'
Elevation = 471.5'

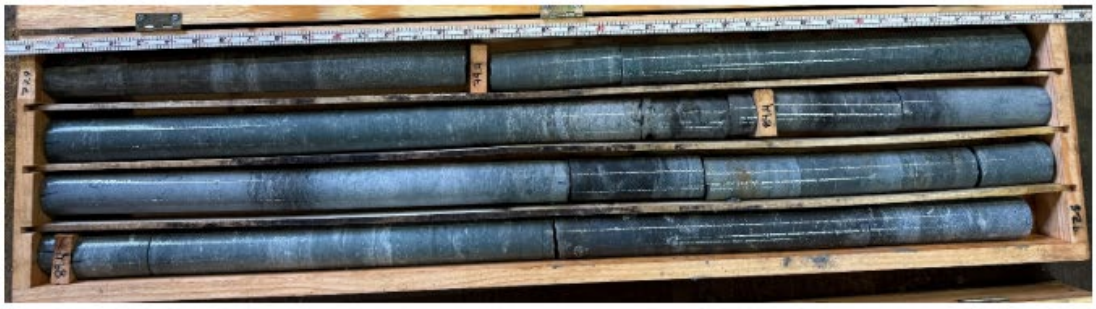
Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1015P (cont.)

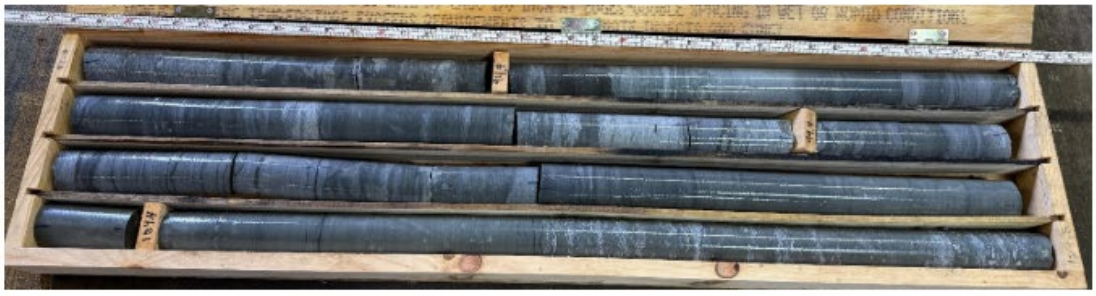
CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1015P - Box 1 of 3



1015P - Box 2 of 3



1015P - Box 3 of 3

Geologist's Subsurface Log for B-1016P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1016***	Immediate Water Depth ***NA***	Start Date ***03/09/2026***	Hole Type ***core***
Surface Elevation ***532.2'***	Static Water Depth ***NA***	End Date ***03/12/2026***	Rig_Number ***55***
Total Depth ***100.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806663***	***GQ-737 Cravens***
Location ***104+76.00 17.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.510100***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
		Overburden.						

Top of Rock = 75.2' Elevation = 457.0'
Base Weathered Rock = 76.8' Elevation = 455.4'
Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1016P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1016***	Immediate Water Depth ***NA***	Start Date ***03/09/2026***	Hole Type ***core***
Surface Elevation ***532.2'***	Static Water Depth ***NA***	End Date ***03/12/2026***	Rig_Number ***55***
Total Depth ***100.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806663***	***GQ-737 Cravens***
Location ***104+76.00 17.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.510100***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
457.0	75.2	**Overburden**.	(Begin Core)						
		Limestone: *Med. gray to lt. greenish gray and dk. gray, fine to med. grained, mod. weathered, moderately strong, intensely fractured, trace (<5%) fossils, trace dk. gray shale laminations, interbedded lt. gray to med. gray to lt. greenish-gray, thinly bedded, [76.8 ft. - Slightly weathered, strong, trace vugs infilled with dark green mineral, moderately fractured].*		53 / -	3.8	3.8	100		79.0 **Fracture zone, 0° @ 76.5-76.8**
				86 / -	5.0	5.0	100		84.0 **Dark gray clay seam, strongly reactive @ 80.4-80.8**
443.2	89.0			98 / -	5.0	5.0	100		89.0 **Shale bed, dark gray, strongly reactive @ 85.3-85.4**
		Limestone: *Light to dark gray, fresh to moderately weathered, fine to coarse grained, 10% fossils, thinly bedded, medium gray silty beds (with no fossils), trace dark gray laminations, slightly to moderately fractured, very strong.*		100 / -	5.2	5.2	100		94.2 **5% - 10% limestone clasts, subrounded (avg. 0.5cm - 1.0cm) @ 86.1**
				100 / -	4.8	4.8	100		**Dark gray clay, strongly reactive @ 88-88.1**
432.9	99.3								99.0 **5% dark gray**
432.1	100.1	**Dolostone**: *Medium gray, moderately reactive*		73 / -	1.1	1.1	100		

Top of Rock = 75.2' Elevation = 457.0'
Base Weathered Rock = 76.8' Elevation = 455.4'
Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1016P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1016***	Immediate Water Depth ***NA***	Start Date ***03/09/2026***	Hole Type ***core***
Surface Elevation ***532.2'***	Static Water Depth ***NA***	End Date ***03/12/2026***	Rig_Number ***55***
Total Depth ***100.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806663***	***GQ-737 Cravens***
Location ***104+76.00 17.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.510100***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
		when powdered, very strong, moderately fractured.						100.1 **dolostone beds @ 88.1 Medium gray beds become silty @ 93 Clay bed, 2cm thick, medium gray, weakly reactive @ 96.6 No recovery @ 98.2-98.3**
105		(Bottom of Hole 100.1')						105
110								110
115								115
120								120
125								125
130								130
135								135
140								140
145								145
150								150

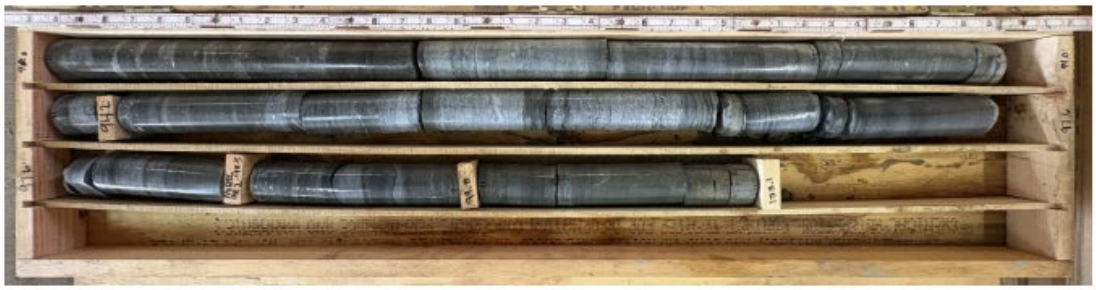
Top of Rock = 75.2' Elevation = 457.0'
Base Weathered Rock = 76.8' Elevation = 455.4'
Rowland Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1016P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1016P - Box 1 of 2



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Geologist's Subsurface Log for B-1017P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1017***	Immediate Water Depth ***NA***	Start Date ***03/12/2026***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***03/13/2026***	Rig_Number ***55***
Total Depth ***103.9'***	Driller ***Andrew Clements***	Latitude(83) ***37.806464***	***GQ-737 Cravens***
Location ***109+27.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.508509***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden						
		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
			1	2.0-3.5	1.5	3-2-3	SPT	
			2	5.0-6.5	1.5	6-2-2	SPT	
			3	10.0-11.5	1.5	4-5-6	SPT	
			4	15.0-16.5	1.5	7-7-8	SPT	
			5	20.0-21.5	1.5	11-10-10	SPT	
		Overburden.						
			6	25.0-26.5	1.5	5-7-9	SPT	
			7	30.0-31.5	1.5	9-6-11	SPT	
			8	35.0-36.5	1.5	7-13-11	SPT	
			9	40.0-41.5	0.6	15-26-48	SPT	
485.3	44.4	(Begin Core)						
		Limestone: *Light to medium gray to light brown, fine to medium grained, thinly bedded, dark gray to light brown, moderately weathered, intensely fractured, moderately strong, clay seam with trace subangular shale fragments, strongly reactive 46.3 ft. - 46.7 ft.*	10	44.0-44.4	0.4	50/0.40'	SPT	**Intensely weathered @ 45-46.7**
			11 / -	4.4	4.4	100		**Near vertical**
480.6	49.1							48.8 **fracture, iron oxide stained**
			86 / -	5.0	5.0	100		

Top of Rock = 44.4' Elevation = 485.3'
Base Weathered Rock = 59.8' Elevation = 469.9'
Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1017P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026*** Item Number: ***04-05013.00***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***1017***	Immediate Water Depth ***NA***	Start Date ***03/12/2026***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***03/13/2026***	Rig_Number ***55***
Total Depth ***103.9'***	Driller ***Andrew Clements***	Latitude(83) ***37.806464***	***GQ-737 Cravens***
Location ***109+27.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.508509***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (%)	SPT Blows Sample Type SDI (JS)	Remarks
		Dolostone: *Medium gray to medium greenish gray, moderately weathered, trace vugs, some partially filled with dark green mineral, moderately fractured, moderately strong.*	86 / -	5.0	5.0	100	@ 45.3-46 Near vertical fracture, iron oxide stained, closed to partially open from 50.9 - 51.2 @ 50.6-50.9
55			52 / -	5.0	5.0	100	53.8 55
470.9	58.8						58.8 Near vertical fracture, iron oxide stained @ 55.5-55.8 Intensely weathered @ 57.4-57.8 Clay, dark gray, weakly reactive @ 59.4-59.7
60		**Limestone**: *Light gray to light brownish gray, slightly to moderately weathered, moderately fractured, strong, fine to medium grained.*	80 / -	5.0	5.0	100	60
65			94 / -	5.0	5.0	100	63.8 65
70			100 / -	5.0	5.0	100	68.8 Shale bed, dark gray, strongly reactive @ 59.7-59.8 Clay, dark gray, strongly reactive @ 65.9-66 70
459.0	70.7						73.8
		Dolostone: *Medium gray to medium greenish gray, fresh to slightly weathered, very slightly to slightly fractured, very strong, thinly to medium bedded, trace vugs (avg <5mm) some infilled with dark green mineral, 10% limestone beds dark gray.*	100 / -	5.0	5.0	100	75
75							Shale bed, dark gray, strongly reactive @ 66.2-66.3 Dark brown, decomposed clay, moderately reactive @ 80.1-80.3 Dark gray, shale bed, moderately weathered, strongly reactive @ 80.3-80.5
453.4	76.3						78.8
80		**Limestone**: *Light gray, medium gray to light greenish gray, fresh to slightly weathered, fine to medium grained, trace fossils, trace vugs (avg <5mm), some partially infilled with dark green mineral, trace fossils, unfractured to very slightly fractured, very strong.*	96 / -	5.0	5.0	100	80
85			100 / -	5.0	5.0	100	83.8 85
90			100 / -	5.0	5.0	100	88.8 90
95			94 / -	5.0	4.9	98	93.8 Alternating bands of light and dark brown with 10% fossils @ 94.8 95
431.1	98.6						98.8
100		**Dolostone**: *Medium gray to medium greenish gray,*	100 /	5.1	5.1	100	100

Top of Rock = 44.4' Elevation = 485.3'
Base Weathered Rock = 59.8' Elevation = 469.9'
Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1017P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1017***	Immediate Water Depth ***NA***	Start Date ***03/12/2026***	Hole Type ***core and sample***
Surface Elevation ***529.7'***	Static Water Depth ***NA***	End Date ***03/13/2026***	Rig_Number ***55***
Total Depth ***103.9'***	Driller ***Andrew Clements***	Latitude(83) ***37.806464***	***GQ-737 Cravens***
Location ***109+27.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.508509***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		fresh, massive, very slightly fractured, very strong.	-					
427.8	101.9	**Dolostone**: *Medium gray to medium greenish gray, fresh, massive, very slightly fractured, very strong.*	100 / -	5.1	5.1	100		**No recovery @ 98.7-98.8**
425.8	103.9	**Dolostone & Limestone**: *Interbedded dolostone/limestone (60/40), fresh, thinly bedded, dolostone is medium gray to medium greenish gray, silty, limestone is light gray, fine to medium grained, 10% fossils, very slightly fractured, very strong.*						103.9
		(Bottom of Hole 103.9')						

105 110 115 120 125 130 135 140 145 150

Top of Rock = 44.4' Elevation = 485.3'
Base Weathered Rock = 59.8' Elevation = 469.9'
Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1017P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

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Geologist's Subsurface Log for B-1017P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

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Geologist's Subsurface Log for B-1018P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1018***	Immediate Water Depth ***NA***	Start Date ***03/17/2026***	Hole Type ***core***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***03/18/2026***	Rig_Number ***55***
Total Depth ***104.5'***	Driller ***Andrew Clements***	Latitude(83) ***37.806428***	***GQ-737 Cravens***
Location ***110+26.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.508220***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
505.3	24.5	**Overburden**.	(Begin Core)						
		Limestone: *Medium to light gray and light brown, fresh to moderately weathered, fine to medium grained, with argillaceous beds (10%), trace fossils, non reactive iron oxide stained shale bed 1-5cm thick at 30.2 ft. and 33.8 ft., trace vugs, mod. fractured, strong, [31.8 ft. 32.5 ft. - Single coral fossil width of core, near vertical fracture iron oxide stained, partially clay infilled].*		40 / -	5.0	4.5	90		29.5 **No recovery (clay infilling along joint surfaces) @ 26.5-27**
				76 / -	5.0	5.0	100		**Near vertical joint, partially filled w/clay, iron-oxide**
493.4	36.4								34.5 **stained @ 28.5-29.3**
		Limestone: *Light to medium gray, fresh, with 10% dark gray dolostone beds, trace fossils, very slightly fractured, very strong.*		82 / -	5.0	5.0	100		**Near vertical joint @ 29.5-29.9**
488.8	41.0								39.5 **Near vertical fracture, intensely weathered @ 33.2-33.4**
		Limestone: *Light to dark gray, fresh to moderately weathered, trace fossils, trace vugs (avg <5mm), single coral fossil 41.2 ft. - 41.3 ft., fine to medium grained, slightly fractured, very strong, [45.0 ft. - 46.3 ft. - 5% vugs (5-10mm), some partially infilled with dark green mineral].*		92 / -	5.0	4.9	98		**Single slightly**
									44.5 **weathered coral fossil entire core width @ 40-40.85**
				92 / -	5.0	5.0	100		49.5 **No recovery**

Top of Rock = 24.5' Elevation = 505.3'
Base Weathered Rock = 33.5' Elevation = 496.3'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1018P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1018***	Immediate Water Depth ***NA***	Start Date ***03/17/2026***	Hole Type ***core***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***03/18/2026***	Rig_Number ***55***
Total Depth ***104.5'***	Driller ***Andrew Clements***	Latitude(83) ***37.806428***	***GQ-737 Cravens***
Location ***110+26.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.508220***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
478.9	50.9			5.0	5.0	100		@ 44.4-44.5 Near vertical fracture @ 48.7-49.1
		Dolostone: *Medium gray to medium greenish gray, fresh to slightly weathered, trace vugs (partially filled with dark green mineral), moderately reactive when powdered, massive bedding, unfractured, very strong.*	100 / -	5.0	5.0	100		
55								54.5 55
473.5	56.3		100 / -	5.0	5.0	100		10% limestone beds, grades to limestone @ 55.1
60								59.5 60
		Limestone: *Interbedded lt. gray, med. gray, lt. greenish gray to dk. gray, fresh to slightly weathered, thinly to very thinly bedded, fine to medium grained, trace vugs (<5mm) some partially filled with dark green mineral, unfractured to moderately fractured, strong, [67.0 ft. 67.2 ft. - Dark gray clay, trace angular to subangular shale fragments, weakly to non-reactive, decomposed].*	92 / -	5.0	5.0	100		Dark gray, strongly reactive shale beds @ 60.7-61.1
65								64.5 65
			70 / -	5.0	5.0	100		Dark gray, non reactive clay seam @ 60.9-61
70								69.5 Dark gray, weakly reactive shale bed @ 67.2-67.5 70
457.3	72.5		92 / -	5.0	5.0	100		
75		**Dolostone**: *Medium gray to medium greenish gray, fresh, thinly to medium bedded, unfractured, very strong.*						74.5 Near vertical fracture @ 68.9-69.5 75
452.1	77.7		100 / -	5.0	5.0	100		Near vertical fracture @ 70.6-71
80								79.5 Light gray limestone beds @ 75 80
			94 / -	5.0	5.0	100		Dark gray, non-reactive, decomposed clay @ 81.4-81.5
85		**Limestone**: *Light gray to dk. gray and med. greenish gray, fresh to slightly weathered, trace vugs (some infilled with dk. greenish gray mineral), fine to medium grained, thinly to medium bedded, trace fossils, unfractured to slightly fractured, strong to very strong, [94.5 ft. - Dark gray, fine grained beds interbedded with light gray, medium to coarse grained beds (60/40), thinly bedded, dark gray beds have trace fossils, light gray beds have 10% -20% fossils].*	100 / -	5.0	5.0	100		84.5 85 Dark gray, non-reactive shale bed @ 81.5-81.7
90								89.5 Dark gray, moderately reactive shale bed @ 84.4-84.5 90
			100 / -	5.0	5.0	100		Trace fossils @ 86.3
95								94.5 95
			88 / -	5.0	5.0	100		Trace silty shale laminations, medium grained @
100 429.9	99.9							99.5 100

Top of Rock = 24.5' Elevation = 505.3'
Base Weathered Rock = 33.5' Elevation = 496.3'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1018P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***		Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***			Project Manager: _
Hole Number ***1018***	Immediate Water Depth ***NA***	Start Date ***03/17/2026***	Hole Type ***core***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***03/18/2026***	Rig_Number ***55***
Total Depth ***104.5'***	Driller ***Andrew Clements***	Latitude(83) ***37.806428***	***GQ-737 Cravens***
Location ***110+26.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.508220***	

Lithology Elevation	Lithology Depth	Description	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden						
426.8	103.0	**Dolostone**: *Medium gray to medium greenish gray, fresh, massive, moderately reactive when powdered, very slightly fractured, very strong.*	100 / -	5.0 / 5.0	5.0 / 5.0	100 / 100		**89.8-90.7 Light gray, medium to coarse grained, 10% fossils @ 91.9-93.5**
425.3	104.5	**Dolostone & Limestone**: *Interbedded dolostone/limestone (60/40), fresh, thinly bedded, dolostone is medium gray to medium greenish gray, limestone is light gray, medium grained, 10% fossils, very slightly fractured, very strong.*						104.8
		(Bottom of Hole 104.5')						

Top of Rock = 24.5' Elevation = 505.3'
Base Weathered Rock = 33.5' Elevation = 496.3'
Bardstown Member
Grant Lake Limestone

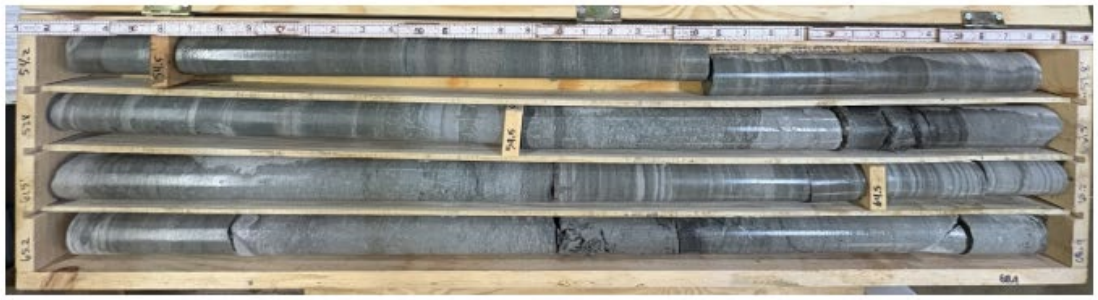
Geologist's Subsurface Log for B-1018P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1018P - Box 1 of 6

1018P - Box 2 of 6



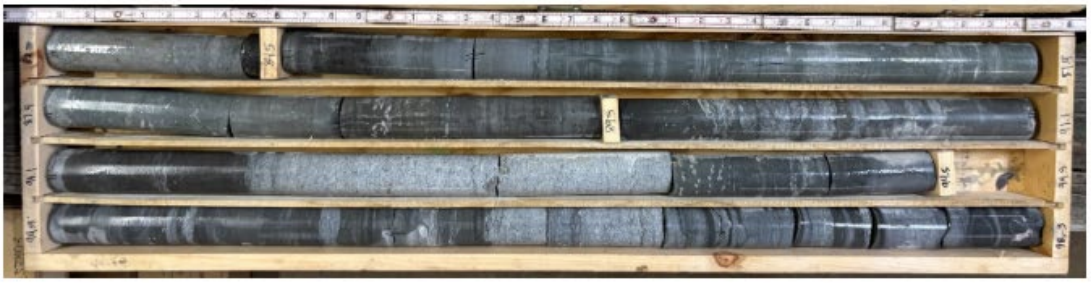
1018P - Box 3 of 6

Geologist's Subsurface Log for B-1018P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1018P - Box 4 of 6



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Geologist's Subsurface Log for B-1019P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1019***	Immediate Water Depth ***NA***	Start Date ***03/18/2026***	Hole Type ***core***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***03/19/2026***	Rig_Number ***55***
Total Depth ***103.0'***	Driller ***Andrew Clements***	Latitude(83) ***37.806399***	***GQ-737 Cravens***
Location ***111+01.00 17.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507962***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
519.3	10.5	**Overburden**.	(Begin Core)						
516.0	13.8	**Cored Overburden**: *No recovery.*		0 / -	3.1	0.0	0		13.6 **No recovery @ 13.6-13.8**
		Limestone: *Mottled light and dark gray to light greenish gray, slightly weathered, fine to medium grained, trace fossils, 10% - 20% dark gray silty beds, trace vugs, thinly to medium bedded, slightly to moderately fractured, strong to very strong.*		96 / -	5.0	4.8	96		18.6
				100 / -	5.0	5.0	100		23.6 **Single coral fossil, width of core @ 22.5-23**
				100 / -	5.0	5.0	100		**10% fossils @ 27-28** 28.6
				90 / -	5.0	5.0	100		**Massive coral fossil, most of core diameter @ 31-31.4**
				100 / -	5.0	5.0	100		33.6 **Single coral fossil, width of core @ 31.4-31.7**
				96 / -	5.0	4.9	98		38.6 **Single coral fossil, width of core @ 32.1-32.4**
486.2	43.6								43.6
479.9	49.9	**Limestone**: *Light gray, slightly weathered, fine to medium grained, trace vugs, some partially infilled with dark green mineral, unfractured to slightly fractured, very strong, [45.3 ft. - 46.0 ft. - Dark gray silty bed with interbedded light gray, medium grained. 46.8 ft. - 48.5 ft. - Dark gray silty beds with 5% light gray, medium grained beds].*		98 / -	5.0	5.0	100		**Dark gray, strongly reactive shale bed @ 32.4-32.5**
				100 /	5.0	5.0	100		48.6 **Dark gray, moderately reactive clay seam @**

Top of Rock = 13.8'
Elevation = 516.0'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1019P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1019***	Immediate Water Depth ***NA***	Start Date ***03/18/2026***	Hole Type ***core***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***03/19/2026***	Rig_Number ***55***
Total Depth ***103.0'***	Driller ***Andrew Clements***	Latitude(83) ***37.806399***	***GQ-737 Cravens***
Location ***111+01.00 17.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507962***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
		Dolostone: *Medium gray to medium greenish gray, slightly weathered, trace vugs (avg. <5mm), some partially infilled with dark green mineral, unfractured, very strong, [54.0 ft. - Limestone beds grades to limestone].*	- / 100 / -	5.0	5.0	100		32.8-32.95 Single coral fossil, nearly width of core @ 39-39.3 10% vugs (avg. 0.5cm - 1.0 cm) @ 46-46.6 Light gray, trace shale laminations @ 48.5 5% medium greenish gray dolostone beds @ 57.6 Dark gray, non-reactive, decomposed clay seam @ 59.8-60.2 Dark gray non-reactive, 1cm clay seam @ 66.2 5% dark gray to dark green shale laminations @ 67.9 Dark gray to dark green, thinly bedded, 10% shale laminations @ 70.3 Increase to 10% light gray beds @ 79.9 Dark gray moderately reactive clay seam @ 80.3-80.4 Dark gray strongly reactive shale bed @ 80.4-80.5 Medium gray, thinly bedded @ 82.4-82.6 5% - 10% limestone
475.2	54.6							53.6
55		**Limestone**: *Interbedded light gray to light greenish gray, fresh, trace fossils, very thinly to medium bedded, fine to medium grained, slightly fractured, very strong, [58.4 ft. - 66.4 ft. - Slightly weathered, trace vugs (avg. 0.5cm-1.0cm), some infilled with dark green mineral].*	100 / -	5.0	5.0	100		55
60			92 / -	5.0	5.0	100		58.6 60
65			92 / -	5.0	5.0	100		63.6 65
70			100 / -	5.0	5.0	100		68.6 70
457.2	72.6							
455.8	74.0	**Dolostone**: *Interbedded medium gray to medium greenish gray to light gray, fresh, no visible fossils, thinly bedded, unfractured, very strong.*						73.6
75		**Limestone**: *Med. gray to med. greenish gray and dk. gray, slightly weathered, 5% vugs (avg. <5mm), some partially filled with dk. green mineral, massive, trace (<5%) fossils, trace lt. gray beds, fine to medium grained, unfractured to slightly fractured, very strong, [76.1 ft. - 5% dolostone beds, medium gray to medium greenish gray].*	100 / -	5.0	5.0	100		75
80			96 / -	5.0	5.0	100		78.6 80
448.6	81.2							
85		**Limestone**: *Mottled light gray to light greenish gray, slightly weathered, fine to medium grained, 5% vugs (avg. 0.05cm - 1.0cm), some partially filled with dark green mineral, very slightly to slightly fractured, very strong, [83.6 ft. - Interbedded medium gray to medium greenish gray with trace light gray beds, thinly bedded, fresh, no fossils. 85.2 ft. - 85.6 ft. - Slightly weathered 10% vugs (avg. <5mm), some partially filled with dark green mineral].*	100 / -	5.0	5.0	100		83.6 85
440.9	88.9							88.6
90		**Limestone**: *Light gray, medium to coarse grained (70%), interbedded with dark gray, fine grained (30%), fresh, light gray beds have 20% fossils, dark gray beds have trace fossils, medium bedded, very slightly fractured, very strong.*	100 / -	5.0	5.0	100		90
437.6	92.2							93.6
95		**Limestone**: *Light gray to medium greenish gray, fresh, fine to coarse grained, thinly to medium bedded, very slightly to slightly fractured, very strong, [92.3 ft. - 92.6 ft. - 10% limestone clasts, light gray, subrounded (avg. 0.5cm - 1.0cm)].*	100 / -	5.0	5.0	100		95
430.8	99.0							98.6
100			98 / -	4.4	4.3	98		100

Top of Rock = 13.8'
Elevation = 516.0'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1019P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1019***	Immediate Water Depth ***NA***	Start Date ***03/18/2026***	Hole Type ***core***
Surface Elevation ***529.8'***	Static Water Depth ***NA***	End Date ***03/19/2026***	Rig_Number ***55***
Total Depth ***103.0'***	Driller ***Andrew Clements***	Latitude(83) ***37.806399***	***GQ-737 Cravens***
Location ***111+01.00 17.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507962***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden						
		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
427.8	102.0	**Dolostone**: *Medium gray to medium greenish gray, fresh, massive, very slightly fractured, very strong.*	98 / -	4.4	4.3	98		**clasts, light gray, subrounded**
426.8	103.0	**Dolostone & Limestone**: *Dolostone/limestone (60/40), fresh, thinly bedded, dolostone is medium gray to medium greenish gray, silty, limestone is light gray, 10% fossils, unfractured, very strong.*						103.0 **(avg. 0.5cm - 2.0cm) @ 86.6**
		(Bottom of Hole 103.0')						

Top of Rock = 13.8'
Elevation = 516.0'

Bardstown Member
Grant Lake Limestone

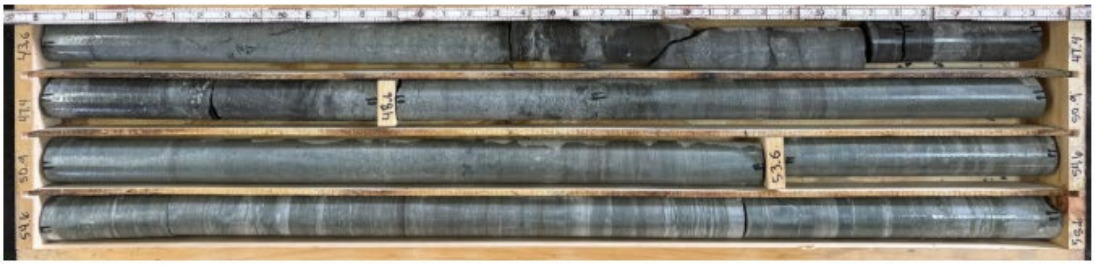
Geologist's Subsurface Log for B-1019P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1019P - Box 1 of 6

1019P - Box 2 of 6

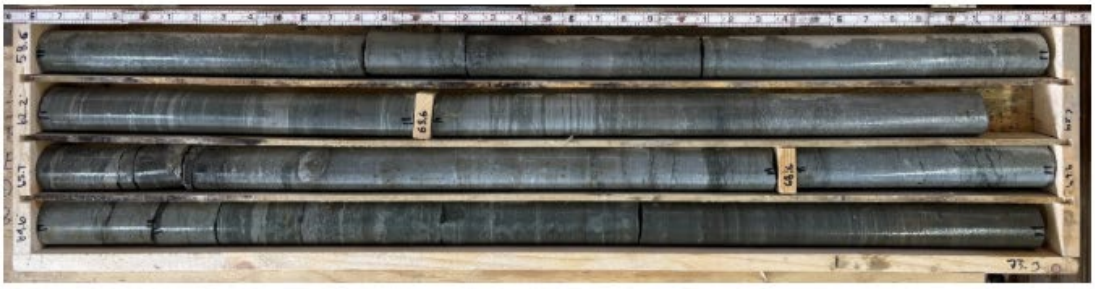


1019P - Box 3 of 6

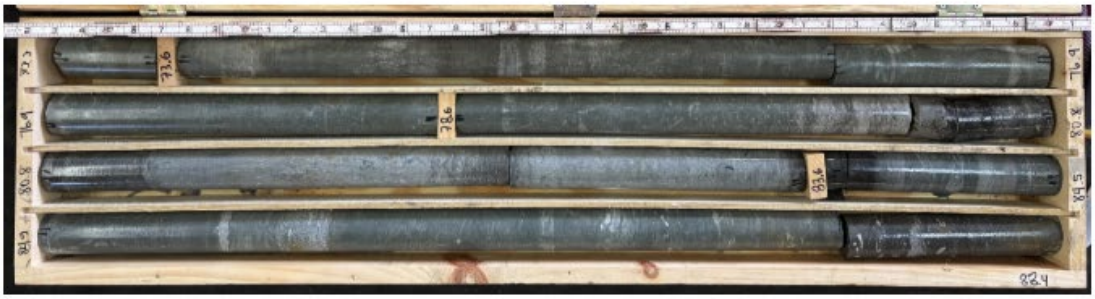
Geologist's Subsurface Log for B-1019P (cont.)

CORE PHOTOGRAPHIC RECORD

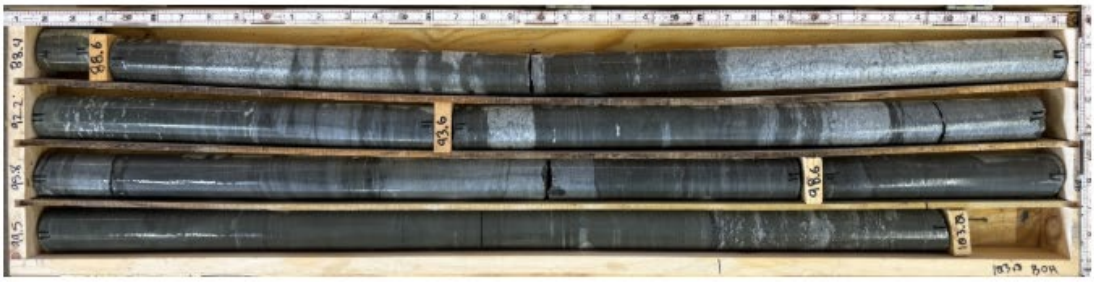
Sympson Lake Dam Cutoff Wall US62 Westbound Lane



1019P - Box 4 of 6



1019P - Box 5 of 6



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Geologist's Subsurface Log for B-1020P

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1020***	Immediate Water Depth ***NA***	Start Date ***03/20/2026***	Hole Type ***core***
Surface Elevation ***530.2'***	Static Water Depth ***NA***	End Date ***03/23/2026***	Rig_Number ***55***
Total Depth ***103.9'***	Driller ***Andrew Clements***	Latitude(83) ***37.806367***	***GQ-737 Cravens***
Location ***111+76.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507706***	

Lithology Elevation	Lithology Depth	Description — Overburden / Rock Core	Sample No. — Std/Ky RQD	Depth (ft) — Run (ft)	Rec. (ft) — Rec (ft)	SPT Blows — Rec (%)	Sample Type — SDI (JS)	Remarks
524.7	5.5	**Overburden**. (Begin Core)						
516.4	13.8	**Shale (claystone)**: *Mudstone, mottled medium gray to light greenish gray, fresh to moderately weathered, very fine grained, bedding appears mottled, non-reactive when powdered, moderately fractured, very strong, [13.2 ft. - Trace (<5%) fossils in 0.05 to 0.1 beds spaced 5"-6" apart, grades to limestone].*	79 / -	3.9	3.8	97		9.4
			94 / -	4.8	4.8	100		14.2
506.8	23.4	**Limestone**: *Mottled medium gray to light greenish gray, fresh, fine grained, trace (<5% fossils in thin beds, medium bedded, slightly fractured, very strong.*	92 / -	5.0	5.0	100		19.2 **Light gray, strongly reactive clay seam @ 15.35-15.4**
			96 / -	5.2	5.2	100		24.4
492.9	37.3	**Limestone**: *Light to medium gray, fresh, fine grained with 10% - 20% medium grained beds, medium to thinly bedded, trace fossils, very slightly to slightly fractured, very strong, [32.4 ft. - Light gray fine to medium grained with 10% - 20% dark gray, fine grained beds. 35.6 ft. - 37.0 ft. - Mottled light greenish gray to dark gray, wavy and irregular laminations of very fine grained, strongly reactive].*	100 / -	5.0	5.0	100		**Vug (0.5cm x 1cm), partially filled with calcite @ 25.9** 29.4
			100 / -	5.0	5.0	100		34.4 **Vug (1.0cm x 2.5cm), infilled with calcite @ 33.5**
			100 / -	4.7	4.7	100		
486.3	43.9	**Limestone**: *Medium gray to medium greenish gray with some light gray beds, fresh, fine grained, trace (<5%) to no fossils, slightly to moderately fractured, strong, [43.0 ft. - 43.6 ft. - Healed 5° joint (open from 43.5 ft. - 43.6 ft. likely due to drilling)].*	96 / -	5.0	5.0	100		39.1 **Medium gray, strongly reactive clay seam @ 34.4-34.5**
			98 / -	5.0	5.0	100		44.1 **Thinly bedded @ 46.6-47.4**
		Limestone: *Light gray, fine grained, fresh, 10% - 20% dark gray, very fine grained beds, medium bedded, trace (<5%) fossils, slightly fractured, very*		5.0	5.0	100		49.1

Top of Rock = 5.5'
Elevation = 524.7'

Saluda Dolomite Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1020P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1020***	Immediate Water Depth ***NA***	Start Date ***03/20/2026***	Hole Type ***core***
Surface Elevation ***530.2'***	Static Water Depth ***NA***	End Date ***03/23/2026***	Rig_Number ***55***
Total Depth ***103.9'***	Driller ***Andrew Clements***	Latitude(83) ***37.806367***	***GQ-737 Cravens***
Location ***111+76.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507706***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
478.8	51.4	*strong, [45.2 ft. - 46.6 ft. - Slightly weathered, trace vugs (avg. <1cm), some filled with dark green mineral. 48.2 ft. - Argillaceous, dark gray beds increase to 80% - 90% with 10% - 20% light gray beds, thinly bedded].*	100 / -	5.0	5.0	100		
474.6	55.6	**Dolostone**: *Medium gray to medium greenish gray, fresh, massive, strongly reactive when powdered, slightly fractured, very strong, [53.6 ft. - 54.0 ft. - Slightly weathered, trace vugs (avg. <5mm), some infilled with dark green mineral].*	100 / -	4.8	4.8	100		54.1 **Grades to limestone, 5% limestone beds @ 55.3** 58.9
		Limestone: *Interbedded light gray to medium gray to medium greenish gray, fresh, thinly bedded, bedding becomes mottled light gray to medium gray to medium greenish gray at 60.0 ft. - 61.0 ft., moderately to slightly fractured, very strong, [61.3 ft. - 61.4 ft. - Dark gray, decomposed, strongly reactive clay seam, trace shale fragments, subangular. 68.0 ft. - 70.6 ft. - Slightly weathered, trace vugs (avg <1cm), some with dark green mineral infilling].*	96 / -	5.0	5.0	100		63.9 **Dark gray, strongly reactive shale bed @ 61.4-61.6 Light gray with 5% dark gray laminations @ 61.6-63.7** 68.9
			98 / -	5.0	5.0	100		
			98 / -	5.0	4.9	98		**Dark gray, fine grained to silty bed @ 67.3-67.5 10% laminations, remains thinly bedded @ 69** 73.9
456.6	73.6							
454.4	75.8	**Dolostone**: *Medium gray to medium greenish gray, fresh, massive, thinly bedded, strongly reactive when powdered, unfractured, very strong.*	100 / -	5.0	5.0	100		**Grades to dolostone, 10% dolostone beds @ 73.3 10% dolostone beds @ 77.4** 78.9
		Limestone: *Medium gray to medium greenish gray with some light gray beds, fresh, fine grained, thinly bedded, very slightly to slightly fractured, very strong, [82.7 ft. - 84.9 ft. - Light gray,slightly reactive, trace vugs (<5mm), infilled with dark green mineral. 87.2 ft. - 87.8 ft. - 5% to 20% limestone clasts, light gray, 1cm - 2cm, subrounded to rounded].*	94 / -	5.0	5.0	100		83.9 **Medium gray, decomposed, strongly reactive clay seam @ 81.7-81.8** 88.9
			100 / -	5.0	5.0	100		
			100 / -	5.0	5.0	100		**Dark gray, strongly reactive shale bed @ 81.8-82.1** 93.9
438.2	92.0							
436.9	93.3	**Limestone**: *Light gray, fresh, medium to coarse grained, 20% fossils, very slightly fractured, very strong.*						
		Limestone: *Interbedded light gray to medium gray, fresh, fine to medium grained, thinly bedded, trace (<5%) silty beds, moderately to slightly fractured, very strong.*	90 / -	5.0	5.0	100		**Medium gray, trace (<5%) fossils @ 89 5% light gray, medium grained beds** 98.9
430.3	99.9			5.0	5.0	100		

Top of Rock = 5.5'
Elevation = 524.7'

Saluda Dolomite Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1020P (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1020***	Immediate Water Depth ***NA***	Start Date ***03/20/2026***	Hole Type ***core***
Surface Elevation ***530.2'***	Static Water Depth ***NA***	End Date ***03/23/2026***	Rig_Number ***55***
Total Depth ***103.9'***	Driller ***Andrew Clements***	Latitude(83) ***37.806367***	***GQ-737 Cravens***
Location ***111+76.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507706***	

Lithology Elevation	Lithology Depth	Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
		Overburden						
		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
427.0	103.2	**Dolostone**: *Medium gray to medium greenish gray, fresh, strongly reactive when powdered, massive, slightly fractured, very strong.*	100 / -	5.0	5.0	100		**@ 90.5 Trace fossils @ 93.5-94.1**
426.3	103.9	**Dolostone & Limestone**: *Dolostone/limestone (60/40), fresh, thinly bedded, dolostone is medium gray to medium greenish gray, silty, limestone is light gray, 10% fossils, unfractured, very strong.*						103.9
		(Bottom of Hole 103.9')						

105 110 115 120 125 130 135 140 145 150

Top of Rock = 5.5'
Elevation = 524.7'

Saluda Dolomite Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1020P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

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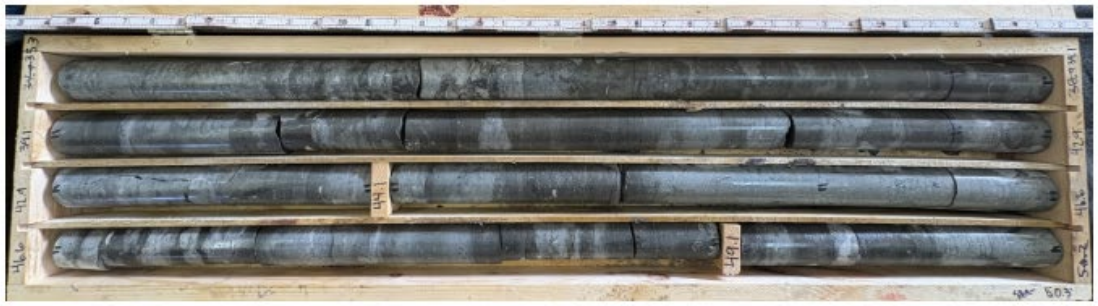
1020P - Box 2 of 7

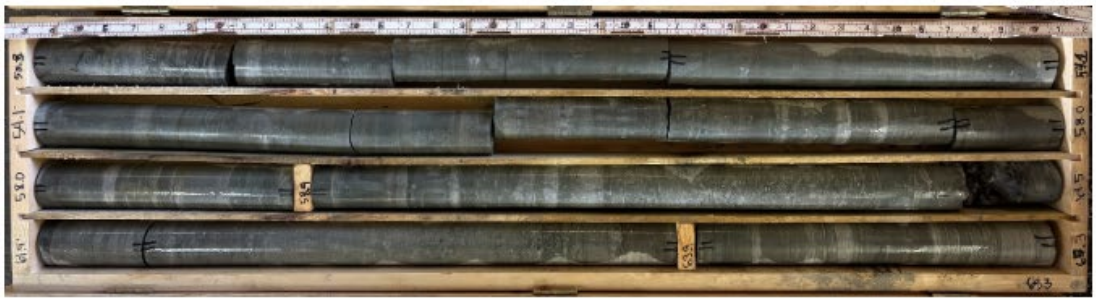


1020P - Box 3 of 7

Geologist's Subsurface Log for B-1020P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane



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Geologist's Subsurface Log for B-1020P (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

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Geologist's Subsurface Log for B-1021S

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1021***	Immediate Water Depth ***NA***	Start Date ***03/04/2026***	Hole Type ***core***
Surface Elevation ***546.7'***	Static Water Depth ***NA***	End Date ***03/05/2026***	Rig_Number ***55***
Total Depth ***119.3'***	Driller ***Andrew Clements***	Latitude(83) ***37.806809***	***GQ-737 Cravens***
Location ***101+36.00 19.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.511260***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
5									5
10									10
15									15
20		**Overburden**.							20
25									25
30									30
35									35
507.7	39.0		(Begin Core)						39.3
40		**Limestone**: *Light to medium gray, fresh to slightly weathered, trace fossils, fine to medium grained, slightly fractured, very strong, [46.6 ft. - Mottled light gray to medium greenish gray to light brownish gray, 5% - 10% fossils, trace wavy, dark green shale partings].*		0 / -	0.3	0.3	100		40
				94 / -	5.0	5.0	100		**Dark gray strongly reactive shale bed @ 41.7-41.7**
45				100 / -	5.0	5.0	100		44.3 45
497.8	48.9								**Dark gray, strongly reactive shale lamination** 49.3
50				74 / -	5.0	4.1	82		50

Top of Rock = 39.0'
Elevation = 507.7'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1021S (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1021***	Immediate Water Depth ***NA***	Start Date ***03/04/2026***	Hole Type ***core***
Surface Elevation ***546.7'***	Static Water Depth ***NA***	End Date ***03/05/2026***	Rig_Number ***55***
Total Depth ***119.3'***	Driller ***Andrew Clements***	Latitude(83) ***37.806809***	***GQ-737 Cravens***
Location ***101+36.00 19.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.511260***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
494.6	52.1	**Shale**: *Dark gray, fresh, trace fossils, weakly to moderately reactive, slightly fractured, weak to moderately strong, [Assumed no recovery 49.6 ft. - 50.5 ft. based on joint condition].*	74 / -	5.0	4.1	82		(5mm) @ 43.5 Trace vugs (0.5cm - 1.5 cm) @ 44-45.6
55		**Limestone**: *Light to dark gray, fresh to slightly weathered, fine to medium grained, trace vugs (avg. <1cm), trace fossils, very slightly to slightly fractured, moderately strong to strong, [58.7 ft. - 61.8 ft. - Interbedded light gray and dark gray, thinly to medium bedded, 5% - 10% fossils. 61.8 ft. - Light gray, fresh, 5% dark gray to dark greenish gray shale laminations].*	100 / -	5.0	5.0	100		54.3 Dark gray, fine grained, argillaceous @ 45.6
60			98 / -	5.0	5.0	100		59.3 Dark gray shale lamination (5mm) @ 46 10% light gray limestone clasts and fossils @ 51.3
482.7	64.0							
65		**Dolostone**: *Medium gray to medium greenish gray, slightly weathered, trace vugs, moderately to strongly reactive when powdered, unfractured, very strong.*	100 / -	5.0	5.0	100		64.3 5% dark green, wavy to irregular shale partings @ 57-58.7
479.0	67.7							
70		**Limestone**: *Interbedded light gray to dark greenish gray and dark gray, fresh, very thinly to medium bedded, fine to medium grained, very slightly to slightly fractured, very strong, [73.6 ft. - 73.9 ft. - Shale bed, medium greenish gray to dark gray, slightly weathered, moderately reactive].*	100 / -	5.0	5.0	100		69.3 Dark gray, slightly weathered shale bed @ 62.9-63
75			100 / -	5.0	5.0	100		74.3 Light gray to light greenish gray @ 63
80			100 / -	5.0	5.0	100		79.3 Trace vugs (avg. <5mm) @ 72.4 10% - 20% shale laminations @ 75.4-78.9
85			100 / -	5.0	5.0	100		84.3 Trace dark green shale partings @ 80.3
460.0	86.7							
458.6	88.1	**Dolostone**: *Medium gray to medium greenish gray, fresh, 5% - 10% limestone beds, unfractured, very strong.*	100 / -	5.0	5.0	100		89.3 Slightly weathered, trace vugs (avg. <5mm) @ 90.4
90		**Limestone**: *Light to dark gray and medium greenish gray, fresh, fine to medium grained, medium to thickly bedded, unfractured to slightly fractured, strong to very strong, [94.3 ft. - 94.6 ft. - Dark gray strongly reactive shale bed].*	100 / -	5.0	5.0	100		94.3 10% fossils @ 94.6-95.2
95			98 / -	5.0	5.0	100		99.3
100				5.0	5.0	100		

Top of Rock = 39.0'
Elevation = 507.7'

Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1021S (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

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Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***		Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***			Project Manager: _
Hole Number ***1021***	Immediate Water Depth ***NA***	Start Date ***03/04/2026***	Hole Type ***core***
Surface Elevation ***546.7'***	Static Water Depth ***NA***	End Date ***03/05/2026***	Rig_Number ***55***
Total Depth ***119.3'***	Driller ***Andrew Clements***	Latitude(83) ***37.806809***	***GQ-737 Cravens***
Location ***101+36.00 19.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.511260***	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
				100 / -	5.0	5.0	100		**5% - 10% fossils @ 99.8**
105		**Limestone**: *Light to dark gray and medium greenish gray, fresh, fine to medium grained, medium to thickly bedded, unfractured to slightly fractured, strong to very strong, [94.3 ft. - 94.6 ft. - Dark gray strongly reactive shale bed].*		100 / -	5.0	5.0	100		104.3 **Dark gray, strongly reactive shale bed @ 101.6-101.8** 105
110				92 / -	5.0	5.0	100		**20% - 30% fossils @ 101.8-103.8** 109.3 **Trace fossils @ 103.8** 110
432.7	114.0								**10% - 20% dark gray, wavy shale laminations @ 106.8** 114.3
115									115
430.3	116.4	**Dolostone**: *Medium gray to medium greenish gray, fresh, moderately reactive when powdered, slightly fractured, very strong.*		100 / -	5.0	5.0	100		
427.4	119.3	**Dolostone & Limestone**: *Interbedded dolostone/limestone (60/40), fresh, 10% fossils, thinly to medium bedded, dolostone is medium gray to medium greenish gray, moderately reactive when powdered, limestone is light gray, slightly fractured, very strong.*							119.3
120		(Bottom of Hole 119.3')							120
125									125
130									130
135									135
140									140
145									145
150									150

Top of Rock = 39.0'
Elevation = 507.7'

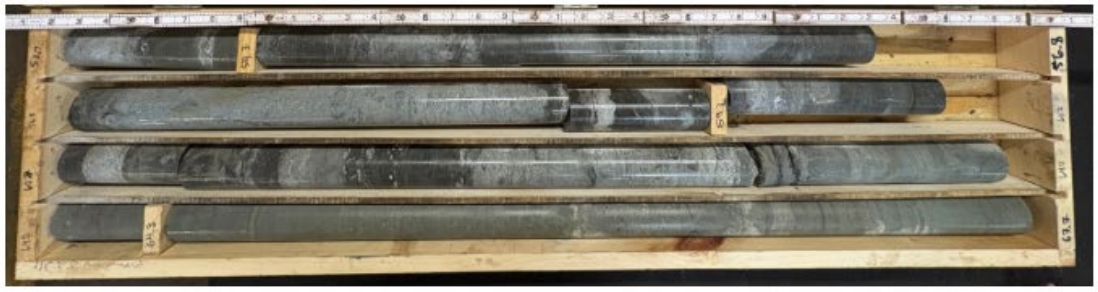
Bardstown Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1021S (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1021S - Box 1 of 6



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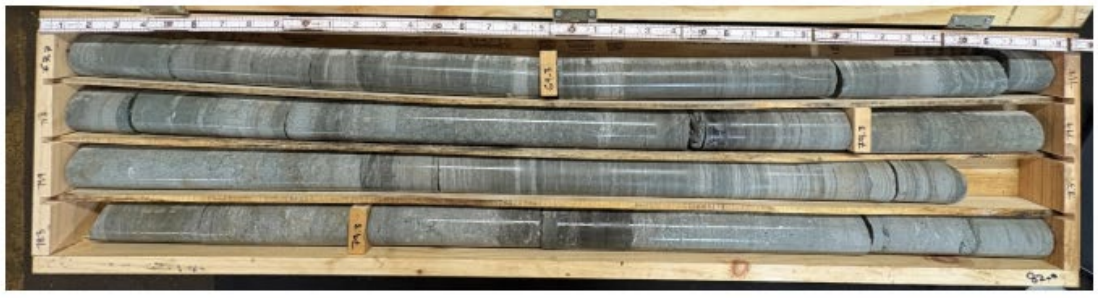
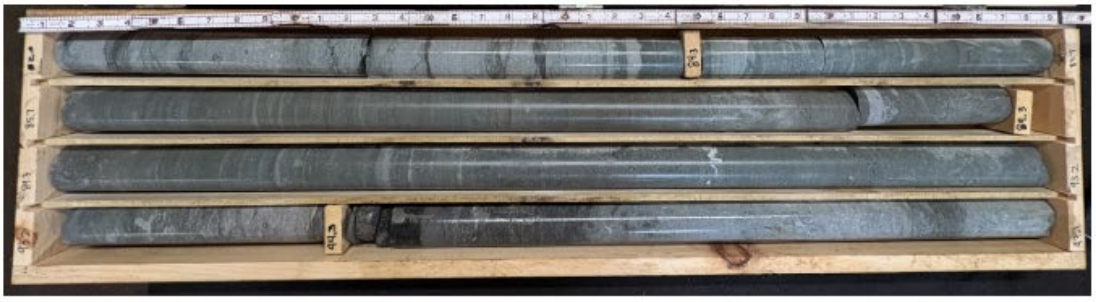


1021S - Box 3 of 6

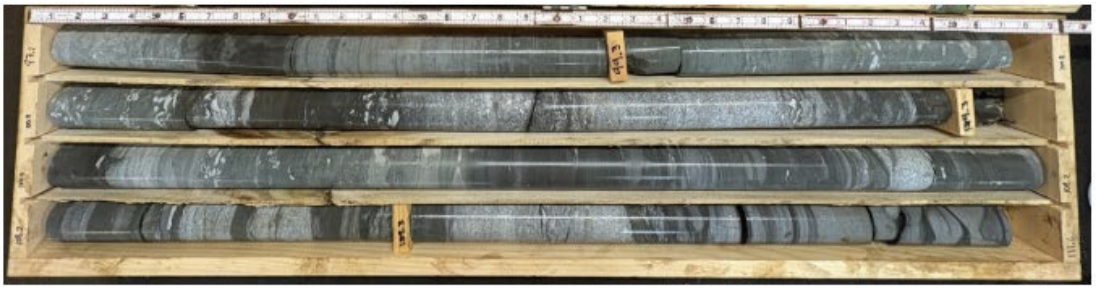
Geologist's Subsurface Log for B-1021S (cont.)

CORE PHOTOGRAPHIC RECORD

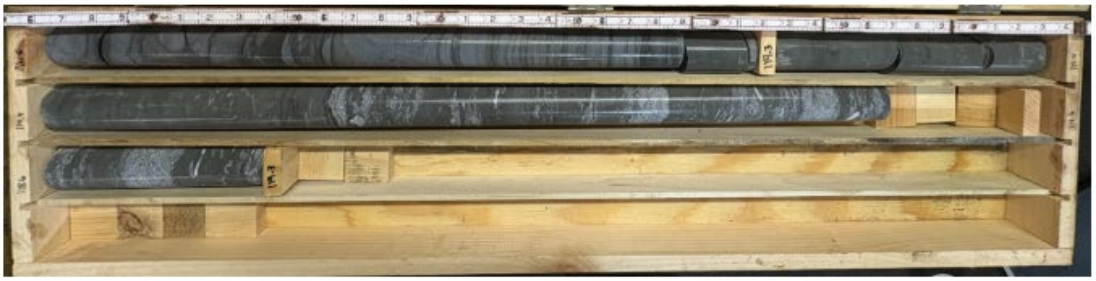
Sympson Lake Dam Cutoff Wall US62 Westbound Lane



1021S - Box 4 of 6



1021S - Box 5 of 6



1021S - Box 6 of 6

Geologist's Subsurface Log for B-1023S

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26

Page 1 of 3

Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1023***	Immediate Water Depth ***NA***	Start Date ***03/24/2026***	Hole Type ***core***
Surface Elevation ***531.7'***	Static Water Depth ***NA***	End Date ***03/24/2026***	Rig_Number ***55***
Total Depth ***104.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806335***	***GQ-737 Cravens***
Location ***112+51.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507450***	

Lithology Elevation	Lithology Depth	Description	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden						
527.7	4.0	**Overburden**. (Begin Core)						
		Shale (claystone): *Mudstone, mottled medium gray to medium greenish gray, fresh to slightly weathered, very fine grained, bedding appears mottled, moderately reactive when powdered, slightly to moderately fractured, very strong.*	100 / -	5.0	5.0	100		
			86 / -	5.0	5.0	100		9.0
			98 / -	5.2	5.2	100		14.0
515.4	16.3							
		Limestone: *Mottled medium gray to medium greenish gray and light to dark gray, fresh to slightly weathered, vuggy, fine to medium grained, trace fossils, thinly bedded, moderately to slightly fractured, very strong, [18.5 ft. - 18.6 ft. - Medium gray, decomposed,strongly reactive clay seam, trace shale fragments, subangular. 47.6 ft. - 49.0 ft. - Light gray, slightly weathered, trace vugs (<1cm), some infilled with dark green mineral].*	100 / -	5.0	5.0	100		19.2 **Mudstone bed @ 18.6-18.9**
			100 / -	4.9	4.9	100		24.2 **20% limestone clasts, sub-rounded and whole fossils @ 21.5-21.8**
			100 / -	5.0	5.0	100		29.1 **20% limestone clasts, sub-rounded and whole fossils @ 24-24.1**
			98 / -	4.9	4.9	100		34.1 **5% - 10% fossils @ 34.4**
			100 / -	5.0	5.0	100		39.0 **Single coral fossil, width of core @ 35.4-35.5**
			92 / -	5.0	4.9	98		44.0 **Decomposed clay seam, strongly reactive @ 37-37.1** **Mottled bedding @ 39.3-39.9** **5% dolostone beds @ 40-40.6**
				5.0	5.0	100		49.0

Top of Rock = 4.0'
Elevation = 527.7'

Saluda Dolomite Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1023S (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26
Page 2 of 3

Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1023***	Immediate Water Depth ***NA***	Start Date ***03/24/2026***	Hole Type ***core***
Surface Elevation ***531.7'***	Static Water Depth ***NA***	End Date ***03/24/2026***	Rig_Number ***55***
Total Depth ***104.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806335***	***GQ-737 Cravens***
Location ***112+51.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507450***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
			100 / -	5.0	5.0	100		**Single coral fossil, width of core @ 40.6-40.7**
477.3	54.4							54.0 **Single coral fossil, width of core @ 43.1-43.3**
55		**Dolostone**: *Medium gray to medium greenish gray, fresh, thinly bedded, strongly reactive when powdered, unfractured, very strong.*	100 / -	5.0	5.0	100		55
473.5	58.2							59.0 **Single coral fossil, width of core @ 44.9-45.2**
60			94 / -	5.0	5.0	100		60 **5% dolostone beds grades to dolostone @ 53.7**
65		**Limestone**: *Interbedded light gray to medium gray, fresh, thinly bedded, very slightly to moderately fractured, very strong, [62.6 ft. - 66.3 ft. - Light gray, trace vugs (avg. 5mm), some infilled with dark green mineral. 69.2 ft. - 73.6 ft. - Slightly weathered, trace vugs (avg. <1cm) some infilled with dark green mineral].*	90 / -	5.0	5.0	100		64.0 **Decomposed clay seam, strongly reactive @ 64-64.2** 65
70			100 / -	5.0	5.0	100		69.0 70
75								74.0 75
453.9	77.8		100 / -	5.0	5.0	100		
453.3	78.4	**Dolostone**: *Medium gray to medium greenish gray, fresh, thinly bedded, strongly reactive when powdered, very strong.*						79.0 **5% dolostone beds grades to dolostone @ 77.5**
80			92 / -	5.0	5.0	100		80 **Trace (<5%) fossils @ 81.7**
85		**Limestone**: *Medium gray to medium greenish gray, dark gray with some light gray beds, fresh, fine grained, thinly bedded, moderately to slightly fractured, very strong, [85.5 ft. - 87.8 ft. - Slightly weathered, trace vugs (<1cm), some infilled with dark green mineral].*	96 / -	5.2	5.2	100		84.0 **Decomposed clay seam, moderately reactive @ 84.4-84.5** 85
90			94 / -	4.8	4.8	100		89.2 **Shale bed, strongly reactive @ 84.5-84.7** 90
95 436.6	95.1							94.0 **5% - 10% fossils @ 84.7-85.2** 95
434.4	97.3	**Limestone**: *Light gray, medium to coarse grained, fresh, 20% fossils, slightly fractured, very strong.*	96 / -	5.1	5.1	100		**5% - 10% fossils @ 89.4**
100		**Limestone**: *Medium gray, fresh, fine grained, thinly bedded, slightly fractured, very strong.*	98 / -	5.0	5.0	100		99.1 **Coarse grained bed @ 90.2-90.3** 100

Top of Rock = 4.0'
Elevation = 527.7'

Saluda Dolomite Member
Grant Lake Limestone

Geologist's Subsurface Log for B-1023S (cont.)

Drilling Firm: Stantec
For: Division of Structural Design
Geotechnical Branch

GEOLOGIST'S SUBSURFACE LOG

Printed: 4/9/26
Page 3 of 3

Project ID: ***M-001-2026***	***Nelson - US-62 MP 11.9-12.1***	Project Type: ***Miscellaneous Dam***
Item Number: ***04-05013.00***		Project Manager: _

Hole Number ***1023***	Immediate Water Depth ***NA***	Start Date ***03/24/2026***	Hole Type ***core***
Surface Elevation ***531.7'***	Static Water Depth ***NA***	End Date ***03/24/2026***	Rig_Number ***55***
Total Depth ***104.1'***	Driller ***Andrew Clements***	Latitude(83) ***37.806335***	***GQ-737 Cravens***
Location ***112+51.00 16.0' Lt.***	Geologist ***Aaron Holland***	Longitude(83) ***-85.507450***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
428.8	102.9	**Limestone**: *Medium gray, fresh, fine grained, thinly bedded, slightly fractured, very strong.*	98 / -	5.0	5.0	100		**Limestone clasts, subrounded @ 90.3-90.5**
427.6	104.1	**Dolostone**: *Medium gray to medium greenish gray, fresh, massive, unfractured, very strong.*						**104.1 Trace (<5%) limestone clasts, subrounded @ 90.7-91.4 Medium grained @ 93.3-94 10% medium gray, fine grained beds @ 95.8 Limestone clasts, subrounded @ 97-97.3 10% limestone clasts, subrounded @ 98-98.1 Mottled light gray to medium gray, 10% - 20% fossils @ 99-99.6 Medium grained @ 99.8-100.1 Very thinly bedded @ 101.3-101.7**
		(Bottom of Hole 104.1')						

105 110 115 120 125 130 135 140 145 150

Top of Rock = 4.0'
Elevation = 527.7'

Saluda Dolomite Member
Grant Lake Limestone

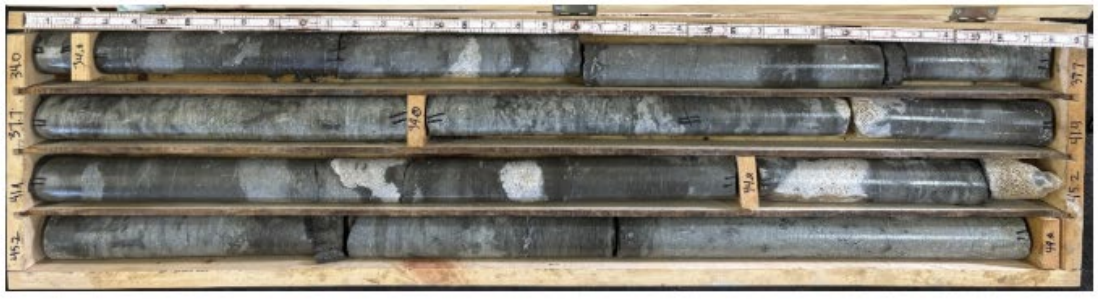
Geologist's Subsurface Log for B-1023S (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1023S - Box 1 of 7

1023S - Box 2 of 7



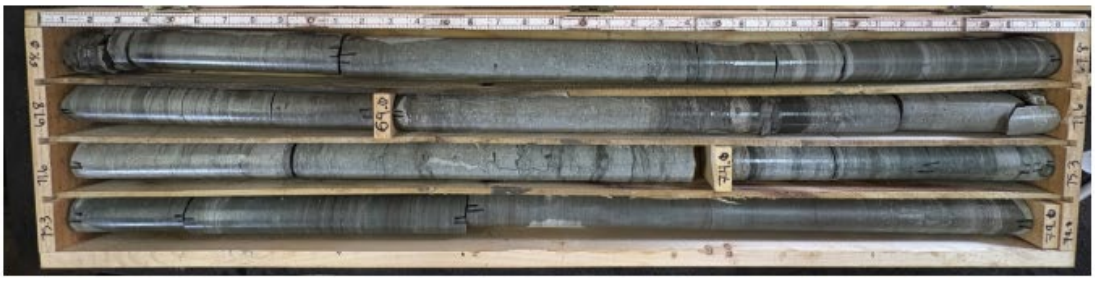
1023S - Box 3 of 7

Geologist's Subsurface Log for B-1023S (cont.)

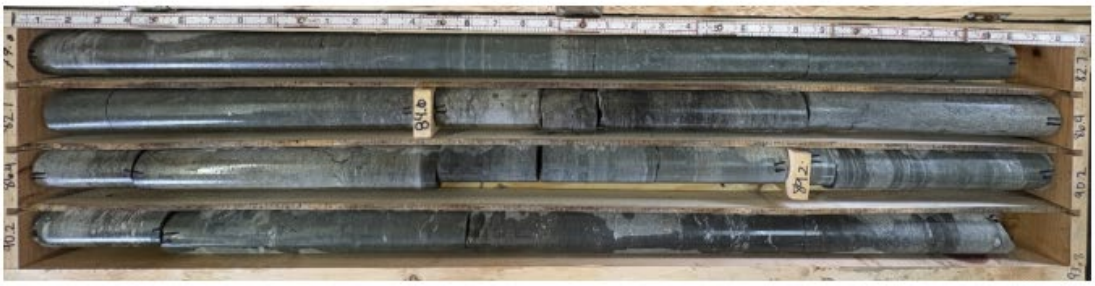
CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1023S - Box 4 of 7



1023S - Box 5 of 7



1023S - Box 6 of 7

Geologist's Subsurface Log for B-1023S (cont.)

CORE PHOTOGRAPHIC RECORD

Sympson Lake Dam Cutoff Wall US62 Westbound Lane

1023S - Box 7 of 7

Special Note for Secant Shaft Cutoff Wall
Appendix C – Non-Destructive Testing in Secant Shafts

U.S. 62 – Sympson Lake Dam (Item #04-5013.00)

The following sections provide the requirements for non-destructive testing (Crosshole Sonic Logging) of the secant shafts, schedule requirements for submittals, reporting requirements and responsibilities of the cutoff wall specialty Contractor, Testing Subcontractor, and Department. The purpose of the non-destructive testing is to evaluate the integrity of the secant shafts, to potentially detect air-, soil- or debris-filled voids or other discontinuities that may affect the shaft's ability to function as a continuous hydraulic barrier.

In all cases, the Department reserves the right to request raw data, field notes and/or other available information that may be necessary to evaluate the results of testing specified in this Special Note Appendix. Upon request, provide any available information at no additional cost to the Department.

In all cases, the Department reserves the right to perform testing to obtain independent results of testing specified in this Special Note Appendix. Upon request, provide any assistance required for Department personnel to perform such testing at no additional cost to the Department.

At the request of the Engineer, personnel representing the cutoff wall Contractor (including testing subcontractors) and the Department may be required to attend a pre-test meeting to discuss procedures related to testing, reports, reviews, etc. This meeting will be at no additional cost to the Department.

The Department will respond to the cutoff wall Contractor regarding acceptability of submittals referenced in this Appendix within ten (10) business days. A "Business Day" is defined as any day except Saturdays, Sundays, and Holidays, as defined in Section 101.03 of the Standard Specifications.

C1.0 CROSSHOLE SONIC LOGGING

C1.1 DESCRIPTION

Crosshole Sonic Logging (CSL) is a nondestructive method to test the integrity of drilled shafts in accordance with Historical Standard ASTM D6760-16. It is the responsibility of the cutoff wall Contractor to supply all equipment and materials necessary to perform this testing and for obtaining the services of a CSL Testing Firm, which is experienced with CSL testing in accordance with Section 3.4.1 of this Appendix and approved by the Department, to perform the testing.

The cutoff wall specialty Contractor will be responsible for providing the following:

1. Access tubes to be used for CSL testing of the secant shafts;
2. Watertight shoes, watertight caps, and non-shrink grout;
3. Suitable working space and access to every shaft; and

4. Any other equipment, materials, or assistance necessary to accomplish the testing.

C2.0 MATERIALS

C2.1 ACCESS TUBES

1. Provide access tubes meeting the requirements below:

    a. 2-inch inside diameter (ID) schedule 40 steel pipe conforming to ASTM A 53, Grade A or B, Type E, F, or S, supported by steel reinforcement consisting of hoops or spirals;
    b. Round, regular internal diameters free of defects or obstructions, including any at pipe joints;
    c. Capable of permitting the free, unobstructed passage of a 1.5-inch-diameter source and receiver probes; and
    d. Watertight and free from corrosion with clean internal and external faces to ensure passage of the probes and a good bond between the concrete and the tubes.

2. Provide watertight shoes on the bottom and removable watertight caps on the top of the access tubes.
3. The Engineer will accept access tubes based on visual inspection and certification the steel pipe meets the requirements of this Appendix.

C2.2 GROUT

Provide non-shrink grout to fill the access tubes and any cored holes at the completion of the CSL tests. Use grout conforming to Section 601.03.03 of the Standard Specifications.

C3.0 EXECUTION

C3.1 ACCESS TUBE INSTALLATION

1. Install ~~four~~ evenly spaced access tubes within each secondary shaft at the locations shown in the Construction Plans.
2. Securely attach the CSL access tubes to the inside periphery of the spiral or hoop reinforcement. Wire-tie the tubes a minimum of every 3 feet so they will stay in position during placement of concrete. Place the tubes so they are parallel with each other and as near to vertical as possible in the finished shaft. Even moderate bending of the tubes will result in large regional variations in the data.
3. Place the access tubes from 6 inches above the shaft tip to at least the top of permanent guide wall (top of concrete). Under no circumstances may the tubes be allowed to come to rest on the bottom of the excavation.
4. Ensure that any joints in the tubes are watertight.
5. Tubes may be extended with mechanical couplings. Do not use duct tape or other wrapping material to seal the joints. Welding of joints is prohibited.
6. Install threaded bottom cap to ensure watertight seal on tubes.
7. During placement of the access tubes and reinforcement cage, exercise care so

that the tubes will not be damaged to the extent that would prevent a 1.5-inch diameter probe from passing through them.

8. After placing the reinforcement cage and before beginning concrete placement, **fill the tubes with clean potable water** and cap or seal the tube tops to keep debris out of the tubes. Replace the watertight caps immediately after filling the tubes with water.
9. Immediately before placing concrete, use a weighted tape to investigate all tubes to make sure that there are no bends, crimps, obstructions or other impediments to the free passage of the testing probes. Additionally, check to ensure there are no water leaks.
10. During removal of the caps from the tubes, exercise care so as not to apply excess torque, hammering, or other stresses which could break the bond between the tubes and concrete.
11. Immediately after concrete placement, recheck each access tube to ensure that the water level is at the top of the tube (this is due to the potential for air bubbles entrapped in the tube to rise during the pour and lower the water level in the tube).
12. After concrete placement and before the beginning of CSL testing, inspect the access tubes and report any access tubes that the 1.5-inch diameter test probe cannot pass through to the Engineer. The Engineer will make an evaluation to determine if the CSL testing can be successfully performed without the tube(s); the Engineer may require the cutoff wall Contractor to, at its own expense, replace one or more tubes with 2-inch-diameter holes cored through the concrete for the entire length of the shaft, excluding the bottom 6 inches. Unless directed otherwise by the Engineer, locate core holes approximately 6 inches inside the reinforcement such that it does not damage the reinforcement. For each core hole drilled, record a log with descriptions of inclusions and voids in the cored holes and submit a copy of the log and photographs to the Engineer. Preserve the cores, identifying the core location. Make cores available for inspection by the Engineer.

C3.2 GROUTING

After completion of the CSL testing, evaluation of results, and upon being directed by the Engineer, remove the water from the access tubes and any cored holes and completely fill the tubes/holes with approved the grout mix. Water may be removed by displacement during tremie grouting. After grouting, cut the tubes flush with the tops of the drilled secant shafts.

C3.3 CSL TESTING AND EVALUATION OF TEST RESULTS

Make submittals in accordance with the Project requirements for submittals. See Table 1 below.

Table 1 – Schedule of CSL Submittals

Submittal Number	Submittal Item	Deadline	Event
1	Technical Proposal with CSL Testing Firm qualifications	10 business days before	Start of Secant Shaft Construction
2	CSL Testing Reports	5 business days after	Completion of testing on an individual secant shaft

Note: Provide all submittals and reports in .pdf format

C3.3.1 TECHNICAL PROPOSAL

Submit a technical proposal prepared by the CSL Testing Firm that addresses the testing procedures and required qualifications and experience of the testing firm. Include at least three (3) similar deep foundation projects for which the testing organization has been engaged in CSL testing. Use personnel having experience in CSL testing and interpretation on a minimum of three (3) similar deep foundation projects.

C3.3.2 TESTING

1. Provide access to the top of the shaft for testing personnel and equipment.
2. Perform CSL testing in accordance with Historical Standard ASTM D 6760-16.
3. Perform CSL testing on secant shafts after the shaft concrete has cured at least 72 hours and has obtained a minimum strength of 2500 psi.
4. Obtain logs as shown in Table 2 below unless directed otherwise by the Engineer.

~~**Table 2 – Schedule of CSL Logs**~~

~~Substructure Unit~~	~~No. of Access Tubes~~	~~Perimeter Logs~~	~~Major Diagonal Logs~~	~~Minor Diagonal Logs~~
~~Secant Shafts~~	~~4~~	~~4~~	~~2~~	~~0~~

Table 2 – Minimum Number of Access Tubes and CSL Logs

Shaft Diameter (inches)	No. of Access Tubes	Diagonal Logs	Perimeter Logs
30 to 54	4	2	4
60 to 78	6	3	6
84 to 96	8	4	8

5. If during testing it becomes apparent tube debonding has occurred, the cutoff wall Contractor may consider flooding the top of the shaft and retesting immediately; it is possible that water may flow into gaps between the tubes and concrete and provide continuity for the sonic waves.
6. If the CSL Testing Firm believes that additional testing is required (such as Angled CSL, Crosshole Tomography, Singlehole Sonic Logging, or Sonic Echo/Impulse Response, etc.), contact the Engineer immediately. The Department will determine if additional testing is required. If the results of the additional testing indicate that any drilled shaft on which additional testing was required is acceptable, the Department will pay for the direct cost of additional testing by change order. If the additional testing or evaluation of cores indicates that the concrete for any drilled shaft is unacceptable, the additional testing will be at the expense of the cutoff wall Contractor.

C3.3.3 TEST REPORTS

1. Submit a test report prepared by the CSL Testing Firm within 5 business days of completion of testing which, at a minimum, contains:

    a. Date of test;
    b. Plan Secant Shaft No., reference elevation, and water level in the tubes at the time of testing;
    c. Schematic showing a plan view of the access tube locations;
    d. CSL logs with reference elevations;
    e. CSL logs for each tube pair tested with any discontinuity zones indicated on the logs and discussed in the report as appropriate;
    f. Analyses of **both** pulse first arrival time (FAT) versus depth **and** velocity versus depth;
    g. Include nested signal peak (i.e. “waterfall”) diagrams as a function of time plotted vs. depth. Clearly indicate the FAT picks used to obtain velocity vs. depth;
    h. Analyses of pulse energy/amplitude versus depth;
    i. Tables which indicate tube pairs, vertical extents, and magnitude (FAT % delay and/or energy decrease) of flaw and defect zones, as defined in Section 3.4.5 of this Special Note; and;
    j. A narrative portion of the report to present items a thru i.

2. Plot data to a scale that will allow adequate evaluation of data variations. The Department reserves the right to request scale adjustments.
3. Complete all reports using English units.

C3.3.4 EVALUATION OF CSL TEST RESULTS

1. Allow direct communication between the CSL Testing Firm and the Department. If the CSL Testing Firm is different than other testing firms on the project, allow direct communication between the CSL and other testing firms.

2. The Department will review the CSL test results in the test report to evaluate whether or not the drilled shaft integrity is acceptable. Within 10 business days after receiving a test report, the Engineer will report to the cutoff wall Contractor whether the construction is acceptable or additional analyses are needed. The Department will also use the results of other non-destructive and materials testing, construction records, etc. to evaluate the condition of the shafts.
3. Perform CSL testing on the first secondary secant shaft constructed and continue drilling operations on subsequent shafts in accordance with this Special Note unless directed otherwise by the Engineer.
4. Commence construction of the structure above the secant shafts only after receiving written approval from the Engineer to do so. Approval is based on evaluation of the CSL test results and other applicable test results, construction records, etc.
5. If the CSL records are inconclusive (e.g. records do not clearly indicate discontinuity, good conditions or missing data), the Department may require additional testing, such as Angled CSL, Singlehole Sonic Logging, or concrete cores, to evaluate the concrete conditions within the shaft in question. If core samples are needed, obtain cores with a minimum diameter of 2 inches using a double tube core barrel at a minimum of 4 locations selected by the Department, unless directed otherwise by the Engineer. Locate core holes approximately 6 inches inside the steel reinforcement, or at other locations selected by the Engineer. For each core hole drilled, record a log with descriptions of inclusions, voids, or abnormalities in the cored holes and submit a copy of the log to the Engineer. Place the cores in core boxes as shown in Exhibit 10 of the current version of the *KYTC Geotechnical Guidance Manual,* properly labeling the shaft depth at each interval of core recovery. Transport the cores and logs to the Geotechnical Services Branch in Frankfort for inspection and testing unless directed otherwise by the Engineer. Only after being directed by the Engineer, grout the core holes in accordance with Section 3.3.2 of this Appendix.
6. If the additional testing or evaluation of cores indicate that concrete for any secant shaft on which additional testing or coring was required is acceptable, the Department will pay for the direct cost of additional testing, concrete coring, and grouting by change order. If the additional testing or evaluation of cores indicates that the concrete for any drilled shaft concrete is unacceptable, the additional testing, concrete coring, and grouting will be at the expense of the cutoff wall Contractor.
7. If discontinuities or other defects are found, an independent structural and/or geotechnical consultant hired by the cutoff wall Contractor will perform a structural and/or geotechnical evaluation at the expense of the cutoff wall Contractor. Use consultants who are prequalified by KYTC in applicable areas. Alternatively, the Engineer may require the Department's designer to perform the referenced evaluations and the Department may require the cost of these evaluations to be borne by the cutoff wall Contractor. Based on the design criteria established for the structure and the results of the independent evaluation, the Engineer will assess the effects of the defects on the performance of the secant shaft cutoff wall. If the results of the analyses indicate that there is conclusive evidence that the discontinuity will result in inadequate or unsafe performance, as defined by the design criteria for the structure, the Engineer will reject the secant shaft.

8. If any secant shaft is rejected, provide a plan for remedial action to the Department for approval. Any modifications to the secant shafts and/or other substructure elements caused by the remedial action will require calculations and working drawings by consultant(s) hired by and at the expense of the cutoff wall Contractor (or the Department's designer), which will be subject to review by the Department. Begin remediation operations only after receiving approval from the Engineer for the proposed remediation. All remedial action will be at no cost to the Department and with no extension of contract time.

C3.3.5 EVALUATION CRITERIA

The Department will generally use the criteria below in Table 3 for evaluation of the shafts but may vary the criteria based on other available information (e.g. construction records, etc.)

Table 3 – Evaluation Criteria for CSL Test Results

Satisfactory	Good (G)	FAT increase 0 to 10% **and** Energy Reduction < 6 dB
Anomaly	Questionable (Q)	FAT increase 11 to 20% **and** Energy Reduction of < 9 dB
Flaw	Poor/Flaw (P/F)	FAT increase 21 to 30% **or** Energy Reduction of 9 to 12 dB
Defect	Poor/Defect (P/D)	FAT increase >31% **or** Energy Reduction > 12 dB

- Flaws must be addressed if they affect more than 50% of the profiles.
- Defects must be addressed if they affect more than one profile (i.e. the result of complete investigation from bottom to top between two tubes) at the same depth.
- "Addressing" a Flaw or Defect may include an evaluation by tomography if the concern is localized (e.g. not across the full section), and/or, depending on the depth to the concern, additional measures like core drilling, repair or replacement, repeat tests after a longer waiting time or testing by other methods (gamma-gamma, low strain, high strain).
- Flaws or Defects covering the entire cross section define a full layer concern requiring repair.
- Anomalies will require evaluation and may need to be addressed based on the results of the evaluation.

Continue with placement of structures and other construction above the top of shaft only after receiving written approval from the Engineer to do so. Approval will be granted based on evaluation of the CSL and other applicable test results.

C3.4 METHOD OF MEASUREMENT CSL TESTING

The Department will pay for the authorized and accepted quantities of "CSL Testing" at the contract unit price per each secant shaft tested. This will constitute full compensation for all costs associated with providing access for testing personnel and equipment, performing the CSL testing in a single secant shaft, and reporting the results to the

Engineer.

Installation of CSL access tubing is incidental to the applicable unit price for CSL Testing. This will constitute all costs and delays associated with installing the CSL access tubing in a single secant shaft, including but not limited to providing and installing access tubing, providing and installing all required bracing for access tubes, and providing and placing grout in access tubes.

The Department will pay for the direct cost of additional testing and concrete coring, authorized by the Engineer, required to investigate shafts with inconclusive CSL records if evaluation of the additional testing or cores indicates that concrete for that drilled shaft is acceptable using a change order. This will constitute full compensation for all costs and delays associated with performing additional tests, obtaining and delivering concrete cores to the Geotechnical Services Branch, and grouting core holes.

C3.5 PAYMENT

The Department will pay for the completed and accepted quantities under the following. The Pay Unit of “Each” refers to each individual shaft.

Code	Pay Item	Pay Unit
~~21321NC~~	~~CSL Testing (4 Tubes)~~	~~Each~~
22839NN	CSL Testing	Each

The Department will consider payment as full compensation for all work required under this Section.

Special Note for Sludge Line Replacement

U.S. 62 – Sympson Lake Dam (Item # 04-5013.00)

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. This Special Note covers the Sludge Line Force Main (FM) Replacement requirements for the project.

1.2 DESCRIPTION

A. **Dam Name:** Sympson Lake Dam (NID No. KY00045)

B. This construction will take place within the west-bound lane and shoulder of the embankment. The embankment affected by this construction was originally designed and constructed by the Kentucky Transportation Cabinet (KYTC). The purpose of these Special Provisions is:

1. To identify the submittals required by the Contractor for compliance,
2. Establish the required replacement items, and
3. Establish necessary requirements to maintain continuous operation of the City of Bardstown (City) Water Treatment Plant (WTP) during Sludge Line replacement operations.

PART 2 – SUBMITTALS

A. The following shall be submitted to KYTC (one electronic copy) 14 days prior to starting the work in this Note:
1. SD-03 Product Data
2. Sludge Line Replacement Plan: Prior to construction, the Contractor shall prepare and follow a workplan that includes the following:

- Proposed time to complete work, including a sequence and schedule,
- Anticipated duration of outage,
- Bypass pumping plan (to be approved by KYTC and the City),
- Excavation limits and depths,
- Methods for removing portions of the cutoff wall and guide wall,
- Location of existing pipe severing,
- Pipe connection details,
- Waterstop material and connection detail,
- Method, details, and mix design of cutoff wall penetration, and
- Method of placement and mix design for grout plugs and backfill materials.

The Sludge Line Replacement Plan shall include emergency contact information, including cell phone numbers of the project manager, project superintendent and foreman. The numbers provided shall be monitored 24 hours a day, 7 days a week.

PART 3 – MATERIALS

A. Grout Plug
1. Non-shrink grout conforming to Standard Specification Subsection 601.03.03 B.

B. Backfill
1. Secant Shaft Cutoff Wall and Guide Wall Limits: Backfill materials associated with the secant shaft cutoff wall and guide wall shall consist of Class B concrete conforming to Standard Specification Subsection 601.03.03 A.
2. General Trench Backfill: Backfill within excavated areas for the Sludge Line replacement located outside the limits of the secant shaft cutoff wall and guide wall shall consist of Flowable fill for Bridge End Bent Backfill conforming to Standard Specification Subsection 601.03.03 B, 5.

PART 4 – CONSTRUCTION AND EXECUTION

A. CONSTRUCTION

1. The existing Sludge Line FM shall be removed and replaced with a 10-inch HDPE force main as shown on the Contract Drawings. The existing FM is anticipated to consist of an 8-inch P.V.C pipe within a 14-inch steel encasement pipe based on available historic correspondence and record drawings provided by the City.
2. Prior to obtaining replacement materials or scheduling outages of the Sludge Line, the Contractor shall expose the existing pipe and encasement pipe as necessary to field verify pipe sizes, material types, and configuration. Any discrepancies between field conditions and available record information shall be immediately reported to the Department and City.
3. The replacement HDPE force main shall have an inside diameter equal to or greater than the existing 8-inch P.V.C. force main. Following field verification of the existing P.V.C. pipe size and configuration, the Contractor shall confirm that the proposed 10-inch HDPE pipe provides an equivalent or greater internal flow area. Submit the proposed HDPE pipe size, pressure rating, and inside diameter to the Department for review prior to ordering materials.
4. The Sludge Line shall be replaced at the same alignment and grade as the existing pipe unless approved by KYTC.
5. The 8-inch P.V.C. pipe and 14-inch steel encasement pipe shall be severed at a location as close as practicable to the proposed secant shaft guide wall while still permitting completion of the required removal, replacement, and reconstruction work. The existing encasement pipe beyond the severance location shall remain in place and shall not be disturbed during construction operations. The severed location shall be approved prior to construction.
6. Field welding associated with reconnection of the severed 14-inch steel encasement pipe shall be performed by qualified welders using procedures conforming to AWS D1.1, latest edition. Welded connections shall provide full structural continuity of the encasement pipe and shall be watertight. Prior to welding, pipe ends shall be properly aligned, cleaned, and prepared to provide sound weld penetration and fusion. All welds shall be visually inspected by the Department and any defective welds shall be repaired or replaced at no additional cost to the Department.
7. The Contractor shall provide P.V.C to HDPE pipe connections as shown on the Contract Drawings and a new 10-inch HDPE pipe through the entire length of the existing casing and new casing extensions, penetrating the secant shaft cutoff wall and guide wall.
8. All connections and fittings must be watertight.
9. Grout plugs for sealing both ends of the steel encasement pipe shall provide a watertight seal between the ends of the encasement pipe and the new 10-inch HDPE FM. Submit material and placement methods as part of the required workplan to the Department for review and approval.
10. The grout plug shall be installed a minimum of two (2) feet into the steel encasement pipe on both ends.
11. To achieve a sturdy bond to the interior of the steel pipe, the pipe's interior shall be cleaned in accordance with SSPC-SP1 to remove oil, grease, dirt, and other contaminates to the depth of the specified grout plug. Grout as soon as practical after cleaning the application surface.
12. The bond strength of the grout plug shall be tested in accordance with ASTM A944. Create a test specimen using the same batch of grout as used in the plugs. The test specimen shall assume a #6 plain rebar, a concrete cover of 1.5 in, and an embedment length of 12 in. Submit the results of the test to the Engineer.
13. Care shall be taken to ensure the existing steel vent pipes remain unobstructed and functional during installation of the grout plugs. Existing vent pipes may require relocation or modification to maintain venting within the ungrouted portion of the encasement pipe between grout plugs.
14. Casing vents shall remain open and fully functional upon completion of this work.
15. The Contractor shall protect the existing Sludge Line during construction and should minimize traversing the alignment. Prior to operation of heavy equipment over the existing

Sludge Line alignment, the Contractor shall evaluate cover conditions and provide temporary protection measures as necessary to prevent damage or disturbance of the pipe system. Any damage to the existing Sludge Line resulting from the Contractor's operations shall be repaired or replaced at no additional cost to the Department.

16. Localized removal of portions of the guide wall and cutoff wall required for installation of the Sludge Line penetration shall be performed using controlled cutting methods to produce neat, clean, and uniform lines. Methods that may induce cracking, disturbance, or damage to adjacent portions of the cutoff wall shall not be permitted unless approved by the Department. Hydrophilic water stops shall be added to the cut surfaces within the guide wall and cutoff wall to provide a watertight seal.
17. Guide wall and cutoff wall removal operations shall not begin until the concrete has attained a minimum compressive strength of 1,000 psi. The Contractor shall coordinate placement and removal operations to minimize damage, spalling, or disturbance to the remaining cutoff wall system.
18. Backfilling of the excavation shall be performed in accordance with the Contract Drawings.
19. Flowable Fill backfill and Class B Concrete shall extend at least 12 inches beyond every side of the encasement pipe.
20. The Sludge Line replacement shall maintain continuity of the seepage cutoff system at the secant shaft wall penetration. All voids, interfaces, and annular spaces shall be sealed with low-permeability materials in accordance with the Contract Drawings and this Special Note.
21. If voids, soft zones, cavities, or unstable subsurface conditions are encountered within the excavation limits or along the Sludge Line replacement alignment, immediately suspend work in the affected area and notify KYTC. The Contractor shall not proceed with placement of pipe, backfill, concrete, or Flowable Fill in the affected area until the condition has been evaluated and corrective measures have been reviewed and approved by KYTC.

B. BYPASS SYSTEM

1. The Sludge Line cannot be inoperable for more than six (6) hours in a 24-hour period without supplemental bypass of the material. A bypass pumping system capable of maintaining continuous operation of the Sludge Line during construction activities is therefore required. Replacement of the Sludge Line shall not begin until a bypass pumping plan has been submitted to and accepted by the Department and City, and all pumps, hoses, fittings, standby equipment, and appurtenances necessary to maintain continuous bypass operation are in place and fully operational. The bypass pump shall be capable of pumping up to 300,000 gallons per day (GPD) to meet requirements of the Water Treatment Plant (WTP).
2. The Sludge Line shall not remain under bypass pumping operations for more than 30 consecutive days. All bypass pumping, removal, replacement, reconnection, and associated construction activities necessary to restore the Sludge Line to full operation shall be completed within this period.
3. The Contractor shall coordinate with the Department for an approved method of sludge line bypass. Once an approved method has been determined, inform the City and the Department of the anticipated start and end dates of sludge line bypass while the Sludge Line is being replaced.
4. The Contractor is responsible for procuring all materials, pumps, hoses and maintaining the bypass system while in use.
5. The Contractor shall maintain standby bypass equipment sufficient to prevent interruption of flow during replacement operations.
6. Waste material conveyed through the Sludge Line may be pumped and discharged into the City's sanitary sewer system for subsequent treatment at the municipal wastewater treatment facility. No material other than Sludge Line effluent from the FM and water treatment operations will be permitted to be discharged to the location designated by the City.

C. MODIFICATIONS
   1. Any modifications to the pre-approved contract documents proposed by the Contractor for construction activities involving the replacement of the Sludge Line, such as: changes to staging, excavation depths, cutoff wall penetration detail, sequence of construction, or materials used must be submitted to KYTC for review and approval.

D. LIMITATIONS
   1. The Contractor shall ensure that the Sludge Line bypass system is always maintained during construction of the Sludge Line replacement and the proposed construction does not interrupt the City's water treatment processes. In accordance with the Contract Drawings, a penalty of $10,000 per day will be imposed for any damage or disruption to the water supply that causes a shutdown of water treatment operations or interruption of water delivery.
   2. The proposed construction shall not involve any additional excavations beyond what is shown in the Contract Drawings that may impact the ability to always maintain one active lane of traffic along US 62 during construction of the Sludge Line replacement. The Maintenance of Traffic (MOT) shown in the Contract Drawings shall be maintained during the replacement construction.

PART 5 – METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. The Department will measure and pay for the accepted quantity of items listed below required to replace the Sludge Line. The Department considers payment as full compensation for all costs and delays associated with Sludge Line replacement including but not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note. Payment for Flowable Fill and Class B Concrete, including furnishing, placement, and all incidentals associated with trench backfill and encasement sealing, shall be considered incidental to the Steel Encasement Pipe bid item.

Code	Pay Item	Pay Unit
15000	S Bypass Pumping	Each
24786EN	HDPE Pipe	Linear Foot
23911EC	Grout	Cubic Yard
24668EC	Steel Encasement Pipe	Linear Foot

UTILITIES AND RAIL CERTIFICATION NOTE

Project:	**4-5013.00**	**Nelson County**	**US 62**
Funding Source:	**FD04SM5038129**	**FD04 090 1487101D**	
Description:	**EMERGENCY REPAIRS TO THE US 62 SYMPSON LAKE DAM EMBANKMENT BETWEEN MP 11.9 TO MP 12.1 AT BARDSTOWN, KENTUCKY IN NELSON COUNTY. (2020BOP)**		
Mile Point:	**11.9 To 12.1**		

GENERAL UTILITY NOTES

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

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

3. The contractor should be aware that there is UTILITY WORK INCLUDED IN THIS ROAD CONSTRUCTION CONTRACT. The Contractor shall review the GENERAL UTILITY NOTES AND INSTRUCTIONS which may include KYTC Utility Bid Item Descriptions, utility owner supplied specifications, plans, list of utility owner preapproved subcontractors, and other instructions. Utility contractors may be added via addendum if KYTC is instructed to do so by the utility owner. Potential contractors must seek prequalification from the utility owner. Any revisions must be sent from the utility owner to KYTC a minimum of one week prior to bid opening.

4. For all projects under 2000 Linear feet which require a normal excavation locate request pursuant to KRS 367.4901-4917, the awarded contractor shall field mark the

UTILITIES AND RAIL CERTIFICATION NOTE

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Mile Point:	**11.9 To 12.1**		

proposed excavation or construction boundaries of the project (also called white lining) using the procedure set forth in KRS 367.4909(9)(k). For all projects over 2000 linear feet, which are defined as a "Large Project" in KRS 367.4903(18), the awarded contractor shall initially mark the first 2000 linear feet minimally of proposed excavation or construction boundaries of the project to be worked using the procedure set forth in KRS 367.4909(9)(k). This temporary field locating of the project excavation boundary shall take place prior to submitting an excavation location request to the underground utility protection Kentucky Contact Center. For large projects, the awarded contractor shall work with the impacted utilities to determine when additional white lining of the remainder of the project site will take place. This provision shall not alter or relieve the awarded contractor from complying with requirements of KRS 367.4905 to 367.4917 in their entirety.

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

UTILITIES AND RAIL CERTIFICATION NOTE

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Mile Point:	**11.9 To 12.1**		

DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT

Utility Company	Facility Type

Not Applicable

The Contractor is fully responsible for protection of all utilities listed above

UTILITIES AND RAIL CERTIFICATION NOTE

Project:	**4-5013.00**	**Nelson County**	**US 62**
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Mile Point:	**11.9 To 12.1**		

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

Not Applicable

UTILITIES AND RAIL CERTIFICATION NOTE

Project:	**4-5013.00**	**Nelson County**	**US 62**
Funding Source:	**FD04SM5038129**	**FD04 090 1487101D**	
Description:	**EMERGENCY REPAIRS TO THE US 62 SYMPSON LAKE DAM EMBANKMENT BETWEEN MP 11.9 TO MP 12.1 AT BARDSTOWN, KENTUCKY IN NELSON COUNTY. (2020BOP)**		
Mile Point:	**11.9 To 12.1**		

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

Not Applicable

UTILITIES AND RAIL CERTIFICATION NOTE

Project:	**4-5013.00**	**Nelson County**	**US 62**
Funding Source:	**FD04SM5038129**	**FD04 090 1487101D**	
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Mile Point:	**11.9 To 12.1**		

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

City of Bardstown – Water – Has an 8-inch PVC sludge line that will be adjusted by highway contractor.

UTILITIES AND RAIL CERTIFICATION NOTE

Project:	**4-5013.00**	**Nelson County**	**US 62**
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Mile Point:	**11.9 To 12.1**		

RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

No Rail Involvement

UTILITIES AND RAIL CERTIFICATION NOTE

Project:	**4-5013.00**	**Nelson County**	**US 62**
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Mile Point:	**11.9 To 12.1**		

AREA FACILITY OWNER CONTACT LIST

1. City of Bardstown - Water
   Jessica Filiatreau - Phone: (502) 348-5947 Email: jhfiliatreau@bardstownconnect.com

262198

PROPOSAL BID ITEMS

Report Date 5/19/26

262198

Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE (REVISED 5-19-26)	3,097.00	TON		$	
0020	00100		ASPHALT SEAL AGGREGATE (REVISED 5-19-26)	41.00	TON		$	
0030	00103		ASPHALT SEAL COAT (REVISED 5-19-26)	6.00	TON		$	
0040	00214		CL3 ASPH BASE 1.00D PG64-22 (REVISED 5-19-26)	1,051.00	TON		$	
0050	00356		ASPHALT MATERIAL FOR TACK	4.00	TON		$	
0070	02697		EDGELINE RUMBLE STRIPS	2,700.00	LF		$	
0080	22906ES403		CL3 ASPH SURF 0.38A PG64-22 (REVISED 5-19-26)	326.00	TON		$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0090	00078		CRUSHED AGGREGATE SIZE NO 2 (REVISED 5-19-26)	2,801.00	TON		$	
0100	02014		BARRICADE-TYPE III	4.00	EACH		$	
0110	02200		ROADWAY EXCAVATION (REVISED 5-19-26)	5,309.00	CUYD		$	
0120	02562		TEMPORARY SIGNS	186.00	SQFT		$	
0135	02585		EDGE KEY (ADDED 5-19-26)	112.00	LF		$	
0140	02602		FABRIC-GEOTEXTILE CLASS 1 (REVISED 5-19-26)	2,754.00	SQYD		$	
0150	02608		FABRIC-GEOTEXTILE CLASS 4A (REVISED 5-19-26)	3,498.00	SQYD		$	
0160	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0170	02671		PORTABLE CHANGEABLE MESSAGE SIGN	2.00	EACH		$	
0190	02701		TEMP SILT FENCE	1,242.00	LF		$	
0200	02726		STAKING	1.00	LS		$	
0210	03171		CONC BARRIER WALL TYPE 9T	1,300.00	LF		$	
0220	04933		TEMP SIGNAL 2 PHASE	2.00	EACH		$	
0230	05953		TEMP SEEDING AND PROTECTION	1,814.00	SQYD		$	
0240	05963		INITIAL FERTILIZER	0.19	TON		$	
0250	05964		MAINTENANCE FERTILIZER	0.11	TON		$	
0260	05985		SEEDING AND PROTECTION	3,629.00	SQYD		$	
0270	05992		AGRICULTURAL LIMESTONE	2.25	TON		$	
0280	06511		PAVE STRIPING-TEMP PAINT-6 IN	3,500.00	LF		$	
0290	06515		PAVE STRIPING-PERM PAINT-6 IN	2,825.00	LF		$	
0300	06568		PAVE MARKING-THERMO STOP BAR-24IN	48.00	LF		$	
0310	08912		CRASH CUSHION TY 6 CLASS T TL3	2.00	EACH		$	
0320	10030NS		ASPHALT ADJUSTMENT	5,743.00	DOLL	$1.00	$	$5,743.00
0330	20191ED		OBJECT MARKER TY 3 (REVISED 5-19-26)	4.00	EACH		$	

262198

PROPOSAL BID ITEMS

Report Date 5/19/26

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0340	20430ED		SAW CUT	2,735.00	LF		$	
0345	21289ED		LONGITUDINAL EDGE KEY (ADDED 5-19-26)	2,735.00	LF		$	
0350	22664EN		WATER BLASTING EXISTING STRIPE	2,000.00	LF		$	
0360	26248EC		ELECTRONIC DELIVERY MGMT SYSTEM - AGG	1.00	LS		$	

Section: 0003 - SECANT WALL

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0301	08003		FOUNDATION PREPARATION (ADDED 5-19-26)	1.00	LS		$	
0325	15000		S BYPASS PUMPING (ADDED 5-19-26)	1.00	EACH		$	
0352	23911EC		GROUT (ADDED 5-19-26)	1.00	CUYD		$	
0354	24786EN		HDPE PIPE (ADDED 5-19-26)	80.00	LF		$	
0356	24668EC		STEEL ENCASEMENT PIPE (ADDED 5-19-26)	12.00	LF		$	
0361	26322ED		SECANT SHAFT-COMMON (ADDED 5-19-26)	47,968.00	SQFT		$	
0362	26323ED		SECANT SHAFT-SOLID ROCK (ADDED 5-19-26)	30,165.00	SQFT		$	
0363	26324ED		SECANT SHAFT W/LT WT CONCRETE-COMMON (ADDED 5-19-26)	1,682.00	SQFT		$	
0364	26325ED		SECANT SHAFT W/LT WT CONCRETE-SOLID ROCK (ADDED 5-19-26)	127.00	SQFT		$	
0365	26326ED		SECANT SHAFT GUIDE WALL (ADDED 5-19-26)	991.00	LF		$	
0370	00001		DGA BASE	200.00	TON		$	
0380	00083		CRUSHED AGGREGATE SIZE NO 8	100.00	TON		$	
0385	02403		REMOVE CONCRETE MASONRY (ADDED 5-19-26)	39.00	CUYD		$	
0386	02268		REMOVE & REPLACE FENCE (ADDED 5-19-26)	35.00	LF		$	
0390	02483		CHANNEL LINING CLASS II	150.00	TON		$	
0400	02700		SAND	550.00	TON		$	
0405	08100		CONCRETE-CLASS A (ADDED 5-19-26)	39.00	CUYD		$	
0407	08150		STEEL REINFORCEMENT (ADDED 5-19-26)	5,200.00	LB		$	
0410	22839NN		CSL TESTING (ADDED 5-19-26)	10.00	EACH		$	
0420	21843EN		GEOMEMBRANE LINER	256.00	SQYD		$	
0430	24550EC		VIBRATION MONITORING	1.00	LS		$	
0440	26201EC		24 HR FALLING HEAD PERM TEST IN CORES	2.00	EACH		$	
0450	26202EC		WATER PSSR TEST IN CORES-SINGLE PACKER	2.00	EACH		$	
0460	26203EC		SECANT SHAFT CONCRETE CORES	10.00	EACH		$	

PROPOSAL BID ITEMS

Report Date 5/19/26

Section: 0004 - GUARDRAIL

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0490	01984		DELINEATOR FOR BARRIER - WHITE	13.00	EACH		$	
0500	01987		DELINEATOR FOR G/R BI DIRECTIONAL WHITE (REVISED 5-19-26)	24.00	EACH		$	
0510	02360		G/R TERMINAL SECTION NO 1	1.00	EACH		$	
0520	02373		G/R END TREATMENT TYPE 3 (REVISED 5-19-26)	3.00	EACH		$	
0530	02381		REMOVE G/R (REVISED 5-19-26)	2,356.00	LF		$	
0540	21802EN		G/R STEEL W BEAM-S FACE (7 FT POST) (REVISED 5-19-26)	2,300.00	LF		$	
0550	25078ED		THRIE BEAM G/R TRANSITION TL-3 (REVISED 5-19-26)	4.00	EACH		$	

Section: 0005 - DEMOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0130	02568		MOBILIZATION	1.00	LS		$	
0560	02569		DEMOBILIZATION	1.00	LS		$	