CLACKAMAS
WATER ENVIRONMENT SERVICES

GREGORY L. GEIST | DIRECTOR
Water Quality Protection
Surface Water Management
Wastewater Collection & Treatment

May 4, 2023 BCC Agenda Date/Item: _____

Board of County Commissioners
Acting as the governing body of Water Environment Services
Clackamas County

**Approval of an Amendment for Contract 6881 with Michels Trenchless, Inc. for Additional Scope for Early Work on the Tri-City Water Resources Recovery Facility Outfall Project. Amendment value is $453,536.60, contract value is increased to $2,158,083.60. Funding through Water Environment Services Construction Fund. No County General Funds are involved.**

| | | | |
|---|---|---|---|
| **Previous Board Action/Review** | · The BCC Public Hearing and Approval of a Resolution #2020-86 for Exemption and Authorization to use the Request for Proposals method to Obtain a Progressive Design Builder for the Tri-City Water Resources Recovery Project on December 17, 2020.<br>· Initial Contract (6881) presented at Issues on August 9, 2022, Contract signed on August 11, 2022.<br>· Amendment presented at Issues on May 2, 2023. | | |
| **Performance Clackamas** | · This project supports the WES Strategic Plan goal to provide properly functioning infrastructure that supports healthy streams and reduces flooding, by increasing hydraulic capacity of the new outfall and the diffuser dilution performance as they are important part of the new outfall design.<br>· This project supports the County Strategic Plan of building a strong infrastructure that delivers services to customers and honors, utilizes, promotes and invest in our national resources, by increasing capacity from 75 Million Gallons per Day (MGD) to meet the current and future capacity needs for the system. | | |
| **Counsel Review** | Yes | **Procurement Review** | Yes |
| **Contact Person** | Jeff Stallard | **Contact Phone** | 503-278-2311 |

**EXECUTIVE SUMMARY**:
This amendment makes two changes to Contract #6881 (Contract) with Michels Trenchless, Inc. (Design Builder): fixing an administrative error and adding additional work for pre-construction geotechnical services.

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The Contract not-to-exceed amount of $1,704,547.00 (NTE) captured the pre-construction and Phase 1 design services, but inadvertently omitted the agreed upon Design Builder Fee of 12.1%. An additional amount equal to $206,250.19 should have been included in the NTE amount for the Design Builder's Fee. This amendment corrects this administrative error by adding the Design Builder Fee to the Contract NTE.

During the conceptual design on the Tri-City Outfall, WES completed a preliminary geotechnical investigation along the preferred alignment. During the advancement of the design and permitting, additional geotechnical investigations have been identified as being necessary. The cost of the additional work amounts to $247,286.41. This additional investigation will provide WES with added details on underground geology and utilities, which will reduce the risk of the overall project during construction. In addition to reducing the project risk profile, a portion of this additional exploration will generate the information that ODOT requires for approval of tunneling underneath ODOT-owned roadways. This additional information will be included in the final permit application for ODOT's approval.

The cumulative total for this amendment is $453,536.60, which will bring the total Contract not-to-exceed amount to $2,158,083.60.

**RECOMMENDATION:** Staff recommends that the Board of County Commissioners of Clackamas County, acting as the governing body of Water Environment Services, approve the Amendment for Contract 6881 with Michels Trenchless, Inc. for additional scope for early work on the Tri-City WRRF Outfall Project.

Respectfully submitted,

Greg Geist
Director, WES

Attachment: Amendment #1 to Contract #6881

**AMENDMENT #1**
**TO THE CONTRACT DOCUMENTS WITH MICHELS TRENCHLESS, INC. FOR TRI-CITY WRRF OUTFALL PROJECT P632241**
**Contract #6881**

This Amendment #1 is entered into between **Michels Trenchless, Inc.** ("Design-Builder") and Water Environment Services ("Owner") and shall become part of the Contract documents entered into between both parties on **August 11, 2022** ("Contract").

The Purpose of this Amendment #1 is to make the following changes to the Contract:

1. **Assignment of Contract.** Effective August 29, 2022, Michels Trenchless, a Division of Michels Corporation formally merged with Michels Trenchless, Inc. As a result, all rights, responsibilities, and contractual obligations of Michels Trenchless, a Division of Michels Corporation, transferred to Design-Builder. The notice of merger is attached as **Exhibit C** and hereby incorporated by this reference herein. By execution of this Amendment #1, Design-Builder represents it has fully and unconditionally assumed all the obligations, liabilities, warranties, and responsibilities under this Contract. Design-Builder shall honor and continue to perform under the Contract, as amended. By execution of this Amendment #1, Owner hereby consents to the assignment and assumption of the Contract to Design-Builder in accordance with Article 9, Section 9.02 of the Contract.

2. **Article 1, Section 1.01 – General Description.** As the design of the Outfall has advanced from conceptual to 30%, Design-Builder has identified additional subsurface work that needs to be completed, including geotechnical borings to support the required ODOT permitting effort, as well as geophysical investigation. The purpose of this additional work is to obtain the ODOT permit required borings for crossing their infrastructure. In addition to this permitting support, this additional exploration will allow Owner and Design-Builder to further define the risks associated with tunneling of the pipeline. The Scope of Work for Phase 1 is hereby amended to add performance of the following Early Work preconstruction services:

   Design-Builder shall perform the Preconstruction Supplemental Geotechnical Investigation, as further described in **Exhibit D**, attached hereto and incorporated by this reference herein. Performance of the Supplemental Geotechnical Investigation shall be in accordance with Exhibit D and the terms and conditions of the Contract Documents.

3. **ARTICLE 3, Section 3.01(B) – Phase 1 Price** is hereby amended as follows:

   a. The Contract captured the cost of Phase 1 Work ($1,704,547.00) and authorized the Design-Builder's fee percentage (12.1%). However, due to an administrative error, the amount of the Design-Builder's fee of **$206,250.19** for the Phase 1 Work was not incorporated into the total not-to-exceed amount of the Contract. To correct this error and add the Design-Builder's approved fee for Phase 1 Work, the Contract's amount-not-to-exceed is hereby removed and replaced with an amount not exceed One Million Nine Hundred Ten Thousand Seven Hundred and Ninety-Seven Dollars and Nineteen Cents **($1,910,797.19)**.

   b. In consideration for Design-Builder performing the Preconstruction Supplemental Geotechnical Investigation (identified in Section 2 above) in accordance with the terms of the Contract Documents, Owner shall pay Design-Builder an amount not to exceed **$247,286.41** (the "Early Work Price"). The Early Work Price is on a fixed fee basis Payment of the Early Work Price will be in accordance with the terms of the Contract Documents. The total Contract amount not to exceed shall be **$2,158,083.60**, which incorporates the correction of the administrative error above and the addition of the Early Work Price.

| | |
|---|---|
| ORIGINAL CONTRACT | $ 1,704,547.00 |
| **AMENDMENT #1** | **$ 206,250.19 – Administrative Correction** |
| | **$ 247,286.41 – Early Work Price** |
| **TOTAL AMENDED CONTRACT** | **$ 2,158,083.60** |

Except as expressly amended above, all other terms and conditions of the Contract shall remain in full force and effect. By signature below, the parties agree to this Amendment #1, effective upon the date of the last signature below.

**Michels Trenchless, Inc.**

4-24-2023

Authorized Signature Date

Jeffrey Scott Wueller

Printed Name

**Water Environment Services**

Chair

Date

**Approved as to Form**

4/24/23

County Counsel Date

**Exhibit C**
**Name Change Notice**

MICHELS®

August 29, 2022

**Sent Via Email at jstallard@clackamas.us**

Clackamas County Water Environment Services
Attn: Jeff Stallard, Owner's Authorized Representative
150 Beavercreek Road
Oregon City, OR 97045

**Re: Notice of Contract Allocation**
**Contract #6881**

Dear Mr. Stallard:

Please consider this letter notice that, effective August 29, 2022, Michels Trenchless, formerly an operating division of Michels Corporation, merged with Michels Trenchless, Inc. This change aligns Michels Corporation's structure with similar contractors serving the industry and will permit Michels Trenchless, Inc. to best serve our customers' operational needs and regulatory requirements.

As you are aware, Michels Corporation, and Clackamas County Water Environment Services executed Contract #6881 dated August 11, 2022 (the "Agreement"). As part of this merger, Michels Corporation allocated the Agreement to Michels Trenchless, Inc. by operation of law.

Michels Corporation values Clackamas County Water Environment Services as a customer and Michels Trenchless, Inc. looks forward to continuing to work with you and honor its contractual obligations under the Agreement.

I have copied Genette Zubrod, Business Administration Manager (gzubrod@michels.us, 920.924.4300 ext. 7691). To ensure seamless invoicing and payment moving forward, **please provide Genette Zubrod any information necessary to set up Michels Trenchless, Inc. as a vendor.**

Sincerely,

Andrew Simon
Associate General Counsel
asimon@michels.us

cc: Craig Vandaelle, Vice President – Trenchless Preconstruction Services
Genette Zubrod, Business Administration Manager

**Exhibit D**
**Early Work Authorization Scope of Work and Fee Schedule**

DRAFT

AECOM

# Supplemental Geotechnical Investigation Work Plan

Tri-Cities Water Resource Recovery Facility (WRRF) Outfall

Prepared for:

Clackamas Water and Environmental Services

December 22, 2022

Delivering a better world

## Quality information

| Prepared by | Checked by | Approved by |
|---|---|---|
| Justin Juggert, EIT | Lance Finnefrock, PE, GE | Mathew Francis, PE |

## Revision History

| Revision | Revision date | Details | Authorized | Name | Position |
|---|---|---|---|---|---|
| 0 | 11/23/2022 | Initial draft | 11/23/2022 | M. Francis | PM |
| 1 | 12/22/2022 | Rev 1 (Jacobs' Comments) | 12/22/2022 | M. Francis | PM |

## Prepared for:

Jeff Stallard, PE
Capital Program Manager
Clackamas Water and Environmental Services
150 Beavercreek Road
Oregon City, Oregon 97045
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Email: jstallard@clackamas.us

## Prepared by:

AECOM
888 SW 5th Avenue
Suite 600
Portland, OR
aecom.com

# Table of Contents



# Tables



# Figures

# Acronyms and Abbreviations

| | |
|---|---|
| FRP | Fiber reinforced polymer |
| GDM | Geotechnical Design Manual |
| GDR | Geotechnical Data Report |
| GPR | Ground Penetrating Radar |
| HASP | Health and Safety Plan |
| HSA | hollow stem auger |
| ID | Inside Diameter |
| IWP | Investigation Work Plan |
| MASW | multi-channel analysis of surface wave |
| MSW | Municipal Solid Waste |
| NTP | Notice to Proceed |
| OD | Outside Diameter |
| ODOT | Oregon Department of Transportation |
| QMS | Quality Management System |
| RFP | Request for Proposal |
| ROE | Rights of Entry |
| SRT | Seismic Refraction Tomography |
| TBM | Tunnel Boring Machine |
| THA | Task Hazard Assesment |
| TSUP | Temporary Street Use Permit |
| Work Plan | Investigation Work Plan |
| WES | Water Environment Services |
| WRRF | Water Resource Recovery Faciity |

# 1. Introduction

Michels/AECOM team has been contracted to design the Tri-Cities Water Resource Recovery Facility (WRRF) Outfall project in Oregon City, Oregon. The project is a progressive design-build delivery for Clackamas Water Environment Services (WES), who has retained Jacobs Engineering (Jacobs) as the Owner's Engineer. The Design Build Team is led by Michels who is serving as the prime firm and construction contractor, with Michels/AECOM team subcontracted as the lead design firm.

The project includes an approximately 2,500-foot-long open-cut trench section beginning at an existing 72-inch stub-out pipe near the WRRF facility. The remainder of the outfall consists of an approximately 2,200-foot-long trenchless installation. The carrier pipe for the full alignment will consist of 90-inch inside diameter (ID) pipe. The open-cut section carrier pipe will be fiber-reinforced polymer (FRP) pipe.

The Design-Build Team has evaluated the tunnel alignment/profile included in the request for proposal (RFP), as well as several alternative alignment/profile options to optimize trenchless construction cost and risk. Two tunnel construction options, Option 1 and Option 2, have been advanced forward for detailed analysis, one of which will be selected as the preferred option for final design and construction. The alignment for both options is the same, while the profile is generally similar except at and west of highway 99E. The options are briefly summarized below:

- Option 1 would consist of a 122.5-inch-diameter tunnel excavation by an earth pressure balance tunnel boring machine (EPB-TBM) method. The installation would be two-pass where an initial tunnel liner (i.e., ring beams and lagging) would be erected immediately behind the TBM to support the excavated tunnel. After tunnel excavation is completed, the 90-inch ID FRP carrier pipe would be placed in the tunnel and the annulus between the initial liner and carrier pipe would be grouted full.
- Option 2 would consist of a 111-inch-diameter tunnel excavation by micro-tunnel boring machine (MTBM) method. The installation would be one-pass where the 108.5-inch outside diameter (OD) / 90-inch ID carrier pipe is jacked into place immediately behind the MTBM. Flow-crete™ jacking pipe (fiberglass-line reinforced concrete pipe) is proposed for the Option 2 trenchless section.

The Design-Build Team's proposal authorized by WES did not include supplemental geotechnical investigation, and instead proposed to rely on the geotechnical data contained in the RFP and other historical geotechnical data near the project alignment. However, during development of the two leading tunnel design options, design and construction challenges and stakeholder requirements have been identified by the project team that warrant additional geotechnical investigation. A summary of these issues is provided below.

1. ODOT Crossings: Proposed tunnel alignments cross Oregon Department of Transportation (ODOT) highway 99E, the southbound off-ramp to I-205, and the southbound on-ramp to I-205. Michels/AECOM team has engaged in ongoing correspondence with ODOT representatives to clarify requirements for geotechnical investigations and construction requirements for trenchless crossings under ODOT roadways. ODOT has indicated that geotechnical investigations need to meet the requirements of Chapter 17, *Culverts, and Trenchless Technology Design* of the ODOT Geotechnical Design Manual (GDM), and that additional geotechnical investigation is required beyond the RFP borings. Michels/AECOM team believes that incorporation of the Shannon and Wilson (2021) geotechnical data prepared for the adjacent I-205 Bridge Upgrade project may provide adequate data for the I-205 on-ramp and off-ramp crossings (subject to ODOT review), but at least one supplemental geotechnical boring will likely be required on the tunnel alignment at 99E (preferably on the west side) to meet ODOT requirements. The Michels/AECOM team will continue coordination with ODOT for concurrence on supplemental borings and boring locations.

2. Main Street Conflicts: The presence of congested utilities and existing structures through the Main Street corridor will require ground improvement and/or underpinning of adjacent structures, and installation of a temporary or permanent sanitary sewer bypass will be necessary. This is a key location for analysis, and a supplemental geotechnical boring in this area (near the existing garage, sanitary manhole, and proposed sanitary diversion alignment) would allow confirmation of foundation conditions and refinement of mitigation alternatives to reduce project risk.

3. Outfall Riverbank Seismic Performance: Potential poor seismic performance (liquefaction triggering and strength loss, slope instability and/or deformation, etc.) is predicted for the design earthquake event. This is based on preliminary simplified seismic analyses by Michels/AECOM team (i.e., liquefaction triggering and strength loss, post-earthquake slope stability, and seismic deformation). Supplemental geophysical survey near the riverbank would allow confirmation of shear wave velocity necessary to determine seismic site class and ground motion amplification factors and allow completion of more sophisticated seismic analyses (e.g., finite element method) to better define seismic performance and reduce conservatism.

4. Landfill Waste Limits: Most of the open-cut alignment will traverse the Unpermitted Rossman Landfill. Available geotechnical borings indicate the municipal solid waste (MSW) extends to depths of more than 30 feet below ground surface (bgs) which is more than 15 feet below the proposed pipeline invert. Historical data and on-site surface observations indicate the lateral limits of the MSW extend under and beyond Agnes Road. The RFP design proposed a deep-foundation-supported pipeline in the open-cut alignment using helical piles that bypass the MSW and derive support in underlying natural soils to mitigate the risk of excessive settlement caused by continued MSW decomposition. The Design-Build Team is evaluating the pile-supported (micropile and helical piles) option in the RFP, as well as an alternative option that would include overexcavation of MSW and replacement with compacted fill under the pipeline. The vertical and lateral extents of MSW is a significant driver of costs for both the pile-supported pipeline and overexcavation/ replacement options. Supplemental geophysical survey, and/or geo-probes/test pits along the open-cut alignment may allow refinement of the extents of MSW and related costs for both options. Additionally, the supplemental geophysical investigation would improve seismic characterization of the MSW and natural soil units along the open-cut alignment and may permit more economical and less conservative design for pile-supported pipeline and/or overexcavation / replacement options.

Several of these issues were discussed preliminarily with WES during workshop meetings held in November 2022. WES requested the Design-Build Team to submit a change order proposal for a supplemental geotechnical investigation to address the issues described above.

The purpose of this Investigation Work Plan (IWP) is to provide formal documentation of the proposed methods and procedures that will be implemented by Michels/AECOM team and its subcontractors during performance of the proposed supplemental geotechnical investigation.

# 2. Scope of Services

Michels/AECOM team proposes to perform the supplemental geotechnical investigation Scope of Work (SOW) as a series of tasks which may be broadly categorized as follows:

1. Project Management and Permitting.
2. Geotechnical Drilling Investigation.
3. Geophysical Investigation.
4. Laboratory Testing; and
5. Geotechnical Data Report.

Details of each task are provided in the following sections. Work performed will comply with Michels/AECOM team's Quality Management System (QMS) to implement quality assurance and quality control principles.

## 2.1 Task 1 – Project Management and Permitting

This task covers supplemental project management duties such as contract approvals, subcontractor procurement and management, invoicing, stakeholder coordination, and day-to-day project management and communication tasks.

This task also includes supplemental permitting activities required to obtain permission for the proposed field geotechnical investigation. Based on review of the proposed investigation locations and tax lot numbers, permits or rights of entry (ROE) will need to be secured from the following stakeholders at minimum:

- ODOT
- Oregon City Parks
- Clackamas County
- Several private properties belonging to Cherry Holdings, LLC along the open-cut alignment:

Temporary construction easements will be needed for a parcel with Hamilton's Appliance Warehouse and another adjacent and undeveloped property to the north due to encroachment from the sewer placement and construction.

This task also includes supplemental coordination with ODOT, and Kiewit involved in the adjacent construction of the I-205 Bridge Upgrades Project for access.

## 2.2 Task 2 – Geotechnical Drilling Investigation

Michels/AECOM team proposes to conduct a geotechnical investigation program to meet the additional requirements discussed previously. The proposed scope of the investigation is discussed in the following subsections.

### 2.2.1 Task 2a. Planning

In accordance with Michels/AECOM team corporate safety policies, this subtask includes updating the project-specific Health and Safety Plan (HASP). The current HASP prepared for proposed environmental investigations at the site will be updated to address task hazard assessments (THA) and other necessary information related to proposed geotechnical and geophysical scopes of work.

The subtask also includes preparation of a field investigation work plan (IWP) to address proposed drilling and sampling methods, permits and ROE, required notifications and points of contact, traffic control, and other necessary information. A draft IWP will be submitted to WES/Jacobs for review and comment in PDF format. A final IWP will be prepared to incorporate review comments received from WES/Jacobs.

### 2.2.2 Task 2b. Utility Clearance and Drill Site Preparation

This subtask includes marking proposed boring and geophysical survey locations, clearing for buried utilities and surface/overhead obstructions, and preparing the area for geotechnical investigation. The components of this task are described below.

- ***Site Reconnaissance.*** Michels/AECOM team staff will visit the site to stake boring locations for utility clearance, identify site constraints, and plan site access for drilling equipment. Michels/AECOM team will locate borings using a hand-held GPS unit and modify locations as needed for access.

- ***Utility Clearance.*** Michels/AECOM team will contact Oregon 811 at least 72 hours before mobilization in accordance with State law. Michels/AECOM team will also subcontract a private utility locator to mark and clear utilities at each proposed borehole location using radiofrequency detection methods for conductible utilities and/or ground penetrating radar (GPR) methods for non-conductible utilities. Michels/AECOM team staff will accompany the private utility locator during utility clearance activities. Available as-built plans of underground utilities to be used to aid in clearing boring locations.

- ***Survey.*** The proposed boring locations will be surveyed prior to drilling by a licensed surveyor subcontracted to Michels/AECOM team. The purpose of the survey is to ensure that the borings are drilled at a suitable offset from the proposed tunnel alignment (i.e., 10 feet or greater) to avoid potential conflicts during construction, particularly for boring SB-01-22 where the work area is constrained and close to the alignment. The surveyed locations and nearby section tunnel alignment will be clearly marked using stakes or other survey markers for reference during subsequent drilling.

- ***Soft Dig.*** Michels/AECOM team will employ “soft dig” methods in the upper 5 feet of each borehole to minimize the risk of inadvertent utility strikes. In areas with low density of marked utilities, hand auger methods may be suitable. In areas with high density of marked utilities and/or critical utilities, Michels/AECOM team will subcontract a drilling firm to perform non-mechanical vacuum excavation (with or without air knife) to excavate the first 5 feet of each boring. The air knife holes will be filled temporarily with hydrated bentonite chips and clearly marked for subsequent drilling to avoid leaving open holes at the site. Michels/AECOM team staff will accompany the drilling firm on-site during air knife / vacuum excavation pre-clearance to log the subsurface materials encountered and to collect grab samples for subsequent lab testing, if necessary.

This proposal includes budget for a 1-day site reconnaissance with utility locating by Michels/AECOM team staff (maximum 6 hours on-site). Proposed Michels/AECOM team field oversight for the air knife / vacuum excavation work is 1 day.

### 2.2.3 Task 2c. Geotechnical Borings

The proposed geotechnical borings are summarized in **Table 1** below. A plan of the proposed boring locations is provided in **Figure 1** and **Figure 2**. The purposes of the borings are to address items listed in the "background" section of this proposal.

Michels/AECOM team will provide full-time oversight of the field investigation program by a geotechnical engineer or geologist to coordinate activities with facility personnel and to modify the field investigation program, if necessary, based on the encountered subsurface conditions. Michels/AECOM team staff will log borings, direct soil sampling, and collect package samples for transport to the geotechnical and analytical testing laboratories.

Michels/AECOM team has budgeted for a maximum of three (3) days to provide on-site field drilling and sampling oversight.

**Table 1. Summary of Proposed Geotechnical Borings**

| Boring ID | General Location | Plan Depth (feet bgs) | Drilling Method | Sampling Methods | Installs |
|---|---|---|---|---|---|
| SB-01-22 | Hwy 99E | 100 | Roto-sonic (20-ft runs) | Sonic core, SPT / Mod Cal every 20 feet | VW Piezometer |
| SB-02-22 | Main St | 70 | Roto-sonic (20-ft runs) | Sonic core, SPT / Mod Cal every 20 feet | None |

Borings will be advanced to the planned depths listed in Table 1. The planned depths are to accommodate the case where the tunnel profile may need lowering for any reason; we will have the geotechnical information to dictate design; and for determining load bearing strata suitable for deep foundations that will underpin existing structures/utilities. The depth of borings (100' and 70') was selected to terminate well into the anticipated depth of gravel alluvium. This will allow confirmation of stratigraphic contact elevations, evaluation of cobbles/boulders frequency, and collection of bulk samples for lab gradation testing. Michels/AECOM team reserves the right to modify borings depth based on actual subsurface conditions encountered in the field. Groundwater levels encountered at the time of drilling and at the end of drilling will be measured using an electronic water level indicator.

The borings will be advanced using roto-sonic drilling methods in continuous 20-foot runs. Sonic core samples will be placed into wooden core boxes for storage and subsequent review / observation. Split-spoon sampling and Standard Penetration Testing (SPT, ASTM D1586) will be conducted at 20-foot intervals in between sonic core runs. Large Penetration Testing (LPT, ASTM D3550) will be conducted in lieu of SPT in gravelly soils using Modified California samplers each with three 6-inch brass or stainless-

steel liners. A 140-pound auto-hammer will be used to drive both SPT and LPT samples. Blow-counts will be recorded on a per-inch basis in gravelly soils to permit the use of gravel corrections.

Neither of the geotechnical borings are located within the limits of the Unpermitted Rossman Landfill, and Michels/AECOM team is not aware of any previous site usage that would suggest potential contaminated soil/groundwater conditions. Therefore, Michels/AECOM team has assumed that contaminated soils/groundwater will not be encountered during the field investigation, and contaminated soil/groundwater protocols will not be required (e.g., containerization/testing of investigation derived waste, decontamination, etc.). However, due to the known potential for methane in the formation, a 4-gas meter will be used at every rig for early detection purposes. The Michels/AECOM team will notify WES and Jacobs if contaminated soils or groundwater are encountered, and proposed measures will be discussed.

After reaching borehole termination depth, water levels and/or cave-in depth will be measured using a water level indicator. Geotechnical boring SB-01-22 will be completed as a vibrating wire piezometer (VWP), as discussed in the next section. Geotechnical boring SB-02-22 will be backfilled upon completion using bentonite chips capped with surficial soils in accordance with local and state regulations. Investigation-derived waste (cuttings, grout, etc.) will be spread level on the ground surface at each boring location.

Approximate as-drilled boring location coordinates, if different from initial surveyed locations, will be established by Michels/AECOM team using measured offset and direction hand-held GPS unit providing a horizontal accuracy of ±15 feet and a vertical accuracy of ±1 feet. Boring locations will be clearly marked for subsequent surveying by others if greater accuracy is required.

### 2.2.4 Task 2d. Option to Add: Geotechnical Geo-Probing Along Open-Cut Alignment

Eight, 45-foot-deep geo-probes will be hydraulically direct-pushed into the ground at field-determined intervals along the open-cut alignment. To help assess open-cut standup time, the samples will be field tested for shear strength using the pocket shear vane (torvane) and unconfined compressive strength with a pocket penetrometer; and the 45-foot depth with help ascertaining the extents of the MSW and calibrate the geophysics and to ultimately assist in bearing design for deep foundations.

All probes will be backfilled upon completion using bentonite chips capped with a lean grout in accordance with local and state regulations. Investigation-derived waste (cuttings, grout, etc.) will be properly tested, treated, and disposed of.

Geoprobing is anticipated to be along the shoulder of Agnes Rd. Accordingly, Michels/AECOM team anticipates the need for traffic control for the full duration of the probing (approximately 3 days), which will likely include signage and a full-time flagger.

Approximate boring location coordinates will be established by Michels/AECOM team using hand-held GPS unit providing a horizontal accuracy of ±5 feet and a vertical accuracy of ±1 feet. Probing locations will be clearly marked for subsequent surveying by others if greater accuracy is required.

### 2.2.5 Task 2e. Option to Add: Geotechnical Test Pits Along Open-Cut Alignment

As an alternative to the above-prescribed geoprobing, test pits could be excavated using either a standard, rubber-tire backhoe, or a track-mounted excavator. Approximate locations are shown in Figure 4 but will be adjusted as necessary in the field. Test pit depths, lengths, and wall slopes will be determined by field conditions but tentatively based on an 8’ x 5’ x (TBD-as deep as possible for excavator)’ dimension. Where deeper than 4 feet, the test pits will be logged from the surface as they are excavated visually and with cameras, unless the pit walls are sloped to be stable and allow entry.

A test pit log will be completed for each test pit and the test pit walls, spoils, and samples will be photographed. The subsurface conditions observed in the test pit will be described on the log, including soil characteristics (e.g., texture, color, consistency, pedogenic features), locations of soil horizons and stratigraphic contacts, sample locations, groundwater level, excavation conditions (e.g., caving), and any other relevant data.

Detailed observation and documentation of the roadway and embankment slope above the test pit excavations will be conducted and marking of existing cracks in the roadway and slope will be performed prior to the onset of excavation. Close observation of the marked features and the slope above the test pits, will be performed throughout the excavation, sampling and backfill process.

No test pits are proposed at the toe of any roadway transverse slopes, where progressive erosion hazards are likely. Progressive erosion materials are not required to be on-site during the test pit excavations on the upstream shell.

Bulk samples of excavated materials from the test pits will be collected either in plastic bags or 5-gallon plastic buckets. These samples will be labeled with project number, test pit number, and sample number and depth.

Excavating into the MSW will require extensive DEQ permitting effort (and time) before they can commence. DEQ will likely not allowed excavated spoils to be put back into the trench; they may need to be hauled off and, subsequently backfilled with a suitable borrow source. The added permitting effort, haul off/disposal and backfilling are included herein.

### 2.2.6 Task 2f. Vibrating Wire Piezometer

Two (2) vibrating wire piezometer (VWP) transducer are planned to be installed in boring SB-01-22. The purpose of the VWP is to measure groundwater levels and fluctuations over time along the tunnel alignment, which play a significant role in tunnel construction method selection and ground behavior. Boring SB-01-22 is a key location for groundwater data: it is adjacent to the Highway 99E tunnel crossing where settlement tolerances are critical, and about 200 feet east of the Willamette Riverbank outfall area where slope stability is important and groundwater levels may be more strongly influenced by changes in the river water surface elevation. Accordingly, one will be in the tunnel horizon to assess pore pressures for tunneling, and one will be at a depth corresponding to the mid-slope elevation of the Willamette Riverbank to assess slope stability.

The nearest existing piezometers to boring SB-01-22 are the RFP monitoring well in TCO-B-07 (located about 1,800 feet east and along the proposed tunnel alignment), and VWPs installed in borings TB19786-001, TB19786-030b, and TB19786-032 for the adjacent I-205 Bridge Upgrade Project (located about 400 feet south of the alignment on the opposite side of I-205). Significant differences and fluctuations in groundwater levels are indicated in each of the ODOT VWPs, ranging from a minimum of Elevation (El.) +5 feet to a maximum elevation of El. +18 feet over the reading period of 2017 to 2020. For reference, the proposed tunnel invert at the proposed location of SB-01-22 is about El. +5 feet for Option 1 and El. -2 feet for Option 2. Groundwater levels in existing nearby piezometers may or may not be representative of long-term groundwater conditions near SB-01-22 and the project tunnel alignment.

Coordination with ODOT and Kiewit will be required to confirm the feasibility of installing the VWP in an area that will not be disturbed/damaged during construction of the adjacent I-205 Bridge Upgrade. The currently planned location for SB-01-22 is a temporary staging area for Kiewit with limited construction traffic.

The VWP will be procured by Michels/AECOM team. The VWP model will be a Durham Geo-Slope Indicator (DGSI) 0.75-inch OD 100-psi transducer. The VWP will be installed with VW Minilogger recording devices to continuously measure groundwater levels. One (1) minilogger will be provided in each borehole (i.e., one per VWP transducer). Two D-cell batteries, a serial-to-USB cable, a laptop computer, and DGSI's Logger Manager software will be required to operate the VW minilogger and conduct the zero reading. Desiccant packets, socket wrench, mini-screwdriver set, and 0.75-inch Sch 40 PVC pipe are also needed to complete the installation.

Zero readings for the VWPs will be taken prior to installation using the VW Minilogger in accordance with the DGSI *VW Piezometer Manual (52611099)* included in **Appendix A**. The VWP filter tip will be saturated (filled with water) in the field immediately before installation. The VWP will be mounted inverted (filter side up) on the outside of a 0.75-inch PVC solid casing pipe riser extending the full depth of the borehole using zip ties and electrical tape, and installed in accordance with **Appendix A**. The mounting depth of the VWP transducer will be determined by the engineer immediately following completion of drilling/sampling in consultation with the Field Representative. The VWP transducer cable will be taped to the PVC riser at 5-foot vertical intervals with a small amount of slack and extend to the ground surface. The borehole annular space around the PVC riser pipe and VWP will be tremie-grouted in place from the bottom up to within 2 feet of ground surface using a manufacturer-recommended grout mix. The interior of the PVC riser pipe shall also be grouted full. Tremie-grouting may be performed with the PVC riser, or a separate tremie pipe. The extra length of the VWP cable shall be protected at the ground surface until grout cures.

A 2-foot-thick concrete surface seal will be installed in conjunction with the preferred surface enclosure. The type of surface enclosure (i.e., flush-mount manhole or stick-up enclosure) will be dependent on planned restoration for the area associated with the adjacent I-205 project and will be determined in conjunction with ODOT and Kiewit staff. For budgeting purposes, the surface completion will consist of a stick-up type of enclosure (to be confirmed jointly by Kiewit and ODOT) consisting of a minimum 6-inch diameter painted steel pipe with locking cover large enough to fit the VW miniloggers inside. A 2-foot-thick concrete surface seal, 2-foot by 2-foot by 0.5-foot concrete pad, and with three (3) protective bollards will be installed at each location to secure and protect the enclosure. The VWP cable will be routed through the stick-up casing, and the interior of the stick-up casing will be filled with filter sand to a height of 12 inches below the top of the casing. The excess VWP cable length and VW minilogger will rest on top of the filter sand surface for future access and monitoring.

Following installation of the surface completion, the VW Minilogger will be connected to the VWP cable and operated in accordance with the Slope Indicator *VW Minilogger Manual (52613399)* included in **Appendix B**. The DGSI Logger Manager software will be used to program each VW minilogger, and will be used in future monitoring events to download data to laptop computer, according to **Appendix C**. In general, the VW Miniloggers should be set to collect a groundwater reading every 3 or 6 hours. The date and time should also be synced to match the laptop computer so that accurate date/time is paired to each VWP reading. VW Miniloggers will be furnished by Michels/AECOM team. One or more desiccant packets will be installed in each VW minilogger to minimize moisture buildup that can cause malfunction of the unit.

### 2.2.7 Task 2g. Data Processing

This task includes data processing of field data obtained during the drilling investigation and quality control (QC) review. This will include preparation of electronic boring logs (gINT software), preparation of sample photo logs, data reduction for VWP, and updates to existing boring location plan figures and subsurface profile drawings.

## 2.3 Task 3 – Geophysical Investigation

Michels/AECOM team proposes to conduct a geophysical investigation program to meet additional data needs discussed previously in the "background" section of this proposal. The geophysical investigation will consist of non-invasive, surface-based seismic survey methods. The survey methods will employ a linear array of sensors (geophones) connected by cables at the ground surface. A seismic source "shot" is deployed at the ground surface (e.g., typically a sledgehammer striking a steel plate set on the ground surface), and the geophones detect the propagation of the seismic waves through the subsurface. The seismic source shot is repeated at various geophone spacing. Following completion of the field survey, the data will be post-processed to obtain wave velocity values and/or profiles that can be used to infer geologic stratigraphy and correlate with engineering properties.

The proposed locations are listed in **Table 2** below. Discussion of the geophysical scope is provided in the following sections.

**Table 2. Summary of Proposed Geophysical Investigation**

| Array ID | General Location | Array Length (LF) | Method |
|---|---|---|---|
| MASW-01-22 | Landfill | 2,400 | 2D MASW |
| SRT-01-22 | Landfill | 2,400 | 2D SRT |
| MASW-02-22 | Riverbank | 350 | 1D MASW |

### 2.3.1 Task 3a. Riverbank Geophysical Survey

A plan of the proposed geophysical survey array at the at the outfall location near the bank of the Willamette River is provided in **Figure 1**. The geophysical array will be performed using the multi-channel analysis of surface wave (MASW) method to produce a one-dimensional (1D) profile of shear wave velocity (Vs) versus depth. A minimum 350-foot-long array is preferred to obtain the required survey depth and resolution.

The 1D MASW data will be used to determine the depth-weighted average shear wave velocity in the upper 100 meters of the site (Vs30) used for seismic site classification. This data will also be used to evaluate liquefaction triggering and associated potential strength loss for seismic stability calculations at the outfall area, particularly for the Gravel Alluvium in which SPT-based methods are unreliable and CPT-based methods are not practical.

### 2.3.2 Task 3b. Landfill Geophysical Survey

A plan of the proposed geophysical survey array at the Unpermitted Rossman Landfill is provided in **Figure 2** and **Figure 3**. The geophysical investigation will be performed using two different methods as follows:

1. MASW to obtain a two-dimensional (2D) contour profile of Vs along the array; and

2. Seismic Refraction Tomography (SRT) to obtain a 2D contour profile of compression wave velocity (Vp) along the array.

The target survey depth and resolution are approximately 50 feet below ground surface, which will require the ends of the array to extend slightly beyond the anticipated waste limits (considered in planned array length). To provide a continuous profile along the 2,400-foot-long alignment, the survey will need to be performed as a series of end-to-end arrays. The survey array will mostly be conducted in the narrow north-side shoulder of Agnes Road but will be required to cross several active driveways as well as a full crossing of Agnes Road near the curve leading to Main Street. The end-to-end arrays will be configured to always maintain at least 1 lane of open traffic. Accordingly, Michels/AECOM team anticipates the need for traffic control for the full duration of the landfill survey (approximately 3 days), which will likely include signage and a full-time flagger.

The data from the MASW and SRT will be post-processed in the office after completion of field work. The generated plots from the two methods will be compared to identify anomalies that may be indicative of the contacts between MSW and natural soils and clean fill, which will be used to develop an interpretive profile of the estimated limits of the MSW along the survey array. It is noted that the success of this method generally requires a density contrast between the MSW and other geologic materials. If the density is similar between materials, the survey results may be inconclusive.

### 2.3.3 Task 3c. Geophysical Report

A single geophysical report will be prepared to discuss the field survey methods, present post-processed data results, and provide interpretations and conclusions regarding the findings. The geophysical report will be reviewed by an Michels/AECOM team senior geophysicist and will be included as an appendix to the Geotechnical Data Report.

## 2.4 Task 4 – Laboratory Testing

The samples recovered from the geotechnical borings will be transported to Michels/AECOM team's warehouse in Portland, Oregon for further classification/review and storage. Select samples will be shipped to Michels/AECOM team's Anaheim, CA geotechnical laboratory for testing. External subconsultant laboratories may also be used depending on the type of testing required. The actual scope of laboratory testing will be determined based on soil types encountered, but is anticipated to include the following test methods:

- Strength:
    - SPT-N (ASTM D1586)
    - Hand Pocket Penetrometer
- Index tests:
    - Moisture content (ASTM D2216)
    - Natural density (ASTM D7263)
    - Atterberg limits (ASTM D4318)
    - Sieve analysis (ASTM D6913)
    - Hydrometer analysis (ASTM D7928)
    - Percent passing the No. 200 sieve (ASTM D1140)
    - Organic content (ASTM D2974)
- Corrosion potential tests:

    - pH (ASTM G51)
    - Sulfates (ASTM D4327/C1580)
    - Chlorides (ASTM D4327)
    - Electrical Resistivity (ASTM G57)
- Abrasivity testing – For individual clasts of Gravel Alluvium (by subconsultant):
    - CERCHAR Abrasivity Index (ASTM D7625)
    - Mohs Hardness
    - Miller Test. Miller test to determine the Slurry Abrasivity (Miller Number) and the Slurry Abrasion Response (SAR Number).

Data processing activities associated with this task will include updating electronic logs of borings with lab results, tabulating laboratory test results, and generating data plots.

## 2.5 Task 5 – Geotechnical Data Report

Michels/AECOM team will prepare a Geotechnical Data Report (GDR) following completion of the prior tasks. The GDR will present information obtained from the field and laboratory investigation and summarize the ground conditions encountered. Consistent with industry standard practice, the GDR will not contain detailed geologic or geotechnical interpretation of subsurface conditions; these will be provided in a separate report authorized under the current existing scope of services.

In general, the GDR will address the following as applicable:

- Project information / background
- Discussion of general site geology, topography, faulting, and seismicity
- Discussion of field and laboratory methods employed
- Discussion of generalized site stratigraphy and groundwater conditions encountered
- Summary of laboratory test results
- Geophysical data report and interpretations
- Figures / Appendices
    - Aerial plan of boring locations
    - Fence diagram containing abbreviated “stick” boring logs
    - Formal logs of borings
    - Laboratory test results

The GDR will be prepared under the supervision of a licensed Professional Engineer in the State of Oregon experienced in geotechnical engineering. Michels/AECOM team will issue a draft GDR for review and comment in electronic format (PDF). Following receipt and incorporation of comments provided by WES/Jacobs, the final signed and sealed GDR will be submitted electronically. The GDR will not include detailed summary of previous investigations for this project or other nearby projects.

# 3. Schedule

Michels/AECOM team has assumed that standard hours of operation (Monday-Friday, 7:00 am – 6:00 pm) will apply to work at all areas of the site, with no schedule restrictions. This will be verified with the varying permitting once final design layouts for the structures have been established by CSRM.

Michels/AECOM team can begin preliminary analysis and safety planning aspects of the work within 1 week upon receipt of written Notice to Proceed (NTP). Field work can begin as early as 3 weeks from NTP depending on driller availability and the time required for obtaining permits / ROE. Based on current driller availability and estimated permitting durations, the earliest mobilization to the site is expected to be January 16, 2022, assuming NTP is received in early December.

Michels/AECOM team has assumed the drilling and probing work can be performed in a single mobilization, and that the geophysical work can be performed in a single mobilization. On-site duration for geotechnical drilling/probing/test pits and geophysical investigation is 3 (each- drilling and probing) and 4 days, respectively. The drilling, probing, test-pits and geophysical work may occur concurrently or separately depending on available resources.

Geotechnical laboratory testing is expected to take approximately 4 to 5 weeks following the completion of drilling based on current backlog. A draft GDR will be issued to WES/Jacobs within 3 weeks following completion of laboratory testing. The final stamped GDR will be issued within 1 to 2 weeks following receipt of WES/Jacobs comments.

Please note the schedule is dependent upon subcontractor availability, weather conditions, and other circumstances which may be beyond Michels/AECOM team's reasonable control. If delays are anticipated, Michels/AECOM team will immediately alert Michels staff.

# 4. Estimated Fee

Michels/AECOM team will perform the supplemental scope of work on a Firm Fixed Price (FFP) basis for an amount not to exceed the amount listed in **Table 3**. The cost presented in **Table 3** is additional to the value of the current FFP work order. The work will be conducted according to the terms and conditions of our current agreement with Michels for this project. A detailed breakdown of the fee is provided in Attachment A.

The FFP fee will be effective if this proposal is accepted by Michels within 60 days of the date of this proposal due to the current instability in commodity costs and subcontractor pricing. Our services will be invoiced monthly based upon the actual number of units used at the corresponding unit rates.

**Table 3. Summary of Additional Fees**

| Description | AECOM Labor | ODCs | Subs | Line Total |
|---|---|---|---|---|
| Task 1 – Project Management and Permitting | $9,618 | $- | $- | $9,618 |
| Task 2 – Geotechnical Drilling Investigation | $19,285 | $3,605 | $34,137 | $57,026 |
| Task 2 – Option 2d.Add.1 Geoprobing | | | | $25,000 |
| Task 2. –Option 2e Add 2. Test Pit Excavations | | | | $35,000 |
| Task 3 – Geophysical Investigation | $17,246 | $5,513 | $4,364 | $27,123 |
| Task 6 – Laboratory Testing | $4,820 | $12,000 | $- | $16,820 |
| Task 7 – Geotechnical Data Report | $13,120 | $- | $- | $13,120 |
| **Category Subtotal** | **$64,089** | **$21,118** | **$38,501** | **$183,707** |
| | | | | |
| | | | | |

# 5. Assumptions

Several assumptions have been made in developing this estimate and, if not valid, may constitute a change in scope requiring an adjustment in the project cost and schedule. These assumptions are:

- Michels/AECOM team will conduct Oregon 811 notifications in accordance with state law at least 48 hours prior to mobilization. This proposal includes budget for soft-dig methods (i.e., air knife and vacuum) in the upper 5 feet of each boring to identify potential unmarked utility locations.
- Work in all areas can proceed during normal working hours (Monday-Sunday, 7:00 am to 6:00 pm) and there will be no delay in obtaining access via permits and ROE agreements.
- Michels/AECOM team takes no responsibility for any underground or buried structures, such as foundations, wells, septic systems, holding tanks, utilities, hazardous materials, or any other items of which no evidence can be found on the surface by a reasonable inspection or are not clearly marked by the utility locator.
- Environmental engineering services are excluded from this scope of work.
- Contaminated soils and/or groundwater will not be encountered in borings, and IDW can be spread directly onto the ground surface at each boring location.
- The draft and final deliverables will be provided as electronic documents.
- Due to current instability in commodity costs, this proposal is valid for 60 days.
- All soil samples taken for laboratory tests will be retained for up to 3 months after the submittal of the final GDR prior to disposal.
- Our professional services will be performed in accordance with generally accepted engineering practices at the time the work is performed. No expressed or implied representation or warranty is included or intended in our reports.

# 6. Closure

We look forward to working with you on this project. If you have any questions, please feel free to contact Mathew Francis at 801-696-4552.

Sincerely yours,

AECOM Technical Services, Inc.

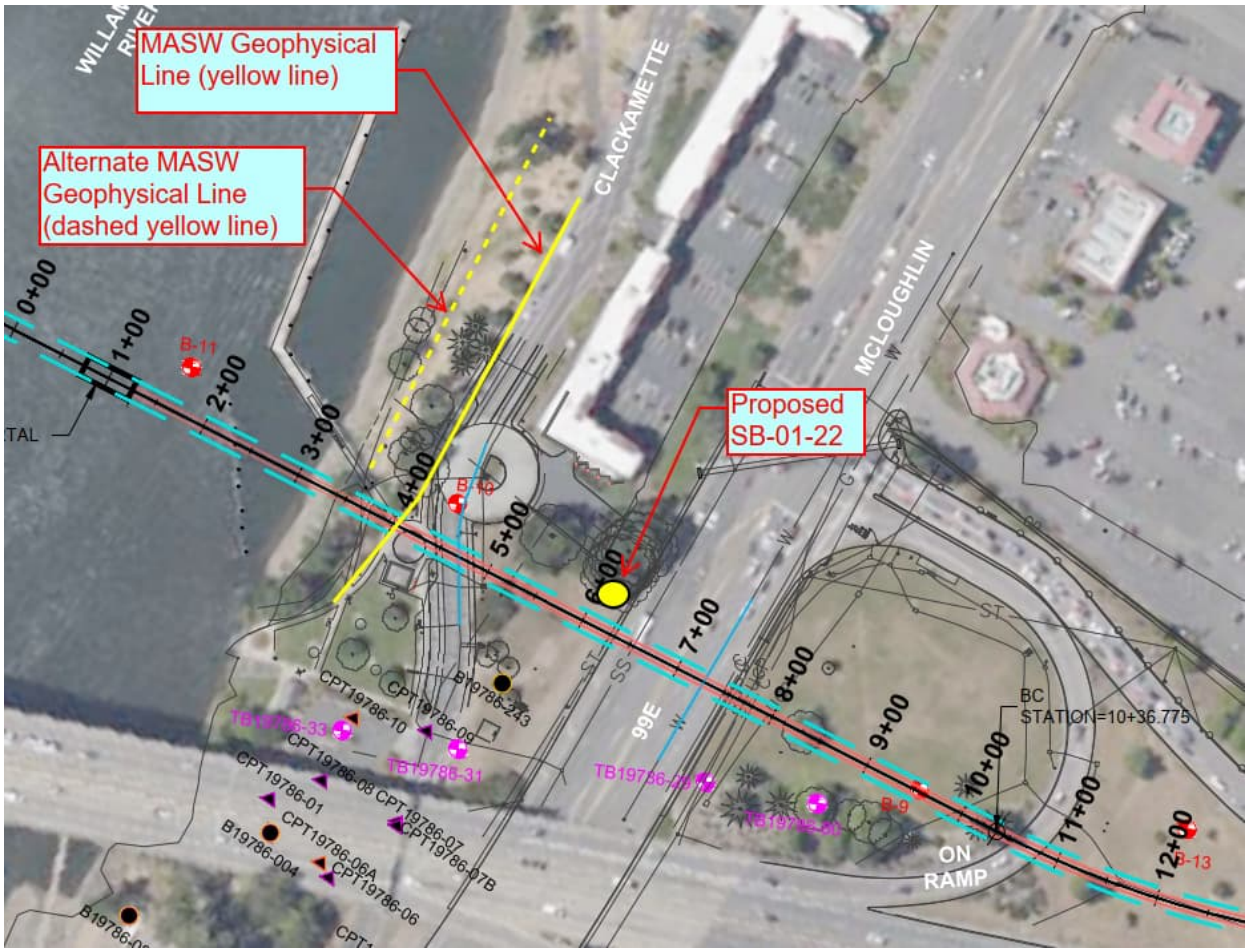
Mathew Francis, P.E. (UT)

Project Manager

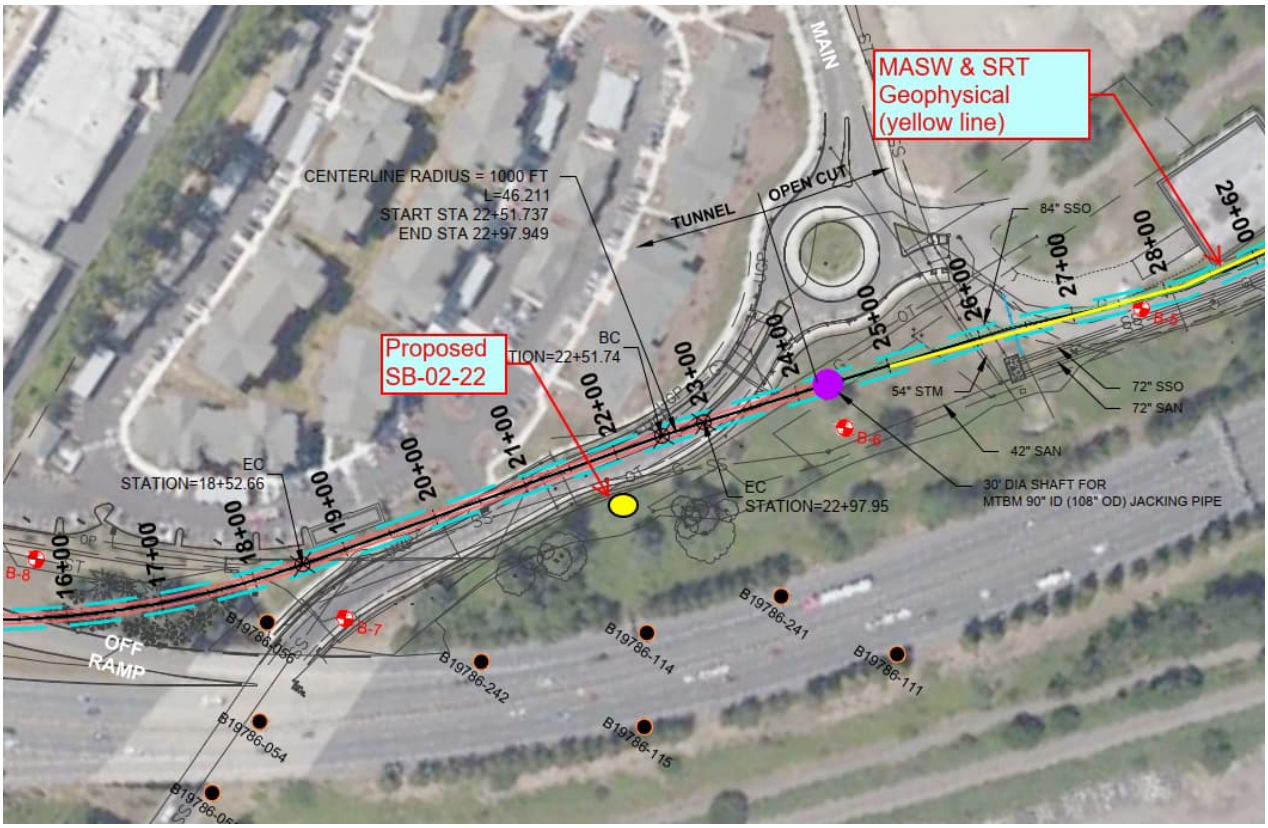
CC: Lance Finnefrock, PE, GE

## FIGURES

## Figure 1 – Proposed Plan of Supplemental Investigation (1 of 2)

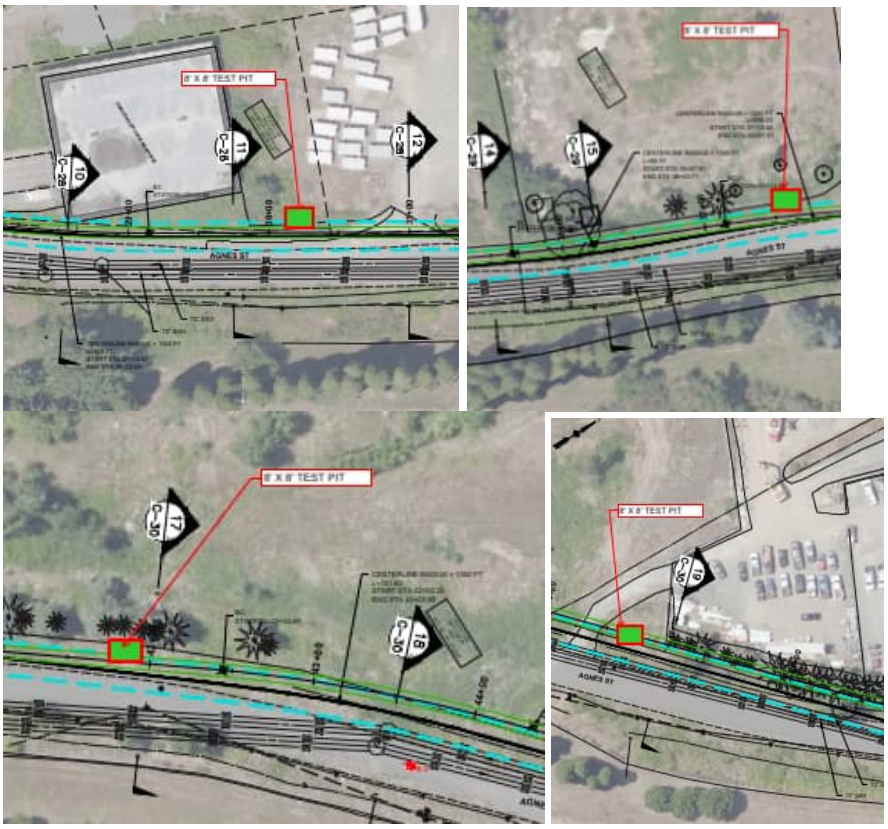


## Figure 2 – Proposed Plan of Supplemental Investigation (2 of 2)



# Figure 3 – Proposed Geophysical Survey for Landfill Delineation

## Figure 4 – Proposed Test Pit Approximate Locations for Landfill Delineation and Open-Cut Standup Time Assessment



# ATTACHMENT A

aecom.com

December 27th, 2022

**Mr. Jeff Stallard**
Clackamas County - Water Environment Services
Civil Engineering Supervisor
E: jstallard@clackamas.us

**Project:** Tri-City WRRF Outfall Project P632241

**Subject:** Geotechnical Investigative Workplan – Commercial Proposal

Mr. Stallard,

In support of the provided Geotechnical Investigative Workplan, Michels Trenchless, Inc. and AECOM have developed the following commercial proposal to capture the overall costs of the proposed supplemental investigation.

***WRRF – Supplemental Geotechnical Investigation Lump Sum Cost……$247,286.41***

Pricing is inclusive of the Design Builder Fee of 12.1%. Attached document details the intended scope and cost breakdown for your reference.

Please review and provide acceptance of proposal by January 6th, 2023, to secure engagement of Geotechnical Subcontractors currently scheduled for the week of January 16th, 2023.

If you have any questions or require clarification of the information provided, contact me directly via email mgravel@michels.us or by phone at (920) 791-3338.

Respectfully,

Marc Gravel
Special Projects Manager
Michels Trenchless, Inc.

| WES - WRRF - Supplemental Field Investigation Services (Geotech) Fee Estimate by Task | | PM - AECOM | Senior QA/QC | QA/QC | Senior Geotech | Staff Geotech | Project Geotech | Permit Specialist | Staff Enviro | Princ. Geophysics | Project Geophysics | Staff Geophysics | CAD / Graphics | GIS | Senior Admin | Field Engineer - Michels | PM - Michels | Task Hours | TASK COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | M. Francis | Daryl Poduska | M. Rabei | L. Finnefrock | J. Juggert | P. Craig | A. Clodfelter | J. Ray | T. King | M. Greer | Munschauer | M. Rau | J. Lehane | N. Henderson | R. Ward | T. Toelke | | |
| | Labor Rate | $255.00 | $210.00 | $180.00 | $195.00 | $120.00 | $140.00 | $160.00 | $120.00 | $260.00 | $145.00 | $128.00 | $120.00 | $120.00 | $135.00 | $140.00 | $175.00 | | |
| TASK | DESCRIPTION | | | | | | | | | | | | | | | | | | TOTALS |
| 1.1. | **Management and Permitting** | | | | | | | | | | | | | | | | | | |
| 1.1.1 | Permits/ROE | | | | | | | | | | | | | | | | | 0 | $ - |
| 1.1.2.1 | ODOT (SB-01-22, SB-02-22, Riverbank MASW, Landfill MASW/SRT) | | | | | 1 | | 8 | | | | | | | | | | 9 | $ 1,400.00 |
| 1.1.3.2 | Clackamas County (SB-01-22, SB-02-22, Riverbank MASW, Landfill MASW/SRT) | | | | | 1 | | 8 | | | | | | | | | | 9 | $ 1,400.00 |
| 1.1.4.3 | Oregon City Parks Land Use (Riverbank MASW) | | | | | 1 | | 8 | | | | | | | | | | 9 | $ 1,400.00 |
| 1.1.5.4 | Private Property ROE (Landfill MASW) | | | | | 1 | | 16 | | | | | | | | | | 17 | $ 2,680.00 |
| 1.1.6 | Subcontractor Coordination | | | | 2 | 12 | | | | | | | | | | 12 | | 26 | $ 3,510.00 |
| 1.1.7 | Subcontractor PO's / PO Mods | 1 | | | 1 | 8 | | | | | | | | | 8 | 8 | 1 | 27 | $ 3,785.00 |
| 1.1.8 | Preparation & Internal Coordination Meetings | 1 | | | 4 | 4 | | 2 | | | | 1 | | | | 4 | 1 | 17 | $ 2,698.00 |
| | **Task 1.1. Labor Subtotal** | **2** | **0** | **0** | **7** | **28** | **0** | **42** | **0** | **0** | **0** | **1** | **0** | **0** | **8** | **24** | **2** | **114** | **$ 16,873.00** |
| 1.2. | **Geotechnical Drilling, Geoprobing Investigation and Test Pit Excavation** | | | | | | | | | | | | | | | | | | |
| 1.2.1 | Field Investigation Plan (DRAFT & FINAL) | 1 | | | 5 | 16 | | | | | | | | | | 8 | 1 | 31 | $ 4,445.00 |
| 1.2.2 | Health and Safety Plan (HASP) | 1 | | | 2 | 8 | | | | | | | | | | 2 | 1 | 14 | $ 2,060.00 |
| 1.2.3 | Borehole Staking & Utility 811 & Private Utility Locate | | | | 1 | 12 | | | | | | | | | | 8 | | 21 | $ 2,755.00 |
| 1.2.4 | Sonic Borhole Logging, Probe UCS/Su In-Field Testing, Test Pit Logging (5-days, 12-hrs/day) & Travel to Site (daily roundtrips, 1-hrs/roundtrip). | | | | 6 | 70 | | | | | | | | | | 50 | | 126 | $ 16,570.00 |
| 1.2.5 | Option 2D: Up to 8 geoprobes in MSW, (4-days, 12-hrs/day) & Travel to Site (daily roundtrips, 1 hrs/roundtrip* See disposal criteria below). | | | | 4 | 48 | | | | | | | | | | 40 | | 92 | $ 12,140.00 |
| 1.2.6 | Option 2E: Test Pits in MSW. Logging (4-days, 12-hrs/day) & Travel to Site (daily roundtrips, 1 hrs/roundtrip). | | | | 4 | 48 | | | | | | | | | | 40 | | 92 | $ 12,140.00 |
| 1.2.7 | Boring logs (gINT) preparation and QC review | | | | 8 | 16 | 4 | | | | | | | | | 4 | | 32 | $ 4,600.00 |
| 1.2.8 | Sample photo logs preparation and QC review | | | | 1 | 8 | 4 | | | | | | | | | 4 | | 17 | $ 2,275.00 |
| 1.2.9 | Geotech drawings and figures | | | | 4 | 6 | | | | | | | 8 | 8 | | 2 | | 28 | $ 3,700.00 |
| | **Task 1.2. Labor Subtotal** | **2** | **0** | **0** | **35** | **232** | **8** | **0** | **0** | **0** | **0** | **0** | **8** | **8** | **0** | **158** | **2** | **453** | **$ 60,685.00** |
| 1.3. | **Geophysical Investigation** | | | | | | | | | | | | | | | | | | |
| 1.3.1 | Preparation & Mobilization | | | | | | | | | 2 | | 20 | | | | | | 22 | $ 3,080.00 |
| 1.3.2 | Field investigation | | | | | 35 | | | | | | 35 | | | | 35 | | 105 | $ 13,580.00 |
| 1.3.3 | Data Analysis and Report | | | | | | | | | 2 | 6 | 32 | | | | 2 | 1 | 43 | $ 5,941.00 |
| | **Task 1.3. Labor Subtotal** | **0** | **0** | **0** | **0** | **35** | **0** | **0** | **0** | **4** | **6** | **87** | **0** | **0** | **0** | **37** | **1** | **170** | **$ 22,601.00** |
| 1.4. | **Laboratory Testing** | | | | | | | | | | | | | | | | | | |
| 1.4.1 | Lab Test Assignments | | | | 8 | | | | | | | | | | | | | 8 | $ 1,560.00 |
| 1.4.2 | Lab Data Analysis and Processing | | | | 4 | 16 | 4 | | | | | | | | | 2 | | 26 | $ 3,540.00 |
| | **Task 1.4. Labor Subtotal** | **0** | **0** | **0** | **12** | **16** | **4** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **2** | **0** | **34** | **$ 5,100.00** |
| 1.5. | **Reporting** | | | | | | | | | | | | | | | | | | |
| 1.5.1 | Geotechnical Data Report (GDR) - data incorporated as part of 60% submittal | | 12 | | 24 | 40 | 8 | | | | | | | | | | | 84 | $ 13,120.00 |
| 1.5.2 | Geotechnical Baseline Report (GBR) - already included in current budget | | | | | | | | | | | | | | | | | 0 | $ - |
| | **Task 1.5. Labor Subtotal** | **0** | **12** | **0** | **24** | **40** | **8** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **84** | **$ 13,120.00** |
| | **Total Labor** | **4** | **12** | **0** | **78** | **351** | **20** | **42** | **0** | **4** | **6** | **88** | **8** | **8** | **8** | **221** | **5** | **855** | **$ 118,379.00** |
| | **Subcontracts/Vendors** | | | | | | | | | | | | | | | | | | |
| | Drilling sub: WSSC | 1 x 100' and 1 x 50' rotosonic borings - SB-01-22 completed as VWP | | | | | | | | | | | | | | | | | $ 24,994.00 |
| | Drilling sub: WSSC | Up to 8 x 45' direct push geoprobes | | | | | | | | | | | | | | | | | $ 15,000.00 |
| | Test Pit Sub | Est 4, 8' x (depth TBD, but as deep as possilbe) test pits dug with a CAT 350 excavator or equivalent | | | | | | | | | | | | | | | | | $ 15,000.00 |
| | IDW Contain & Transport: WSSC - Not Necessary | | | | | | | | | | | | | | | | | | |
| | Traffic Control for both drilling and probing along the shoulder of Agnes Rd : D&H Flagging | | | | | | | | | | | | | | | | | | $ 7,434.16 |
| | Private Utility Locate: APS | (2 borings and 8 geoprobes) | | | | | | | | | | | | | | | | | $ 640.00 |
| | Analytical Lab Testing: tbd | (n/a) | | | | | | | | | | | | | | | | | $ - |
| | IDW Lab Testing - Not Necessary | | | | | | | | | | | | | | | | | | $ - |
| | S&F Land Services (Surveying Subcontractor) | (2 borings, 2 geophysical arrays) | | | | | | | | | | | | | | | | | $ 5,400.00 |
| | Subcontracts Fee (10%) | | | | | | | | | | | | | | | | | | $ 6,846.82 |
| | **Total Subconsultants** | | | | | | | | | | | | | | | | | | **$ 75,314.98** |

| WES - WRRF - Supplemental Field Investigation Services (Geotech) Fee Estimate by Task | | PM - AECOM | Senior QA/QC | QA/QC | Senior Geotech | Staff Geotech | Project Geotech | Permit Specialist | Staff Enviro | Princ. Geophysics | Project Geophysics | Staff Geophysics | CAD / Graphics | GIS | Senior Admin | Field Engineer - Michels | PM - Michels | Task Hours | TASK COST |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | M. Francis | Daryl Poduska | M. Rabei | L. Finnefrock | J. Juggert | P. Craig | A. Clodfelter | J. Ray | T. King | M. Greer | Munschauer | M. Rau | J. Lehane | N. Henderson | R. Ward | T. Toelke | | |
| | Labor Rate | $255.00 | $210.00 | $180.00 | $195.00 | $120.00 | $140.00 | $160.00 | $120.00 | $260.00 | $145.00 | $128.00 | $120.00 | $120.00 | $135.00 | $140.00 | $175.00 | | |
| TASK | DESCRIPTION | | | | | | | | | | | | | | | | | | TOTALS |
| | **Other Direct Costs (ODCs)** | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | **Geophyscial Investigation (Travel & Materials)** | **RATE** | **QUANTITY** | **TOTAL** | | | | | | | | | | | | | | | |
| | Lodging (Rates, Nov '22 - May '23) | $152.00 | 5 | $760.00 | | | | | | | | | | | | | | | |
| | Per Diem (M&IE-First and Last Day [Travel Day, 75%]) | $55.50 | 2 | $111.00 | | | | | | | | | | | | | | | |
| | Per Diem (M&IE-Full Day) | $74.00 | 4 | $296.00 | | | | | | | | | | | | | | | |
| | Mileage | $0.58 | | $0.00 | | | | | | | | | | | | | | | |
| | Airfare | $500.00 | 1 | $500.00 | | | | | | | | | | | | | | | |
| | Rental Vehicle | $75.00 | 5 | $375.00 | | | | | | | | | | | | | | | |
| | Fuel | $50.00 | 4 | $200.00 | | | | | | | | | | | | | | | |
| | Airport Shuttle/Taxi | $50.00 | 2 | $100.00 | | | | | | | | | | | | | | | |
| | Parking | $18.00 | | $0.00 | | | | | | | | | | | | | | | |
| | Misc. Materials (stakes, flagging, HCl, etc.) | $100.00 | 1 | $100.00 | | | | | | | | | | | | | | | |
| | DGPS Mob | $270.00 | 1 | $270.00 | | | | | | | | | | | | | | | |
| | DGPS Rental | $340.00 | 1 | $340.00 | | | | | | | | | | | | | | | |
| | Seismic Equip. Mob | $1,629.00 | 1 | $1,629.00 | | | | | | | | | | | | | | | |
| | Seismic Equip. Rental | $832.00 | 1 | $832.00 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | **Total Staking/Recon** | | **$5,513.00** | | | | | | | | | | | | | | | |
| | **Field Recon & Geotechnical Drilling (Travel & Materials)** | | | | | | | | | | | | | | | | | | |
| | Lodging (Rates, Nov '22 - May '23) | $152.00 | 0 | $0.00 | local mobilization | | | | | | | | | | | | | | |
| | Per Diem (M&IE-First and Last Day [Travel Day, 75%]) | $55.50 | 9 | $499.50 | 1 people x 3 days drilling + 3 days probing, local mobilization | | | | | | | | | | | | | | |
| | Per Diem (M&IE-Full Day) | $74.00 | 0 | $0.00 | 1 people x 3 days drilling, local mobilization | | | | | | | | | | | | | | |
| | Mileage | $0.58 | | $0.00 | | | | | | | | | | | | | | | |
| | Airfare | $500.00 | | $0.00 | | | | | | | | | | | | | | | |
| | Rental Vehicle | $75.00 | 11 | $825.00 | 1 day staking + 1 vehicle x 6 days drilling/probing, 1 mobilizations (4-hr RT), plus pickup/return | | | | | | | | | | | | | | |
| | Fuel | $50.00 | 3 | $150.00 | | | | | | | | | | | | | | | |
| | Airport Shuttle/Taxi | $50.00 | | $0.00 | | | | | | | | | | | | | | | |
| | Parking | $18.00 | | $0.00 | | | | | | | | | | | | | | | |
| | Misc. Materials (stakes, flagging, HCl, etc.) | $150.00 | 1 | $150.00 | | | | | | | | | | | | | | | |
| | Soil sample packaging/preservation | $200.00 | 1 | $200.00 | | | | | | | | | | | | | | | |
| | Soil sample shipping/transport (per 4 Shelby tubes) | $300.00 | 2 | $600.00 | | | | | | | | | | | | | | | |
| | Soil sample shipping/transport (per 5-gallon bucket) | $75.00 | 6 | $450.00 | | | | | | | | | | | | | | | |
| | VWP Hardware purchase for SB-06-22 (from DGSI) | $1,138.00 | 1 | $1,138.00 | | | | | | | | | | | | | | | |
| | GPS Rental | $75.00 | 0 | $0.00 | | | | | | | | | | | | | | | |
| | 4-gas Meter Rental | $50.00 | 5 | $250.00 | 1 device x 3 days drilling, plus pickup/return | | | | | | | | | | | | | | |
| | Water Level Meter Rental | $25.00 | 5 | $125.00 | 1 device x 3 days drilling, plus pickup/return | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | **Total GI Drilling** | | **$4,387.50** | **Option: GeoProbe 4-days-Add:** | **$ 3,000.00** | | | | | | | | | | | | | |
| | **Laboratory Testing** | | | | **Option: Test Pits 4-days-Add:** | **$ 2,000.00** | | | | | | | | | | | | | |
| | Geotechnical Lab Testing: AECOM-Anaheim | $12,000.00 | 1 | $12,000.00 | local mobilization | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | **Total Lab Testing** | | **$12,000.00** | | | | | | | | | | | | | | | |
| | **Total Travel/ODCs** | | | | | | | | | | | | | | | | | | **$26,900.50** |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | **Subtotal** | **$220,594.48** |
| | | | | | | | | | | | | | | | | | | **Design Builder Fee Percentage (12.1%)** | **$26,691.93** |
| | | | | | | | | | | | | | | | | | | **Total Geotech Cost** | **$247,286.41** |