AECOM
1555 N. River Center Drive
Suite 214
Milwaukee, WI 53212

T: +1-414-944-6080
aecom.com

March 18, 2024

Mr. Joe Graham
Wisconsin Department of Natural Resources
Spooner Service Center
810 W. Maple Street
Spooner, WI 54801

Project Name:
WDNR Superior Slips (RFP-SLR22), Feasibility Studies & Preliminary Design

WDNR PO:
37000-0000021216

AECOM Project No.
60685299

Subject: DRAFT-Superior Slips Quality Assurance Project Plan (QAPP) Addendum 2 - 2024 AECOM Geotechnical and Data Gap Investigation

Dear Mr. Graham,

AECOM Technical Services, Inc. (AECOM) has prepared this second addendum to the *Quality Assurance Project Plan for Superior Slips* (AECOM 2022a) in accordance with "EPA Requirements for Quality Assurance Project Plans (QA/R-5)" (EPA/240/B- 01/003, March 2001) and "Guidance for Quality Assurance Project Plans (QA/G-5)" (EPA/240R- 02/009, December 2002) and guidelines provided in the Wisconsin Department of Natural Resources' request for proposal (RFP) and the Scope of Work (SOW) presented in Change Order Proposal #10, C-Street Slip Shoreline Analysis (AECOM, Oct. 2023). This Quality Assurance Project Plan (QAPP) Addendum provides details of QA/QC procedures and specifications for additional field activities to be completed as part of geotechnical subsurface investigation and analysis for the C-Street Slip (Slip) Shoreline. Based on a request from Superior Water, Light, and Power (SWL&P) and Foth and approved by the Wisconsin Department of Natural Resources (WDNR) in an email dated December 15, 2023, this QAPP Addendum also provides details of chemical analysis for the C Street Slip soils at one boring location.

1. Introduction and Project Objectives

The United States Environmental Protection Agency (USEPA) awarded the WDNR a Great Lakes Restoration Initiative (GLRI) grant (No. GL-00E03068) to complete feasibility studies and preliminary design tasks for contaminated sediment sites in the Wisconsin portion of the St. Louis River Area of Concern. An additional investigation is proposed under the GLRI grant. Field activities are anticipated to take place in early spring of 2024 (2024 Investigation), pending receipt of access agreements from property owners. Sampling proposed as part of the 2024 Investigation includes collection of subsurface soils following the methods described in the *Superior Slips Field Sampling Plan (FSP) Addendum 2* (AECOM, 2024) and this QAPP Addendum 2 for geotechnical and chemical analysis. In general, samples will be collected during hydro excavation and geotechnical drilling operations.

The purpose of the 2024 Investigation is to obtain geotechnical data for analysis of the existing steel sheet pile bulkhead located along the Slip's north shoreline under proposed dredge conditions. AECOM will also assess if there is a need for water-side borings based on data collected from the land-side borings. A secondary purpose of the 2024 Investigation activities is to evaluate concentrations of select constituents of concern (COCs) at the head of the C Steet Slip. Analytical laboratory results will be used to evaluate the potential for recontamination of the Slip and necessity for installation of a sheet-pile cut-off wall. The project limits and boring locations for the 2024 Investigation are presented on **Figure 1**.

1.1 Addendum Outline

The QAPP Addendum 2 outline is based on the outline of the original *Quality Assurance Project Plan for Superior Slips* (AECOM, 2022a). In accordance with the guidance cited above, the 2022 QAPP is organized into four major sections:

- Group A – Project Management;
- Group B – Data Generation and Acquisition;
- Group C – Assessment and Oversight; and
- Group D – Data Validation and Usability.

This addendum provides updates to the original sections only as necessary to address additional analytical parameters, and is organized as follows, with original QAPP sections noted in parentheses:

- Introduction and Project Objectives;
  - Approval Page (**Section A-1**);
  - Distribution List (**Section A-3**);
  - Project/Task Organization (**Section A-4**)
    - Field Responsibilities (Subcontractors to AECOM) (**Section A-4.3**)
    - Analytical Laboratories (**Section A-4.4**);
    - Project Organization Chart (**Section A-4.5, Figure 1**)
  - Overview/Problem Definition (**Section A-5.1**);
  - Project Task Description (**Section A-6**)
    - Schedule (Section A-6.1.5)
  - Data Quality Objectives Process (**Section A-7.1**);
  - Analytical Methodologies (**Section A-7.3**);
  - Geophysical Testing of Sediments (**Section A-7.4**);
  - Laboratory Methodologies (**Section A-9.1.4**);
  - Reports to Management (**Section C-2**);
  - Data Review, Validation, and Verification Methods (**Section D-1**)
- Figures
  - **Figure 1:** Proposed Survey Area and Boring Locations
  - **Figure 2:** Project Organization Chart for the 2024 Investigation
- Tables
  - **Table 1:** Project Team Summary for the 2024 Investigation
  - **Table 2:** Geotechnical, Chemical Analysis, and Quality Control Samples
  - **Table 3A:** Matrices, Parameter Groups, Sample Containers, Preservation, Handling Procedures, and Hold Times
  - **Table 3B:** Matrices, Parameters, Analytical Methods, and Laboratory SOP References
  - **Table 4:** Sample Locations (Cores, Depth, IDs), Parameter Group and Rationale
  - **Table 5:** Proposed Geotechnical Analysis

- Attachments – Lab SOPs
  - **Attachment A:** AET SOPs
  - **Attachment B:** Pace SOPs

2. Approval Page (Section A-1)

WDNR

Joe Graham/Project Manager
Printed Name/Title

3/26/2024
Signature/Date

USEPA

Meaghan Kern/SLR Sediment Lead
Printed Name/Title

4/11/2024 Meaghan Kern
Signature/Date

GLLA

Mark Loomis/QA Manager
Printed Name/Title

CHRISTIAN BAKO 2024.04.11 14:54:30 -05'00'
Signature/Date

GLLA QA Team member on behalf of Mark Loomis

AECOM

Kim Elias/Project Manager
Printed Name/Title

03/20/2024
Signature/Date

AECOM

Dean Fenske/QC Manager & CQC Systems Manager
Printed Name/Title

03/20/2024
Signature/Date

AECOM

Waverly Braunstein/Chemistry QA Manager
Printed Name/Title

03/20/2024
Signature/Date

Pace – Green Bay (WI)

Christopher Hyska/Lab Project Manager
Printed Name/Title

Signature/Date

AET - Duluth (MN)

Jonathan Gabriel/Project Manager
Printed Name/Title

3/26/2024
Signature/Date

Revision History

Revision	Revision date	Details	Authorized	Name	Position
0	02/09/2024	Draft	Yes	Kim Elias	Project Manager
1	03/18/2024	Response to EPA Comments	Yes	Kim Elias	Project Manager

3. Distribution List (Section A-3)

AECOM Technical Services Inc. (AECOM) will maintain this Quality Assurance Project Plan (QAPP) and subsequent updates, and its distribution. The individuals named in the following table will receive a copy of this QAPP addendum and any subsequent revisions. **Table 1** also provides a summary of the project team for the 2024 Investigation.

Mr. Joe Graham, Project Manager Wisconsin Department of Natural Resources Spooner Service Center 810 W. Maple Street Spooner, WI 54801 715.292.4925 joseph.graham@wisconsin.gov	Donalea Dinsmore, QA Coordinator Wisconsin Department of Natural Resources PO Box 7921 Madison, WI 53707 608-228-2672 donalea.dinsmore@wisconsin.gov
Mark Loomis, GLLA QA Manager U.S. Environmental Protection Agency Great Lakes National Program Office 77 W. Jackson Blvd G-17J Chicago, IL 60604 312.886.0406 Loomis.Mark@epa.gov	Meaghan Kern, Project Manager U.S. Environmental Protection Agency Great Lakes National Program Office 77 W. Jackson Blvd G-17J Chicago, IL 60604 312.353.5784 Kern.Meaghan@epa.gov
Waverly Braunstein, Chemistry QA Manager AECOM 250 Apollo Drive Chelmsford, MA 01824 978.905.2133 waverly.braunstein@aecom.com	Kim Elias, Project Manager AECOM 1555 N Rivercenter Drive Milwaukee, WI 53212 920.377.1371 Kim.Elias@aecom.com
Dean Fenske, QA Manager/QCQ Systems Manager AECOM 200 Indiana Ave Stevens Point, WI 54481 715.342.3043 Dean.Fenske@aecom.com	Vikram Gautam, Sr. Geotechnical Engineer AECOM 1300 East 9th Street, 5th Floor Cleveland, OH 44114 440.317.1380 vik.gautam@aecom.com
Matthew Bloecher, Geotechnical Engineer AECOM 558 N Main Street Oshkosh, WI 920-236-6714 matthew.bloecher@aecom.com	Hugh Kinnard, Site Safety and Health Officer (SSHO), Geologist and Field Team Leader AECOM 2985 South Ridge Road, Suite B Green Bay WI 54304 920.406.3109 hugh.kinnard@aecom.com
Panar Salta, Data Validation Specialist AECOM 19219 Katy Freeway, #100 Houston TX 77094 972.339.8268 panar.salta@aecom.com	Shellee McGrath, Data Validation Specialist QATS/APTIM 2700 Chandler Avenue, Building C Las Vegas, NV 89120 702.895.8719 Shellee.mcgrath@aptim.com

Jonathan Gabriel, Project Manager American Engineering Testing, Inc. 4431 West Michigan Street Duluth, MN 55807 218.216.9910 jgabriel@teamAET.com	Chris Hyska, Laboratory QA Project Manager Pace Analytical Laboratory 1241 Bellevue St, STE 9, Green Bay, WI 54302 920.321.9405 Christopher.Hyska@pacelabs.com
Todd Rothe, President J. R. Jensen Construction 814 21st Ave. E. Superior, WI 54880 (715) 398-6626 TBD	

4. Project/Task Organization – (Section A.4)

4.1 Field Responsibilities (Subcontractors to AECOM) (Section A-4.3)

AECOM will subcontract hydro excavation, drilling and geotechnical and analytical sampling services through American Engineering Testing, Inc. (AET) of Duluth, Minnesota. For the project, AET will subcontract J. R. Jensen Construction of Superior, Wisconsin to perform hydro excavation.

4.2 Analytical Laboratories (Section A-4.4)

American Engineering Testing, Inc. (AET), Duluth, Minnesota has been selected to support this project performing geotechnical analyses of soil samples for Soil Moisture Content, Total Organic Content, Atterberg Limits, Particle Size Distribution, Unconfined Compressive Strength, and Soil Shear Strength (CIU Triaxial).

PACE Analytical Laboratory (Pace), Green Bay, Wisconsin has been selected to support this project performing chemical analyses for soils for mercury, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and analyses of Investigation Derived Waste (IDW).

Each laboratory has provided AECOM with its Quality Manual which provides a summary of the laboratories' geotechnical and analytical methods, laboratory QC, instrument/equipment testing, maintenance and inspection, instrument/equipment calibration and frequency, laboratory data management, and laboratory data reporting procedures.

A summary of the geotechnical, chemical analysis, and quality control samples to be collected for the 2024 Investigation are presented in **Table 2**.

Collection, preservation, and holding times are presented in **Table 3A**. Laboratory SOPs for preparation and analysis are itemized in **Table 3B** and provided in **Attachment A** (AET) and **Attachment B** (Pace).

The analyte list and laboratory limits for PAHs, VOCs, mercury, and IDW are unchanged from the original QAPP.

4.3 Project Organization Chart (Section A-4.5, Figure 2)

A summary of the project team for the 2024 Investigation is presented in the organization chart in **Figure 2.**

5. Overview/Problem Definition (Section A-5.1)

5.1 Geotechnical Investigation

The purpose of the 2024 Geotechnical Investigation is to obtain soil index and strength properties to support analysis of the existing north bulkhead shoreline. In addition, analysis of the site's fill soils will be performed to evaluate proper disposal practices. Field activities for the 2024 Geotechnical Investigation will include:

- Perform a visual and topographic survey of the Slip shoreline to identify grades and existing structures. The visual survey will be completed by an AECOM engineer to document any sinkholes or depressions adjacent to the existing bulkhead and tension cracking along the WWTP berm crest. The extent of the proposed visual and topographic survey is presented on **Figure 1** in the FSP.
- Perform soft clearing methods at boring locations to verify the location is clear of tie rods that are part of the bulkhead wall support system.

- Complete four geotechnical soil borings to the depth of 85 feet below ground surface (bgs) and one geotechnical soil boring to a depth of 55 feet bgs. (**Table 4**)
- Waste characterization and disposal of IDW generated during the 2024 Geotechnical Investigation activities.

The results of the 2024 Geotechnical Investigation will be used to evaluate the soil conditions near the sheet- pile cut-off wall on the C Street Slip to provide recommendations and alternatives for stabilization in anticipation of the dredging of the Slip.

5.2 Chemical Analysis

One of the borings, identified as GB-05-E, will include chemical analysis. The purpose of the environmental sampling activities is to evaluate concentrations of select COCs at the head of the C Steet Slip at the request of SWL&P and Foth. Field activities for the Chemical Analysis are summarized below:

- Collect soil samples for analytical testing from 2-4 feet bgs, above and below the groundwater table, at the bottom of the boring, and intervals with elevated photoionization detector (PID) readings, strong odor, product, and/or visual staining.
- Waste characterization and disposal of IDW generated during the Chemical Analysis activities.

Laboratory results (except for waste characterization results) will be supplied to SWL&P and Foth and used to evaluate the potential for recontamination of the Slip and necessity for installation of a sheet-pile cut-off wall.

6. Project/Task Description (Section A-6)

6.1 Schedule (Section A-6.1.5)

The field event is tentatively scheduled to begin in late March 2024. The field event is dependent on securing access agreements and schedule commitment from the drilling subcontractor, which have not yet been obtained. Therefore, the tentative field and report schedule is estimated as follows:

- Obtain access agreements – estimated by 3/22/2024
- Complete utility clearance – 3/23/2024 to 04/05/2024
- Complete the boring locations layout, survey and visual field inspection – 04/08/2024 to 04/12/2024
- Sample geotechnical soil borings and collect soil samples for chemical analysis – 04/15/2024 to 04/19/2024
- Waste characterization and disposal of IDW generated – 04/19/2024 to 05/17/2024
- Laboratory Tests: geotechnical analysis – 04/22/2024 to 05/27/2024, chemical analysis – 04/22/2024 to 05/06/2024
- Geotechnical and Data Gap Investigation Report:
  - Draft Report submittal – 06/03/2024
  - Receipt of WDNR comments – 06/17/2024
  - Final Report – 06/28/2024

7. Data Quality Objectives Process (Section A-7.1)

The DQO process is a systematic planning tool based on the Scientific Method for establishing criteria for data quality and for developing data collection designs. It was developed by the USEPA to accurately describe the type, quantity, and quality of data to be used in decision-making for an investigation or corrective action implementation. DQOs are developed to verify that data of sufficient quantity and quality

are collected to satisfy the project objectives. The DQOs for the 2024 Investigation have been developed to be consistent with the DQO guidance set out in the USEPA guidance document: "United States Environmental Protection Agency, Guidance for the Data Quality Objectives Process (EPA QA/G-4. EPA/240/B-06/001) from the Office of Environmental Information in Washington, D.C. (February 2006)."

The objectives of this program will be achieved by controlling sample collection, sample custody, sample analysis, data reporting, analytical data review, and the final data evaluation. Refer to the 2022 QAPP and its 2023 addenda (further collectively referred to as the QAPP) for:

- Sample monitoring and collection practices (**Section A-6);**
- Sample handling **(Section B-3.1);**
- Custody procedures **(Section B-3.2);**
- Sample analysis **(Section B-4)**;
- Assessments & response actions **(Section C-1);**
- Data reporting **(Section A-9)**; and
- Analytical data review process **(Section D)**.

7.1 Problem Statement

A Preliminary Remedial Design for the 2024 Geotechnical and Data Gap Investigation requires an investigation at the C Street Slip to collect geotechnical characterization test data, and to delineate the nature and extent of COCs. The rationale for the selection of each location, including reference locations, is provided in **Table 4** of this addendum. Historically, multiple transport pathways have impacted the C Street Slip sediments and include:

- Groundwater: Dissolved phase plumes of contaminants in upland groundwater may have migrated into the lake either directly or via preferential flow paths and impacted sediment contaminant concentrations within the boat slip.
- Stormwater: Contaminants in stormwater (falling onto nearby industrial and commercial properties) may have impacted surface sediment contaminant concentrations within the slip via the City's storm sewer conveyance system.
- CSTP#2 Pond: Adjacent to the boat slip is the City of Superior's main sewage treatment plant and CSTP#2 wastewater pond. Potential contamination from the pond to the boat slip may have occurred via lateral seepage of wastewater (through the pond berm) or via direct discharge of wastewater through the discharge pipe.
- Overwater Activities: Spills or releases associated with commercial vessel loading and offloading and fueling may have impacted sediments within the boat slip.
- Shoreline Erosion / Resuspension and Redistribution of Bedded Sediments: wind, wave erosion, propeller wash, or mass wasting of the slope and natural events, or anthropogenic processes (scour from marine vessel propeller wash) may contribute to redeposits of contamination.

7.2 Decision Identification

- What are the geotechnical characteristics of the sediments at the C Street Slip? How do these geotechnical data provide analysis of the existing north bulkhead shoreline?
- Is there a need for water-side borings based on data collected from the land-side borings?
- What are the concentrations of select COCs at the head of the C Steet Slip? Do the concentrations show potential for recontamination of the Slip and necessity for installation of a sheet-pile cut-off wall?

7.3 Decision Input

Decision inputs will include:

- Soil descriptions including the level and type of visual impact (i.e., bleb, stringer, staining, sheen, saturated), debris (i.e., paint chips, organic material) and odors.
- Geotechnical parameter collection and analysis for soils.Soil sampling for chemical analysis to delineate extent of COCs.
- Soil chemical analysis results that have been validated and are defensible with sufficiently low detection limits to correspond with project-specific action levels.
- Review of historical/background information, data, and reports.
- Waste parameter collection, and analysis to verify meeting landfill requirements for IDW.

7.4 Investigation Boundaries

The sampling program will be limited to soil and IDW. Soil samples will be collected from the five (5) proposed geotechnical boring locations and analyzed for geotechnical parameters. Soil samples will be collected from proposed boring location GB-05-E and submitted for chemical analysis of COCs. For the waste samples, grab samples will be collected in accordance with the SOP in Attachment B of the FSP Addendum 2 (AECOM, 2024).

Practical constraints that may impede sampling will be considered (e.g., weather, boring locations, underwater obstructions, etc.) The proposed boring locations were selected based on historical site investigations, proximity to the existing bulkhead wall, and drill rig accessibility. Borings will be advanced to refusal or target depth below the sediment surface (feet bgs), whichever is attained first. The proposed boring locations, boring termination depths, and anticipated sampling intervals are presented in **Table 4.**

For purposes of clarity the following locations are provided:

- Spatial investigation boundaries of the C Street Slip have been established in previous reports by others. The geotechnical and data gap investigation samples were chosen within those boundaries and sample locations are presented on **Figure 2** of this Addendum.

7.5 Decision Rules

The designated sample areas in the C Street Slip were defined by DNR in the bid process. Geotechnical samples will be analyzed for geotechnical properties to determine target sampling horizons.

7.6 Limits on Decision Error

The possibility of decision error may occur as sampling design error and/or measurement error. Although the possibility of decision error can never be eliminated, it can be minimized and controlled. For this project, sampling and measurement decision errors are to be controlled. The sampling program (location, time, or individual sample collection) is discussed in the FSP Addendum 2 (AECOM, 2024). Measurement errors are controlled using analytical methods that achieve reporting limits that are less than the established action levels. The following describes the possible decision errors and potential consequence of each error:

- Precision: ≤ 40% among field duplicates for COCs

One Trip Blank per cooler for the VOC analysis are required for this investigation.

- *Decision error based on a false positive.*

This error is being generally minimized by use of standardized test methods for sample analysis at an analytical laboratory that has a fully implemented and integrated QA program.

Decision error based on a false negative.

The likelihood of a decision error based on a false negative is minimal for the following reasons:

- The use of standardized test methods and the validation of the results minimize the likelihood of false negatives.

The analytical program is designed to generate data sensitive enough to produce chemical concentrations below the project-specific action levels for soil and waste.

7.7 Decision Optimization

The most cost-effective sampling approach to achieve the objectives of the sampling program is to select locations based on historic knowledge of the operational activities near and at the slips. The project FSP has been designed to maximize the project objectives and usability of the data. Conditions encountered in the field (e.g., inability to access a sampling location) or during validation (e.g., rejection of data due to matrix issues) potentially could result in limitations to the data. Identification, communication, and response to significant problems that would prevent achievement of the project objectives will be handled as described in **Section A-9** of the 2022 QAPP (AECOM, 2022a).

- The soil sampling strategy is detailed in Section 4.5 of the FSP Addendum 2 (AECOM, 2024).

8. Analytical Methodologies (Section A-7.3)

Analytical methods, container requirements, preservation, holding times, and laboratory SOP references are presented in **Tables 3A** and **3B**.

9. Geophysical Testing of Sediments (Section A-7.4)

Geotechnical sampling will be conducted and samples for moisture content, organic content, Atterberg limits, particle size distribution, unconfined compressive strength, and shear strength will be collected. The Geotechnical Investigation includes the advancement of five (5) soil borings to depths ranging between 55 and 85 feet bgs. Representative soil samples will be collected using SPT split-spoon sampling techniques with a calibrated, automatic hammer in accordance with ASTM D1586. Split-spoon sampling will generally be performed at the intervals shown in Table 4.2 of the FSP Addendum 2 (AECOM, 2024). When directed by the AECOM field technician, a sample of cohesive soil will be collected using 3-inch diameter thin-walled “Shelby tube” in accordance with ASTM D5187. SOPs related to geotechnical soil sampling can be found in Attachment B of the FSP Addendum 2 (AECOM, 2024). AECOM sampling methods for proposed boring GB-05-E will generally follow the procedures detailed in Sections 4.7 and 4.8 of the *Field Sampling Plan for Superior Slips* (AECOM, 2022) including PID screening. PID screening is not included in the scope of work for borings GB-01 through GB-04. Recovered geotechnical soil samples will be analyzed by AET for moisture content, organic content, Atterberg limits, particle size distribution, unconfined compressive strength, and shear strength. A laboratory testing program will be developed based on field classification and conditions encountered during drilling and submitted to AET by AECOM prior to geotechnical lab testing. Based on the anticipated soil profile (granular fill soils above clay), the estimated quantity of each geotechnical laboratory test is presented in **Table 5**. The AET laboratory SOPs for these methods are provided in **Attachment A**. Laboratory certifications for geotechnical testing are not available.

10. Laboratory Methodologies (Section A-9.1.4)

Methodologies for VOCs, PAHs, mercury, and IDW are unchanged from the original QAPP.

Documentation in the laboratory must follow the below ASTM procedures for each related test:

Soil Moisture Content – ASTM D2216

Total Organic Content – ASTM D2974

Atterberg Limits – ASTM D4318

Particle Size Distribution – ASTM D422

Unconfined Compressive Strength – ASTM D2166

Soil Shear Strength (CIU Triaxial) – ASTM D4767

11. Reports to Management (Section C-2)

Upon completion of the 2024 Investigation, AECOM will prepare a report under the direction of a professional engineer registered in the state of Wisconsin. The report will describe the investigation and evaluation of the soil conditions near the sheet pile walls along the Slip, detailed in Section 6 of the FSP Addendum 2 (AECOM, 2024).

Upon receipt of laboratory data associated with the chemical analysis, AECOM will evaluate the analytical results and prepare a brief Technical Memorandum for the C Street Slip documenting the results of chemical analysis and observations at proposed boring GB-05-E.

12. Data Review, Validation and Verification Methods (Section D-1)

Data review for all data gap investigative analyses will be performed as described in the 2022 QAPP.

Total PAHs as referenced in the 2022 QAPP consist of the following 19 PAHs: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(e)pyrene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

Total PAHs will be calculated by summing all detected concentrations and using a value of zero (0) for non-detected analytes. Results of the calculation will be rounded to two significant figures.

Data review for all geotechnical investigative analyses will be limited to a completeness verification of each data package. No formal validation will be conducted, but any nonconformances will be discussed in the data usability assessment.

13. References

AECOM, 2022a.Quality Assurance Project Plan for Superior Slips. Prepared by AECOM Technical Services, Inc. for Wisconsin Department of Natural Resources. Addendum 2. August 15, 2022.

AECOM, 2023.Quality Assurance Project Plan for Superior Slips Addendum. Prepared by AECOM Technical Services, Inc. for Wisconsin Department of Natural Resources. Addendum 3. September 25, 2023.

AECOM, 2024. Field Sampling Plan for Superior Slips Addendum. Prepared by AECOM Technical Services, Inc. for Wisconsin Department of Natural Resources. Addendum 2. Draft February 9, 2024.

AECOM, Oct. 2023. Change Order Proposal #10 C Street Slip Shoreline Analysis Superior Slips Project, Superior, WI. Prepared by AECOM Technical Services, Inc. for Wisconsin Department of Natural Resources. October 26, 2023.

WDNR, 2003. *Consensus Based Sediment Quality Guidelines Recommendations for Use Interim Guidance*. Publication No. WT-732 2003. Wisconsin Department of Natural Resources. December 2003.

WDNR. 2022. Wisconsin Department of Natural Resources. 2022. Professional Services Request for Proposals (RFP) and Scope of Work (SOW) for Feasibility Studies & Preliminary Designs for Contaminated Sediment Remediation in the Superior Slips Revision 1. April 20, 2022.

14. Closing Remarks

If there are any questions regarding this QAPP, please feel free to contact me at (920) 377-1371 or email.

Kind regards,

Kim Elias, P.G. (WI)
AVP, Sr. Project Manager
kim.elias@aecom.com

Figures

Figure 1 Proposed Survey Area and Boring Locations

Figure 2 Project Organization Chart for the 2024 Investigation

Figure 1

Proposed Survey Area and Boring Locations

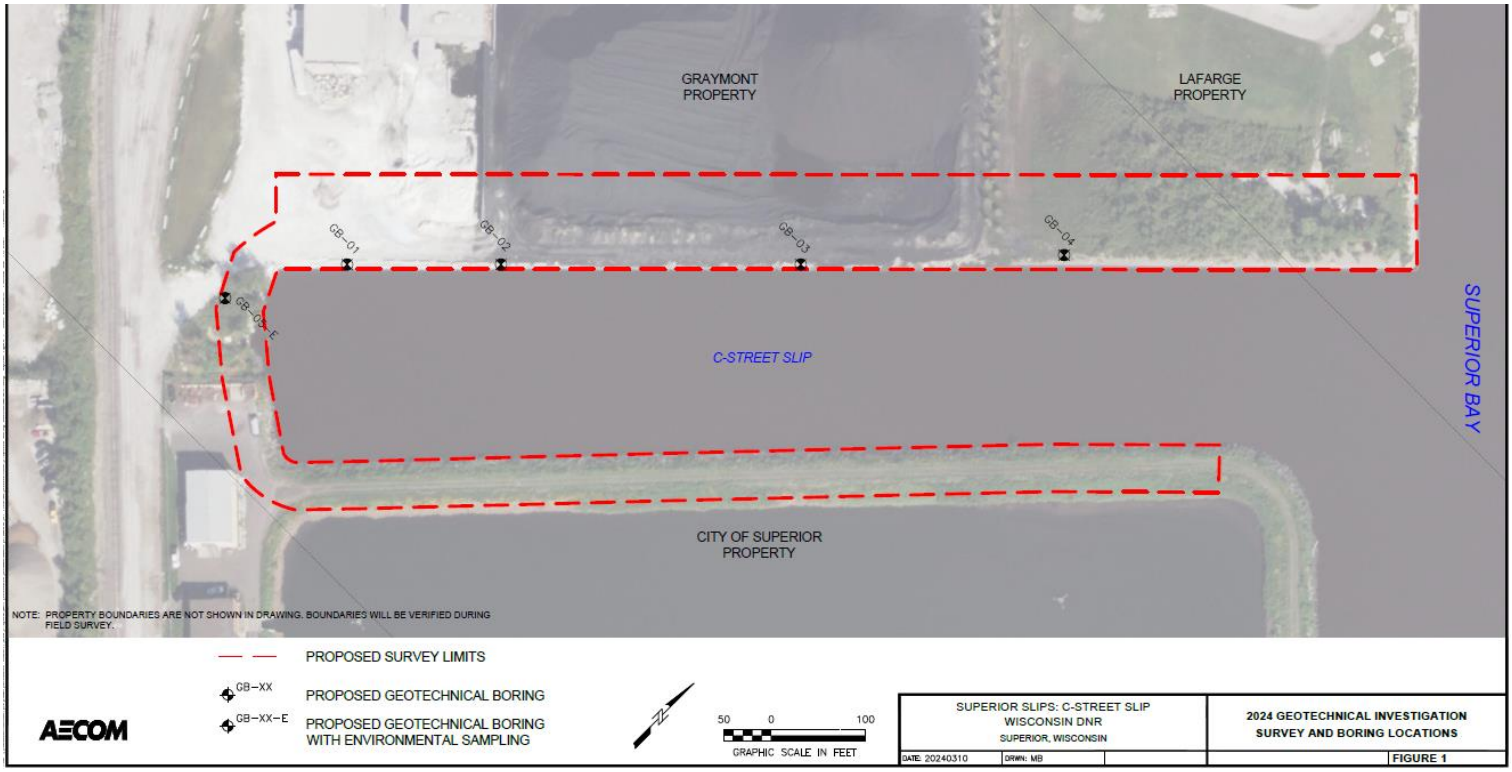
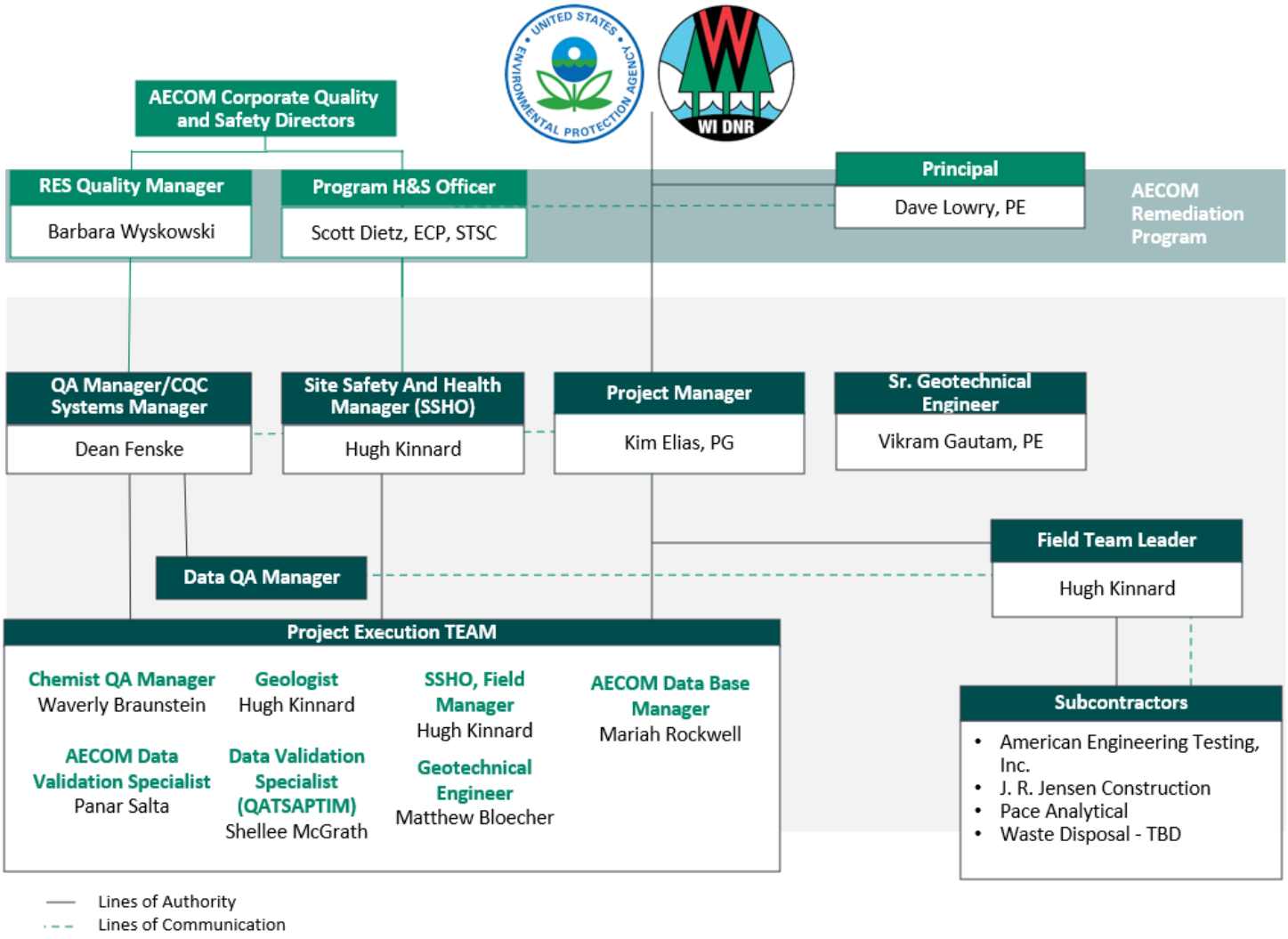


Figure 2

Project Organization Chart for the 2024 Investigation



Tables

Table 1 Project Team Summary for the 2024 Investigation

Table 2 Geotechnical, Chemical Analysis, and Quality Control Samples

Table 3A Matrices, Parameter Groups, Sample Containers, Preservation, Handling Procedures, and Hold Times

Table 3B Matrices, Parameters, Analytical Methods, and Laboratory SOP References

Table 4 Sample Locations (Cores, Depth, IDs), Parameter Group and Rationale

Table 5 Proposed Geotechnical Analysis

Table 1: Project Team Summary for the 2024 Investigation

Name	Affiliation	Title	Telephone	Email
Joe Graham	WDNR	Project Manager	715.292.4925	joseph.graham@wisconsin.gov
Meaghan Kern	USEPA	SLR Sediment Lead	312.353.5784	Kern.Meaghan@epa.gov
Mark Loomis	USEPA, GLLA	QA Manager	312.886.0406	Loomis.Mark@epa.gov
Donalea Dinsmore	WDNR	QA Coordinator	608-228-2672	donalea.dinsmore@wisconsin.gov
Dean Fenske	AECOM	QA Manager & CQCQ Systems Manager	715.342.3043	Dean.Fenske@aecom.com
Kim Elias	AECOM	Project Manager	920.377.1371	Kim.Elias@aecom.com
Vikram Gautam	AECOM	Sr. Geotechnical Engineer	404.317.1380	vik.gautam@aecom.com
Hugh Kinnard	AECOM	SSHO,Geologist, Field Team Leader	920.889.4326	Hugh.kinnard@aecom.com
Matthew Bloecher	AECOM	Geotechnical Engineer	920.236.6714	Matthew.bloecher@aecom.com
Waverly Braunstein	AECOM	Chemistry QA Manager	978.905.2133	Waverly.Braunstein@aecom.com
Panar Salta	AECOM	Project Chemist	972.339.8268	Panar.Salta@aecom.com
Shellee McGrath	QATS /APTIM	Data Validation Specialist	702.895.8719	Shellee.mcgrath@aptim.com
Christopher Hyska	Pace Analytical Laboratory	Laboratory QA Project Manager	920.321.9405	Christopher.Hyska@pacelabs.com
Jonathan Gabriel	American Engineering Testing, Inc.	Geotech Drillers/ Laboratory	218.216.9910	jgabriel@teamAET.com
Todd Rothe	J. R. Jensen Construction	President	715.398.6626	Jrjensen.com

Table 2: Geotechnical, Chemical Analysis, and Quality Control Samples

Matrix	No. of Samples	Parameter Group	Field DUPs[a]	Field REPs[a]	MS/ MSD Pairs	Trip Blanks	PES	Total
Soil	114	Geotechnical (Moisture/Organic content, Atterberg Limits, Particle Size, Compressive Strength, and CIU Triaxial)	0	0	0	0	0	114
Soil	10	Moisture Content	1	0	0	0	0	11
Soil	10	Mercury	1	0	1	0	0	12
Soil	10	PAHs	1	0	1	0	0	12
Soil	10	VOCs	1	0	1	1	0	13
IDW	5	TCLP Suite (VOCs, SVOCs, Pesticides, Herbicides, RCRA Metals), Total PCBs, Ignitability, Reactive Cyanide, Reactive Sulfide, Paint Filter Test, pH	0	0	0	0	0	5

[a] The sample collection procedures for field duplicates and field replicates are provided in **Section A.6** and **B-5.1 of the 2022 QAPP**.
DUPs-field duplicates.
IDW – Investigation derived waste
MS/MSD-matrix spike/matrix spike duplicate
PAHs-Polycyclic aromatic hydrocarbons
PES-Performance Evaluation Samples (obtained from GLLA QATS)
REPs-field replicates
VOCs-volatile organic compounds

Table 3A: Matrices, Parameter Groups, Sample Containers, Preservation, Handling Procedures, and Hold Times

Matrix	Parameter Group	Container [a,b]	Preservation[d]	Storage, Shipping and Handling	Hold Time
Soil [c]	Geotechnical Testing (Moisture Organic Atterberg Limits Particle Size Compressive Strength CIU Triaxial)	*Moisture, Organic, Atterberg Limits and Particle Size* – Cleaned glass jars with lids having a moisture seal. *Compressive Strength & CIU Triaxial* – New 3" diameter thinwall tubes with end caps.	No chemical preservation. Keep thinwall tubes in an upright position.	Keep samples above freezing.	NA
Soil	PAHs	4oz amber glass jar. (Fill jar full.)	No chemical preservation	Cool to 0-6°C.	Extraction within 14 days. Analysis within 40 days
Soil	Mercury	4oz plastic jar, unpreserved (Fill jar full.)	No chemical preservation	Cool to 0-6°C.	Analysis within 28 days
Soil	Percent Moisture	4oz amber glass jar.	No chemical preservation	Cool to 0-6°C.	Analysis within 7 days.
Soil	VOCs	3 x 40mL clear glass VOA vials (with stir bars)	1 x 5mL MeOH 2 x 5mL deionized (DI) water	VOA vials with DI water must be frozen within 48 hours. Cool to 0-6°C.	Analysis within 14 days.
Trip Blank (QC)	VOCs	3, 40-mL VOA	HCl to pH<2 SU	Cool to 0-6°C.	Analysis within 14 days.
IDW (solid)	TCLP VOCs	3, 9 oz amber glass jars	No chemical preservation	Cool to 0-6°C.	Extraction within 14 days. Analysis within 14 days.
	TCLP SVOCs				Extraction within 14 days. Prep within 7 days. Analysis within 40 days.
	TCLP Pesticides				Extraction within 14 days. Prep within 7 days. Analysis within 40 days. Hg: Extraction & prep within 28 days. Analysis within 28 days. Metals: Extraction within 180 days. Analysis within 180 days.
	TCLP Herbicides				
	TCLP RCRA Metals				
	Total PCBs				Extraction within 14 days. Analysis within 14 days.
	Ignitability				ASAP
	Reactive Cyanide				ASAP
	Reactive Sulfide				ASAP
	Paint Filter				NA
	pH				ASAP

[a] For field duplicates samples, double the sample volume is required to be shipped to the laboratory.

[b] For MS/MSD samples, triple the sample volume is required to be shipped to the laboratory. Due to volume restrictions for the cores, MS/MSD samples will not be collected at the same locations as the other field QC samples.
[c] The specific methods of analysis for the geotechnical tests are as follows:

Moisture Content	ASTM D2216
Organic Content	ASTM D2974
Atterberg Limits	ASTM D4318
Particle Size Analysis	ASTM D422
Compressive Strength	ASTM D2166
CIU Triaxial	ASTM D4767

[d] All VOC samples will be shipped on the same day as collection to meet the 48-hr hold time for preservation of solids that were field preserved with DI water.
DI-distilled water (ASTM Type II)
MeOH-methanol
PAH-polycyclic aromatic hydrocarbons
SU-standard units
TCLP-Toxicity Characteristic Leaching Procedure
VOC-volatile organic compounds

Table 3B: Matrices, Parameters, Analytical Methods, and Laboratory SOP References

Matrix	Parameter Group	Analytical Methods	Laboratory SOP Reference
Soil	Geotechnical Testing	ASTM D2216 ASTM D2974 ASTM D4318 ASTM D422 ASTM D2166 ASTM D4767	01-LAB-010 - Determination of Water (Moisture) Content in Soil (ASTM D2216, D4959 and D2974) 20-SOI-010 - Moisture and Organic Content of Soils by Ignition Furnace 01-LAB-030 - Standard Test Method for Liquid Limit - Plastic Limit and Plasticity Index of Soils (ASTM D4318) 01-LAB-050 - Particle Size Analysis of Soils (ASTM D422) 01-LAB-080 - Standard Test Method for Unconfined Compressive Strength of Cohesive Soil (ASTM D2166) 20-SOI-016 - Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils
Soil	PAHs	SW3546 (prep) SW8270E-SIM	ENV-SOP-GBAY-0077 v04_Microwave Extraction in Solids by Method 3546 ENV-SOP-GBAY-0157 v01_Determination of Semi-Volatile Organics by GC_MS SW846 8270E SIM
Soil	Mercury	SW7471A (prep and definitive)	ENV-SOP-GBAY-0013 v03_Determination of Mercury by CVAA-CETAC M-7500(7470A_7471B)
Soil	Percent Moisture	ASTM 2216	ENV-SOP-GBAY-0004 v04_Measurement of Percent Moisture in Soils and Solids
Soil	VOCs	SW5035 (field and prep) SW8260	ENV-SOP-GBAY-0053 v04_Preparation of Volatile Solids ENV-SOP-GBAY-0093 v05_Volatile Organics by GC_MS EPA 8260B
IDW (solid)	TCLP VOCs	SW1311 (ext) SW5030 (prep) SW8260D	ENV-SOP-GBAY-0043 v02_TCLP, SPLP and ASTM D3987-85 ENV-SOP-GBAY-0057 v02_Preparation of Aqueous Samples by SW846 5030B ENV-SOP-GBAY-0156 v01_Volatile Organics by GC_MS SW846 8260D
	TCLP SVOCs	SW1311 (ext) SW3510C (prep) SW8270E	ENV-SOP-GBAY-0043 v02_TCLP, SPLP and ASTM D3987-85 ENV-SOP-GBAY-0083 v05_Separatory Funnel Extraction by SW846 3510C ENV-SOP-GBAY-0155 v02_Semi-Volatile Organics by GC_MS SW846 8270E
	TCLP Pesticides	SW1311 (ext) SW3510C (prep) SW8081A	ENV-SOP-GBAY-0043 v02_TCLP, SPLP and ASTM D3987-85 ENV-SOP-GBAY-0083 v05_Separatory Funnel Extraction by SW846 3510C ENV-SOP-MTJL-0079 REV4 Pesticides by Gas Chromatography (EPA Methods 608, 8081A, 8081B, SM 6630C)
	TCLP Herbicides	SW1311 (ext) SW3510C (prep) SW8151	ENV-SOP-GBAY-0043 v02_TCLP, SPLP and ASTM D3987-85 ENV-SOP-GBAY-0083 v05_Separatory Funnel Extraction by SW846 3510C ENV-SOP-MTJL-0073 REV 4 Chlorinated Herbicides by Gas Chromatography (Methods 8151A, 615 & 1658)
	TCLP Metals	SW1311 (ext) SW3015A (prep) SW6010D or SW7470A (Hg)	ENV-SOP-GBAY-0043 v02_TCLP, SPLP and ASTM D3987-85 ENV-SOP-GBAY-0009 v03_Determination of Metals by ICP Spectroscopy by SW846 6010D & EPA 200.7
	Total PCBs	SW3541 (prep), cleanup, SW8082A	ENV-SOP-GBAY-0075 v02_Extraction of PCBs Using the Automated Soxhlet ENV-SOP-GBAY-0069 v02_Sulfuric Acid Clean-Up-38124-1 ENV-SOP-GBAY-0078 v01_Analysis of PCBs by GC SW846 8082A
	Ignitability	SW1030	ENV-SOP-BTRO-0076 v01_Ignitability by SW846 1030-51955-1 (1030)
	Reactive Cyanide	SW Chapter 7.3.3.2	ENV-SOP-SROS-0034 v01_Reactive Cyanide Sulfide-46122-1-1
	Reactive Sulfide	SW Chapter 7.3.4.2	ENV-SOP-SROS-0034 v01_Reactive Cyanide Sulfide-46122-1-1
	Paint Filter for Free Liquids	SW9095	ENV-SOP-GBAY-0026 v02_Free Liquid SW846 9095B
	pH	SW9045D	ENV-SOP-GBAY-0047 v02 pH in Water, Soil and Waste_SM 4500H+_9040C_9045D

ext = extraction

Table 4: Sample Locations (Cores, Depth, IDs), Parameter Group and Rationale

Matrix & Location	Estimated No. of Samples per Boring	Sampling Interval	Proposed Termination Depth [feet bgs]	Boring[a]	Para-meter Group[b]	Rationale
Soil (Geotechnical) Slips: -C Street, Land	24	2.5 feet to 30 feet depth, 5 feet from 30 feet to termination	85	GB-01	Moisture Organic Atterberg Limits Particle Size Compressive Strength CIU Triaxial	Obtain soil index and strength properties to support analysis of the existing north bulkhead shoreline
Soil (Geotechnical) Slips: -C Street, Land	24	2.5 feet to 30 feet depth, 5 feet from 30 feet to termination	85	GB-02	Moisture Organic Atterberg Limits Particle Size Compressive Strength CIU Triaxial	Obtain soil index and strength properties to support analysis of the existing north bulkhead shoreline
Soil (Geotechnical) Slips: -C Street, Land	24	2.5 feet to 30 feet depth, 5 feet from 30 feet to termination	85	GB-03	Moisture Organic Atterberg Limits Particle Size Compressive Strength CIU Triaxial	Obtain soil index and strength properties to support analysis of the existing north bulkhead shoreline
Soil (Geotechnical) Slips: -C Street, Land	24	2.5 feet to 30 feet depth, 5 feet from 30 feet to termination	85	GB-04	Moisture Organic Atterberg Limits Particle Size Compressive Strength CIU Triaxial	Obtain soil index and strength properties to support analysis of the existing north bulkhead shoreline
Soil (Geotechnical) Slips: -C Street, Land	18	2 feet to 20 feet depth, 5 feet from 20 feet to termination[c]	55	GB-05-E	Moisture Organic Atterberg Limits Particle Size Compressive Strength CIU Triaxial	Obtain soil index and strength properties to support analysis of the existing north bulkhead shoreline
Soil Slips: -C Street, Land	10	2-4 feet (bgs), above and below the groundwater table, bottom of the boring, and intervals with elevated PID readings, strong odor, product, and/or staining	55	GB-05-E	VOCs PAHs Mercury Percent Moisture	Evaluate concentrations of select COCs at the head of the C Street Slip
IDW	5	Composite/Grab	NA	Drummed Material	Disposal	Analysis for landfill required parameters

Note: "bgs" = below ground surface
[a] Borings GB-01 through GB-04 will be performed as geotechnical borings. Boring GB-05-E will be performed as a geotechnical boring with environmental sampling.
[b] Samples for geotechnical testing will be collected per procedures in Superior Slips Field Sampling Plan (FSP) Addendum 2 (AECOM, 2024)
[c] Sampling will be performed by advancing a split-spoon sampler 2 feet at 2-foot intervals to a depth of 20 feet

Table 5: Proposed Geotechnical Analysis

Laboratory Test	Test Method	Estimated Total Number of Geotechnical Tests	Estimated Testing Frequency[a]
Soil Moisture Content	ASTM D2216	114	24 per 85-foot boring location. 18 per 55-foot boring location.
Total Organic Content	ASTM D2974	5	One per boring location.
Atterberg Limits	ASTM D4318	10	Two per boring location.
Particle Size Distribution	ASTM D422	10	Two per boring location.
Unconfined Compressive Strength	ASTM D2166	8	Two per boring location, not including GB-05-E.
Soil Shear Strength (CIU Triaxial)	ASTM D4767	4	One per boring location, not including GB-05-E.

[a] Estimated laboratory testing subject to change based on encountered soil profile.

Attachments

Attachment A AET SOPs

Attachment B Pace SOPs