CITY OF TACOMA

Environmental Services Department

ADDENDUM NO.3 **DATE:** November 21, 2017

REVISIONS TO:
Request for Proposals Specification No. ES17-0269F
Jefferson & Hood Street Surface Water Interceptor Project

NOTICE TO ALL PROPOSERS:

This addendum is issued to modify various sections of the Request for Proposals (RFP) and Attachments thereto (Volume I of II), and the Draft Design-Build Contract and Appendices thereto (Volume II of II).

REVISION TO THE SUBMITTAL DATE:

The submittal date remains the same.

MODIFICATIONS TO THE REQUEST FOR PROPOSAL (Volume I of II):

1. Modify RFP Section 1.3, General Project Description, by revising the second paragraph as follows:

A project map including preliminary potential alignments is shown in Figure 1-1. Proposers should note that the horizontal alignments shown in this drawing are conceptual and have not been precisely located by the City.

2. Modify RFP Section 1.7, Reference Documents, by adding the following new paragraph after the first paragraph:

Proposers should note that the Project website link to City of Tacoma Jefferson & Hood Street Surface Water Interceptor Project Preliminary Plan (AutoCAD) was intended to only contain an AutoCAD version of the pdf drawing found at City of Tacoma Jefferson & Hood Street Surface Water Interceptor Project Preliminary Plan (pdf). However, a number of other drawings were inadvertently included within the zip file accessed via the AutoCAD link. These other drawings were not intended to be shared; may include incomplete, incorrect, or old information; and are not intended for use by Proposers or the Selected Design-Builder. Therefore, these other drawings have been removed from the zip file.

3. Modify RFP, Section 1.8, RFP Definitions, by revising the definition of Key Personnel as follows:

Key Personnel – Individuals fulfilling the roles identified below and that were identified in Proposer's SOQ and committed to work on the Project if Proposer is selected as the Design-Builder. At a minimum, Key Personnel shall include the proposed: Project

Manager (Design-Build Manager); Design Manager; Permitting Lead; In-water Permitting Specialist for Section 404 and related permitting; Biologist supporting Section 404 and related permitting; Lead Trenchless Engineer; Construction Manager; Construction Superintendent(s); Public Outreach Lead, Geotechnical Engineer, Hydrogeologist, and Soil/Groundwater Contamination Specialist. **Proposers should note that the In-Water Permitting Specialist, Biologist, and last three listed positions have been added since issuance of the City's SOQ based on the City's more complete understanding of site conditions and permitting requirements.**

4. Modify RFP, Section 2.2.1.1, Geotechnical and Hydrogeological Investigations, by adding the following new paragraph immediately after the last bullet list item:

   A copy of GeoEngineers draft Subsurface Investigations Work Plan (November 20, 2017) is included as Attachment E (added by this addendum). Proposers are asked to provide limited comments on the draft plan as more specifically described under RFP Section 6.2.3 and RFP Section 6.2.13. The Proposer's comments shall be included in Proposal Appendix H, Suggested Changes to GeoEngineers draft Subsurface Investigations Work Plan. Proposers should note that Proposal Appendix H is added by this addendum.

5. Modify RFP, Section 2.2.1.4, State Environmental Policy Act (SEPA) Compliance, by revising the second to last paragraph as follows:

   For the upland portion of the Project, the project proposal qualifies as a planned action under the South Downtown and North Downtown Subarea Plans Final Environmental Impact Statements (FEISs). The Project is consistent with the subarea plan ordinances and FEISs, and will be required to meet the requirements of the mitigation measures identified per the FEISs. Therefore, no additional environmental review under SEPA is expected for the upland portion of the Project. The Design-Builder will be required to comply with those FEISs' mitigation measures that are identified as applicable to the Project by the City. A final determination as to applicable measures ~~This information~~ will be provided to the selected Design-Builder as part of the contract negotiations. However, on a preliminary basis, the City has determined the following mitigation requirements will apply to the Project:

   - City of Tacoma Stormwater Management Program requirements
   - Ecology Construction Stormwater General Permit conditions if the Project exceeds 1-acre of clearing, grading and excavating activities.
   - Use construction BMPs identified in Regional Road Maintenance Program Guidelines and City of Tacoma Stormwater Management Manual.
   - Use best management practices (BMPs) for control of erosion and sedimentation all development in shorelines through an approved temporary erosion and sediment control (TESC) plan, or administrative conditions.
   - All materials that may come in contact with water shall be constructed of materials that will not adversely affect water quality or aquatic plants or animals.
   - All contaminated soils cleanup under MTCA shall be coordinated through Department of Ecology.

[Note to Proposers: the City will provide guidance on the applicability of Complete Streets requirements via future Addendum]

6. Modify RFP, Section 2.2.1.5, Permitting and Approvals, by revising the section as follows:

   Prior to Stage 1, the City will continue to hold preliminary discussions with certain permitting entities to help lay the groundwork for permitting activities to be undertaken by the Design-Builder. During Stage 1, the City also will be responsible for leading or supporting applications for a limited number of permits, governmental approvals, and non-governmental approvals, as identified in Appendix 3 of the draft Design-Build Contract. The City will also be responsible for paying costs associated with reimbursements for permit reviewer time by agencies or BNSF.

   Proposers should note that responsibility for obtaining any approvals from Ecology associated with contamination at and in the vicinity of the University of Washington, Tacoma Site and / or City of Tacoma's Sauro Cleanerama Site, both of which are subject to Department of Ecology Agreed Orders, has been added to Appendix 3, Table 3-1. This responsibility is assigned to the Design-Builder. See Appendix 3 to the Draft Design-Build Contract, as revised by this Addendum.

   Based on further consultation with the USCOE, the City has determined that it will be more efficient to submit the JARPA application following selection of an alignment and progression of the design. As a result, the City plans to withdraw the JARPA application previously submitted by the City and, via this Addendum, is assigning responsibility for obtaining the USCOE Section 404 Nation-wide permit and Section 401 Ecology Water Quality certification on behalf of the City to the selected Design-Builder**.** Because of the need for ongoing consultations with the USCOE, Ecology, NOAA Fisheries, and the Puyallup Tribe regarding these approvals, the Selected Proposer is required to coordinate with the City and provide for City involvement in all discussions, consultations and negotiations with the applicable agencies and Puyallup Tribe. See Appendix 3 to the Draft Design-Build Contract, as revised by this Addendum.

7. Modify RFP, Section 2.2.2, Design-Build Preliminary Services, by revising the final paragraph in that section as follows:

   A draft Scope of Preliminary Services is included in Appendix 2 to the draft Design-Build Contract. As described in Section 6 of this RFP, Proposers are to base not-to-exceed pricing on the draft scope as written and modified by addenda. Proposers are also asked to identify any recommended scope modifications and to provide the incremental cost impacts associated with those recommendations in their Proposals using Form C. A final Scope of Preliminary Services and final not-to-exceed pricing will be negotiated prior to execution of the Design-Build Contract. The City is asking for comments on GeoEngineers draft Subsurface Investigations Plan, but due to schedule constraints, the draft Scope of Preliminary Services will not be modified to reflect any changes made due to these comments. Proposers shall assume that no changes will be made and shall price Task 3 of the draft Scope of Preliminary Services, as by addenda, accordingly.

8. Modify RFP Section 6.1, Proposal Organization, by adding the following at the end of Table 6-1:

Proposal Sections and Appendices	Relationship to Evaluation Criteria
Appendix H – Suggested Changes to GeoEngineers' draft Subsurface Investigations Work Plan	Will be used to facilitate contract negotiations.

9. Modify RFP Section 6.2.1, Proposal Section 1. Supplemental Qualifications and Experience (30 points) by revising the first paragraph and associated list as follows:

   Proposers shall identify the following Key Personnel (added by the City since issuance of the RFQ) and summarize their qualifications in Proposal Section 1:

   - Geotechnical engineer
   - Hydrogeologist
   - Soil/Groundwater contamination specialist
   - In-water Permitting Specialist for Section 404 and related permitting;
   - Biologist supporting Section 404 and related permitting

10. Modify RFP Section 6.2.2, Proposal Section 2. Management Plan / Commercial Approach (30 points) by revising the requirements for Proposal Section 2.5: Approach to Assuring Permitting, Design and Construction Integration, first listed item as follows:

– How Proposer would approach the design to facilitate permitting, including but not limited to in-water permitting, WSDOT approvals, and BNSF approvals.

11. Modify RFP Section 6.2.3, Proposal Section 3. Technical Approach / Design Concept (25 points) by revising the requirements for Proposal Section 3.3: Approach to Geotechnical and Hydrogeologic Investigations, first listed item as follows:

– Proposer's approach to use of geotechnical and hydrogeologic data to be provided in the data report under development by GeoEngineers, assuming no changes are made to the GeoEngineers' draft Subsurface Investigations Work Plan provided in Attachment E.

12. Modify RFP Section 6.2.3, Proposal Section 3. Technical Approach / Design Concept (25 points) by revising the requirements for Proposal Section 3.4: Approach to Characterization and Management of Contaminated Soil and Groundwater, first listed item as follows:

– Proposer's approach to ~~reviewing and verifying existing information~~ use of data related to contaminated soil and groundwater in the data report under development by GeoEngineers, assuming no changes are made to GeoEngineers' draft Subsurface Investigations Work Plan provided in Attachment E.

13. Modify RFP Section 6.2.3, Proposal Section 3. Technical Approach / Design Concept (25 points) by revising the first paragraph under the requirements for Proposal Section 3.10, Technical Approach Scenarios as follows:

    The Proposer shall include responses to three technical approach scenarios at the locations shown in Figure 6-1. The City is making certain documents available ~~on~~ on the Project website to assist Proposers in preparing their responses to these scenarios. Available documents are included in Table 6-2. Proposers should note that the Project website has been updated to include a link to the Department of Ecology – Sauro's Cleanerama website.

14. Revise RFP Section 6.2.4, Proposal Section 4. Pricing Factors (10 points) paragraphs 5 through 7, as previously modified by Addendum No. 2, as follows (note that both changes by Addendum No. 2 and by this Addendum No. 3 are shown):

    The Proposer shall complete and include Form 4-2 (All-Inclusive Billing Rates for Stage 1 Preliminary Services). Listed billing rates shall be all-inclusive (including all benefits, overhead, and profit, and markup by the Design-Builder) and shall cover professional services and services provided by the construction team. Overhead shall include all taxes, except for sales-type taxes. These billing rates shall be in effect throughout Stage 1.

    The Proposer shall complete and include Form 4-3 (Billing Rates for Stage 2 Professional Services Only). Billing Rates shown Form 4-3 shall include benefits and professional services firms' overhead and profit, but not Design-Builder's overhead and profit, which will be covered by the proposed Design-Build Fee, or general conditions, which will be covered by the General Conditions Fee. Billing Rates in Form 4-3 shall only apply to personnel who will provide professional services (such as design, surveying and mapping, ongoing permitting support, stakeholder involvement, engineering during construction) during Stage 2. Overhead shall include all taxes, except sales-type taxes. These rates shall be in effect throughout Stage 2.

    The Proposer shall complete and include Form 4-4 (Billing Rates for Self-Performed Construction Work). Billing Rates shown Form 4-4 shall include benefits, but not Design-Builder's overhead and profit, which will be covered in the proposed Design-Build Fee, or general conditions, which will be covered by the General Conditions Fee. Billing Rates in Form 4-4 shall only apply to personnel who will conduct self-performed direct construction work (i.e. craft labor) during Stage 2. The Design-Builder's proposed Stage 2 Amendment will be expected to include hours and the Form 4-4 billing rates for all self-performed work. Overhead shall include all taxes, except sales-type taxes. These rates shall be in effect throughout Stage 2. The City may, in its discretion, agree to lump sum pricing for self-performed work in lieu of time and materials pricing / cost substantiation.

15. Modify RFP Section 6.2.6, Proposal Appendix A, Supplemental Firm Profiles and Resumes, by revising the first paragraph as follows:

    Appendix A shall include profiles for any firms added to Proposer's team since submittal of its SOQ. The Proposer shall include resumes for additional Key Personnel (geotechnical engineer, hydrogeologist, ~~and~~ groundwater/soil contamination specialist, in-water permitting specialist; and biologist supporting in-water permitting). Appendix A shall also include any resumes for additional personnel identified by the Proposer as having an important role and/or experience applicable to the Project (all submitted

resumes limited to 2-pages per person).

16. Modify RFP Section 6.2.8, Proposal Appendix C, Suggested Changes to Draft Scope of Preliminary Services, by revising the two paragraphs as follows:

    The RFP includes a draft Scope of Preliminary Services in Appendix 2 to the draft Design-Build Contract. The draft Scope of Preliminary Services will be subject to negotiation with the selected Design-Builder.

    In Proposal Appendix C, `Proposers are invited to propose modifications to the draft Scope of Preliminary Services that they believe would be appropriate, necessary, and/or beneficial to the Project using Form C (Suggested Changes to Draft Scope of Preliminary Services). If modifications are proposed, the Proposer shall describe the reasons for the proposed change, and indicate the incremental change in cost (positive or negative). Use separate copies of Form C for each proposed modification or related group of modifications. <u>In determining whether or not to recommend a change to Task 3 of the draft Scope of Preliminary Services, Proposers should not assume any of their recommended changes to the GeoEngineers' draft Subsurface Investigations Work Plan, as provided in Proposal Appendix H, have been made by the City.</u>

17. Add new RFP Section 6.2.13, Proposal Appendix H, Suggested Changes to GeoEngineer's draft Subsurface Investigations Work Plan as follows:

    Proposers are invited to provide limited comments on GeoEngineer's draft Subsurface Investigations Work Plan (see Attachment E) in the following areas:

    - Adjustments to the location of borings (but not requested new borings, which should be suggested using Form C, unless included in the draft Scope of Preliminary Services as a Design-Builder responsibility)
    - Depth of borings
    - Screening locations for measuring aquifer water levels
    - Types of geotechnical testing
    - Location of contaminated soils sampling
    - Types of testing for contaminated soils and groundwater

18. Add new RFP Attachment E. GeoEngineer's draft Subsurface Investigations Work Plan (November 20, 2017) (attached).

MODIFICATIONS TO THE DRAFT DESIGN-BUILD CONTRACT (Volume II of II)

1. Revise the second sentence of Section 6.3(C) of the Draft Design-Build Contract as follows:

    The Design-Builder's notice to the City shall be issued by telephone or in person and followed ~~within 24 hours~~ <u>no later than by the end of the next business day</u> thereafter by written notice, providing a brief description of why the condition encountered is considered a Differing Site Condition."]

2. Revise Section 6.3(D) of the Draft Design-Build Contract as follows:

(D) Relief for Differing Site Conditions. If the Design-Builder establishes that the actual conditions encountered during Construction: (1) meet the criteria for a Differing Site Condition, and (2) directly and materially impact the Design-Builder's cost or time of performance, then the Design-Builder shall be entitled to Uncontrollable Circumstance relief as and to the extent provided in Section 14.1. ~~The Design-Builder shall not be provided relief for any conditions of which it should have been aware~~.]

3. Revise Section 13.1(C) of the Draft Design-Build Contract as follows:

(C) Certificates, Policies and Notice. The Required Insurance, including any renewals thereof, shall be evidenced by certificates of insurance and endorsements as provided herein and in Appendix 10. No later than 30 days prior to the issuance date of each policy of Required Insurance, including any renewals thereof, the Design-Builder shall provide the City with a draft certificate of insurance and endorsements for review and approval, and shall deliver the final, approved certificate of insurance and endorsement to the City promptly following its issuance. ~~All policies of Required Insurance shall be made available for review by the City's outside legal counsel, who will conduct the review solely for the purposes of providing the City legal advice as to whether the Design-Builder's policies meet Required Insurance requirements hereunder. The Design-Builder shall certify to the City that the policies being provided for review are a complete, true and correct compilation of all relevant policies evidencing insurance required under Appendix 10, recognizing that the City and its designated representatives will rely on such certification. The City agrees that it shall instruct and require that its outside legal counsel will not disclose or provide to the City access to such insurance policies or the specific terms or conditions thereof, without the express prior written consent of the Design-Builder. The City's outside legal counsel's legal advice shall be limited to only confirming whether such policies of insurance comply with the insurance requirements in this Design-Build Contract, or generally describing the nature of any deficiency observed in such policies. In its submission, the Design-Builder may claim confidentiality with respect to its insurance policies to protect the same against disclosure under the Public Information Act, and in such event the City will take reasonable action (up to seeking an attorney general opinion regarding exceptions that may apply) to seek to preserve the confidentiality of the information about the Design-Builder's insurance policies in the possession of the City's outside legal counsel, pursuant to the attorney client privilege and any other applicable exception to disclosure under the Public Information Act that the City in its sole discretion determines to assert. In addition, upon conducting such review, if the City's outside legal counsel determines that policies of Required Insurance contain deficiencies that cause such policies not to comply with the requirements of this Design-Build Contract, the Design-Builder shall remedy the defect and, without limiting any other the City right or remedy provided for under this Design-Build Contract, in the event of a failure of compliance with the Required Insurance, the Design-Builder shall reimburse the City for the cost and expense incurred by the City in connection with the City's outside legal counsel attempting to resolve~~

~~such policy deficiencies by modification or endorsement thereof to achieve compliance with the requirements hereunder.~~

4. Delete Section 13.1(D) of the Draft Design-Build Contract and replace with the following:

   (D) Subcontractors. Whenever a Subcontractor is utilized, the Design-Builder shall require the Subcontractor to obtain and maintain insurance coverages appropriate to their tier and scope of work in a form and from insurance companies reasonably acceptable to the City.

5. Revise Section 15.2(G) of the Draft Design-Build Contract as follows:

   (G) Design-Builder Responsibility for Costs. If the City Indemnitee is entitled and elects to conduct its own defense pursuant to subsection (E) of this Section, all reasonable Fees and Costs incurred by the City Indemnitee in investigating, defending and conducting the claim for which it is entitled to indemnification hereunder shall constitute an indemnified loss subject to the Design-Builder's indemnification obligations hereunder.

6. Revise Appendix 1 (Project and Site Information) to the Draft Design-Build Contract as follows:

   (1) Add the following items to the bottom of Table A1-1 (Reference Documents):

44.	*Agreed Order No. DE 4283.* Washington State Department of Ecology and City of Tacoma. February 2009.	Agreed Order
45.	*Agreed Order No. DE 11080.* Washington State Department of Ecology and City of Tacoma (CAP). July 2015.	Agreed Order
46.	*Environmental Covenant (Sauro's Cleanarama Site*). City of Tacoma and Department of Ecology. July 2015.	Environmental Covenant

7. Revise Appendix 2 (Stage 1 Preliminary Services) to the Draft Design-Build Contract as follows:

   (1) Revise Task 3, Geotechnical, Hydrogeological, and Contamination Investigations and Reports, first paragraph as follows:

   The City has retained GeoEngineers to conduct investigations to help expedite the schedule, primarily by obtaining information on seasonally high groundwater in areas where groundwater levels could affect the design and construction. Figure A illustrates the general areas where borings are planned by GeoEngineers. Attachment E to the RFP includes GeoEngineers draft Subsurface Investigations Work Plan. GeoEngineers will complete these 10 borings as permanent monitoring wells. At these planned locations, GeoEngineers will also be collecting geotechnical information, conducting lab tests on geotechnical parameters, and collecting soil and groundwater samples to test for potential contamination. Geoengineers will be preparing a Data Report

("GeoEngineers Data Report") on the information collected and analyzed.

(2) Revise Subtask 3.2, paragraphs 2 and 3 as follows:

Soil samples shall be collected at locations appropriate for defining geotechnical conditions, including changes in geotechnical conditions along the soil column, and at locations representing contaminated or potentially contaminated materials. ~~All sampling and mixing equipment shall be decontaminated thoroughly between each sample collected using an Alconox soap wash and distilled water rinse.~~ Soil samples obtained from the borings shall be visually classified in general accordance with ASTM International (ASTM) D 2488. ~~The samples shall be evaluated for the potential presence of contamination using field screening techniques that include visual, water sheen tests and photoionization (PID) measurements.~~ Observations of soil and groundwater (if encountered) conditions and soil field screening results in soil samples collected from each exploration shall be included in each soil boring log.

For samples that may be tested for chemical ~~(~~contamination~~) analysis~~, soil samples shall be collected approximately every 2.5 feet. The samples shall be evaluated for the potential presence of contamination using field screening techniques that include visual, water sheen tests and photoionization (PID) measurements. All sampling and mixing equipment shall be decontaminated thoroughly between each sample collected using an Alconox soap wash and distilled water rinse. The~~se~~ soil samples shall be appropriately stored to allow for accurate chemical analysis. Soil samples collected for VOC and gasoline-range petroleum hydrocarbons analyses shall be collected consistent with EPA method 5035A and preserved in accordance with Ecology Memo 5, document number 04 09 087.

(3) Revise Subtask 3.2, paragraph 5 as follows:

The Design-Builder shall perform ~~one~~ four rounds of groundwater sampling and monitoring on up to 11 existing groundwater monitoring wells (10 wells to be installed by GeoEngineers and one other existing monitoring well).

(4) Revise Subtask 3.5, items 1-3 under paragraph 1 as follows:

1. Volatile organic compounds (VOCs) by Environmental Project Agency (EPA) method 8260 (84 samples)
2. Petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID (84 samples) with appropriate follow-up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx (20 samples), diesel- and oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx (20 samples)
3. Semivolatile organic compounds (SVOCs) by EPA Method 8270D (40 samples), and Resource Conservation and Recovery Act (RCRA) metals by EPA series method 6000/7000 (40 samples).

(5) Revise Subtask 3.5, items 1-4 under paragraph 3 as follows:

1. Analysis of VOCs by EPA method 8260 (44 samples)
2. Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx (44 samples), diesel- and oil-range petroleum hydrocarbons by

Ecology-approved method NWTPH-Dx (44 samples),
3. Semivolatile organic compounds (SVOCs) by EPA Method 8270D (20 samples)
4. RCRA metals by EPA Series Method 6000/7000 (20 samples).

(6) Revise Task 3, NOTE: PROPOSERS SHALL BASE THEIR NOT-TO-EXEED PRICE ON THE PRECEEDING SCOPE FOR TASK 3 AS WELL AS THE FOLLOWING ASSUMPTIONS by adding the following item 3:

3. Assume work by GeoEngineers is as described in the draft Subsurface Investigations Work Plan (Attachment E to the RFP) without any modifications recommended by Proposers.

(7) Revise Subtask 7.3, items 1-2 under paragraph 3 as follows:

1. All schedules encompassing Stage 1 work shall be prepared using Microsoft Project scheduling software (latest version). Schedules encompassing Stage 2 work shall also be prepared using Microsoft. Following acceptance of the proposed Design-Build Baseline Schedule, the Design-Builder may continue using Microsoft Project or may use Primavera scheduling software.

2. Schedules shall be submitted as electronic files (native and Adobe PDF format) and hardcopy and shall be updated monthly to show progress and changes. The City does not have a Primavera license; all Primavera schedules must be submitted in PDF formats as directed by the City.

(8) Revise Task 8, NOTE: PROPOSERS SHALL BASE THEIR NOT-TO-EXEED PRICE ON THE PRECEEDING SCOPE FOR TASK 3 AS WELL AS THE FOLLOWING ASSUMPTIONS: by adding the following item 2:

2. Assume that coordination with Ecology and the University of Washington—Tacoma, will be required related to existing agreed orders in the project vicinity, and related to the Thea Foss Waterway. Assume Ecology approval will be required for any environmental remediation activities, including removal, disposal, or treatment of contaminated media.

(9) At the end of Task 9, insert a new numbered assumption as follows:

2. While evaluation and planning for traffic impacts is required, assume no sophisticated traffic modeling effort is not included.

(10) Revise Subtask 11.3, 30 Percent Design Package, Table 1 (30% Drawings and Specifications – Minimum Requirements), by adding the following row to the bottom of the Civil subsection:

Drawings	Specifications
Preliminary Site, Piping, and Structure Demolition Plans	

(11) At the end of Task 11, Basis of Design Report and 30 Percent Design Documents, add the following:

NOTE: PROPOSERS SHALL BASE THEIR NOT-TO-EXCEED PRICE ON THE PRECEEDING SCOPE FOR TASK 11 AS WELL AS THE FOLLOWING ASSUMPTIONS:

1. The design shall be consistent with and take into account the mitigation measures required in the Final Environmental Impact Statement for the North Downtown Subarea Plan and Final Environmental Impact Statement for the South Downtown Subarea Plan, including the following:

    a. Meet City of Tacoma Stormwater Management Program requirements.

b. Submit for coverage under Ecology Construction Stormwater General Permit if exceed 1-acre of clearing, grading and excavating activities.
c. Use construction BMPs identified in Regional Road Maintenance Program Guidelines and City of Tacoma Stormwater Management Manual.
d. Best management practices (BMPs) for control of erosion and sedimentation shall be implemented for all development in shorelines through an approved temporary erosion and sediment control (TESC) plan, or administrative conditions.
e. All materials that may come in contact with water shall be constructed of materials that will not adversely affect water quality or aquatic plants or animals.
f. Contaminated soils cleanup under MTCA. Coordinate site requirements through Department of Ecology.

[Note to Proposers: The City is evaluating mitigation measure requirements related to Complete Streets Design Standards consistent with the FEIS's, and plans to provide clarification of those requirements in a future addendum.]

2. Assume any design work required for utility relocations (except for sanitary sewer or stormwater relocations) would be by the utility and not by the Design-Builder. Sanitary sewer and stormwater relocation design would be by the Design-Builder.

(12) Revise Task 13, 60 Percent Design, Table 2 (60% Drawings and Specifications – Minimum Requirements), add a row to the bottom of the Civil subsection as follows:

Drawings	Specifications
Revised Site, Piping, and Structure Demolition Plans	

(13) Revise Task 13, 60 Percent Design, by adding add the following at the end of the section:

NOTE: PROPOSERS SHALL BASE THEIR NOT-TO-EXCEED PRICE ON THE PRECEEDING SCOPE FOR TASK 13 AS WELL AS THE FOLLOWING ASSUMPTIONS:

1. The design shall be consistent with and take into account the mitigation measures required in the Final Environmental Impact Statement for the North Downtown Subarea Plan and Final Environmental Impact Statement for the South Downtown Subarea Plan, including the following:

    a. Meet City of Tacoma Stormwater Management Program requirements.
    b. Submit for coverage under Ecology Construction Stormwater General Permit if exceed 1-acre of clearing, grading and excavating activities.
    c. Use construction BMPs identified in Regional Road Maintenance Program Guidelines and City of Tacoma Stormwater Management Manual.

d. Best management practices (BMPs) for control of erosion and sedimentation shall be implemented for all development in shorelines through an approved temporary erosion and sediment control (TESC) plan, or administrative conditions.
e. All materials that may come in contact with water shall be constructed of materials that will not adversely affect water quality or aquatic plants or animals.
f. Contaminated soils cleanup under MTCA. Coordinate site requirements through Department of Ecology.

[Note to Proposers: The City is evaluating mitigation measure requirements related to Complete Streets Design Standards consistent with the FEIS's, and plans to provide clarification of those requirements in a future addendum.]

2. Assume any design work required for utility relocations (except for sanitary sewer or stormwater relocations) would be by the utility and not by the Design-Builder. Sanitary sewer and stormwater relocation design would be by the Design-Builder.

8. Revise Appendix 3 (Governmental and Non-Governmental Approvals) to the Draft Design-Build Contract as follows:

(1) Revise Table A3-1 as follows:

Table A3-1. Governmental Approvals Responsibility					
Name of Governmental Approval	**Issuing Agency**	**Permittee/ Approval Holder**	**Application Manager**	**Responsibility for Obtaining / Supporting Permit Application Process**	**Fee Payment Responsibility (1)**
Environmental Review (SEPA / NEPA)	Washington Department of Ecology / Environmental Protection Agency	City	City	**City:** The City is lead agency for SEPA and is relying on previous SEPA FEISs for the North and South Downtown Subarea Plans to meet this requirement. If NEPA review is required, City will coordinate with federal lead agencies. **Design-Builder:** The Design-Builder will be expected to provide required technical and environmental studies to support any required NEPA process if needed.	City
USCOE Section 404 Nationwide Permit / Section 401 Water Quality Certification (Ecology) / Section 7 Endangered Species Act Consultation (~~NMFS~~ NOAA Fisheries)	USCOE / Department of Ecology	City	Design-Builder	**City:** The City may conduct initial pre-application discussions prior to execution of the Design-Build Contract. The City will participate in all discussions, consultations, and negotiations with the USCOE, Ecology, and NOAA Fisheries. ~~has submitted an initial JARPA application for the two alternative outfall locations based on preliminary concepts for the outfall.~~ **Design-Builder:** ~~Upon execution of the Design-Build Contract, the Design-Builder will assume responsibility for obtaining the permits including amending the JARPA permit application if necessary to reflect its specific design concept.~~ The Design-Builder will be responsible for developing permit application and supporting materials, for managing the process and responding to requests for technical information. The Design-Builder will be responsible for coordinating all communication, consultations, and negotiations to ensure City involvement. ~~The Design-Builder will be responsible for providing other information needed to complete the approval process.~~	City
Hydraulic Project Approval (HPA)	Washington Department of Fish and Wildlife	City	Design-Builder	**City:** The City has had an initial meeting with WDFW to discuss the requirements for this approval. **Design-Builder:** The Design-Builder will be responsible for applying for and obtaining this approval.	~~Design-Builder~~ City

Table A3-1. Governmental Approvals Responsibility					
Name of Governmental Approval	**Issuing Agency**	**Permittee/ Approval Holder**	**Application Manager**	**Responsibility for Obtaining / Supporting Permit Application Process**	**Fee Payment Responsibility (1)**
Approvals for Work	Washington State Department of Ecology	University of Washington – Tacoma / City (for Sauro Site)	Design-Builder	**City:** Provide background information and facilitate discussions with Ecology and UWT. **Design-Builder:** The Design-Builder will be responsible for obtaining any approvals from Ecology on behalf of UWT and the City.	City
Shoreline Conditional Use and Shoreline Substantial Development Permits	City of Tacoma	City	City	**City:** The City has applied for and will be responsible for obtaining these permits.	City
Approvals for Outfall	Washington Department of Natural Resources (DNR)	City	Design-Builder	**City:** The City will be responsible for negotiating any lease required for portions of the outfall on public land beneath waterways. **Design-Builder:** The Design-Builder will be responsible for obtaining any other approvals required from DNR.	City
Franchise, Permit, Limited Access Encroachment Variance, and/or Limited Access Break	Washington State Department of Transportation (WSDOT) / Federal Highway Administration	City	Design-Builder	**City:** The City has been holding initial discussions with the WSDOT regarding the types of approvals required for crossing under I-705. **Design-Builder:** The Design-Builder will be responsible for obtaining these approvals on behalf of the City.	~~Design-Builder~~ City
City Rights of Way Approvals	City of Tacoma	City	City	**City:** The City will approve Design-Builder access to City Rights of Way.	City
Cultural Resources Consultation	City of Tacoma	City	City	**City:** The City will be responsible for developing a Cultural Resources Report and Discovery Plan, including Section 106 consultation with the State Historic Preservation Officer.	City

(1) Payment for review time by permitting entity above and beyond that covered by permit fees will be paid by the City.

9. Revise Appendix 5 (General Design-Build Work Requirements) to the Draft Design-Build Contract as follows:

   (1) Revise Section 5.3.1, first paragraph, as follows:

   All activities comprising the Design-Build Work shall be scheduled and monitored by use of Microsoft Project or Primavera software which sets forth all tasks and key subtasks in a logical and efficient work sequence that the Design-Builder intends to utilize to plan, organize and execute design and Construction work in taking the Project from the Baseline Design Documents to Final Completion and City operation, to record and report actual performance and progress, to show plans to complete all remaining activities as of the end of each progress report period, and to enable City and the Owner Representative to monitor and evaluate work progress. If Primavera is used, the Design-Builder shall provide schedule information to the City in both native and PDF format as directed by the City.

10. Revise Appendix 10 (Insurance Requirements) to the Draft Design-Build Contract as follows:

   (1) Section I(e) shall be deleted and replaced with:

   I(e) The Design-Builder shall forward to the City, a full and certified copy of the certificates of insurance and endorsements required by this Appendix.

   (2) Section III(d) shall be deleted and replaced with:

   III (d) Self-Insured Retention and applicable deductible limits must be disclosed on the COI and be consistent with good industry practice.

   (3) Section V(A)(1)(i) (Abuse and Molestation) shall be deleted.

   (4) Section V(A)(2) shall be amended by adding the following language after the heading “Marine General Liability Insurance”:

   …(only applicable in the event Design-Builder will utilize rented or owned vessels on a waterway to perform Design-Build Work.)

   (5) Section V(H) (Commercial Property Insurance) shall be revised as follows:

   H. Commercial Property (CP) Insurance. The Design-Builder shall provide CP for loss or damage to any and all equipment owned by the City while in the care, custody or control of the Design-Builder, its Subcontractors, or their agents. The coverage shall be provided on an ISO special form Causes of Loss form or equivalent and shall provide full replacement cost coverage~~, and shall not be subject to a deductible of more than $2,500~~. The Design-Builder shall be liable for the payment of the deductible.

   (6) Section V(I) (Builder’s Risk Insurance) shall be revised as follows:

   I. Builder’s Risk (BR) Insurance. Design-Builder shall purchase and maintain during the term of the Contract, a policy of BR insurance

providing coverage for all-risk of physical injury to all structures to be constructed according to the Contract. The City shall be named as an additional insured to the extent of its insurable interests, and a loss payee under the policy. BR insurance shall:

1. Be on an ISO special form Causes of Loss form or equivalent and shall insure against the perils flood, earthquake, theft, vandalism, malicious mischief, and collapse.

2. Include coverage for temporary buildings, debris removal, and damage to materials in transit or stored off-site.

3. Be written in the amount of the completed value of the structures, with no coinsurance provisions exposure on the part of the Design-Builder or the City.

4. Have a deductible ~~of no more than $5,000~~ consistent with good industry practice for each occurrence, the payment of which will be the responsibility of the Design-Builder. Any increased deductibles accepted by the City will remain the responsibility of the Design-Builder.

5. Be maintained until ~~final acceptance~~ Final Completion of the work ~~by the City~~.

The Design-Builder and the City waive all rights against each other, their respective subcontractors, agents and representatives for damages caused by fire or other perils to the extent covered by BR insurance or other property insurance applicable to the work. The policies shall provide such waivers by endorsement or otherwise.

NOTE: Acknowledge receipt of this addendum by initialing the corresponding space as indicated on Form B-1 Signature Page, Addenda Acknowledgement and Non-Collusion Declaration. Vendors who have already submitted their proposal may contact the Purchasing Division at 253-502-8468 and request return of their proposal for acknowledgment and re-submittal. Or, a letter acknowledging receipt of this addendum may be submitted in an envelope marked Request for Proposals Specification No. ES17-0269F Addendum No. 3. The City reserves the right to reject any and all bids, including, in certain circumstances, for failure to appropriately acknowledge this addendum.

cc: Kristy Beardemphl, P.E., Environmental Services

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Jefferson & Hood Street Surface Water Interceptor Project RFP
Attachment E – DRAFT GeoEngineers Subsurface Investigations Work Plan

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GeoEngineers - Subsurface Investigation Work Plan

Jefferson Avenue and Hood Street Surface Water Interceptor Project
Tacoma, Washington

for
City of Tacoma

November 20, 2017

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

GeoEngineers – Subsurface Investigation Work Plan

Jefferson Avenue and Hood Street Surface Water Interceptor Project Tacoma, Washington

File No. 0570-156-00

November 20, 2017

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City of Tacoma
Engineering Department
326 East D Street
Tacoma, Washington 98421-1801

Attention: Kristy Beardemphl

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Disclaimer: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

GeoEngineers

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1.0 INTRODUCTION

This Work Plan describes the subsurface investigation activities to be performed for the City of Tacoma along the proposed Jefferson and Hood Street Surface Water Interceptor Project area generally located from South 21st Street and Jefferson Avenue to the Thea Foss Waterway (Figure 1) in Tacoma, Washington. The City of Tacoma intends to install a new underground stormwater main conveyance system in the general area shown on Figure 1. The installation of the stormwater main will be completed by a design-build team that will be selected by the City of Tacoma.

1.1. Subsurface Investigation Work Plan Objectives

Ten subsurface explorations will be performed to evaluate soil and groundwater conditions during construction of the new stormwater main conveyance system in the City of Tacoma right-of-way (ROW) and on BNSF Railway Company (BNSF) property as shown on Figures 2, 3, and 4. This Work Plan serves as the primary guide and standard operating procedures for field activities related to the sampling and analysis. The work will be completed by GeoEngineers. An additional subsurface investigation will be completed by the design-build team including development of an additional work plan.

2.0 CHEMICALS OF CONCERN

Chemicals of concern (COC) are based on historical operations that may have impacted media within the site. The COCs may include the following.

- Resource Conservation Recovery Act (RCRA) Select metals (arsenic, cadmium, chromium, lead, mercury)
- Diesel- and lube oil-range petroleum hydrocarbons
- Gasoline-range petroleum hydrocarbons
- Volatile organic compounds (VOCs)
- Semivolatile organic compounds (SVOCs)

3.0 INVESTIGATION PLAN

The purpose of the subsurface investigation is to evaluate soil conditions including installation of monitoring wells to measure groundwater levels. Subsurface explorations (borings) will consist of the following activities discussed below. Locations of the borings are shown on Figures 2, 3, and 4 . The location and depth of borings may be modified based on the actual design plans and conditions encountered in the field.

The subsurface investigation will consist of the following components:

- An underground utility locate (public and private) will be conducted in the area of the proposed exploration locations to identify any subsurface utilities and/or potential underground physical hazards prior to beginning the investigation activities.

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- Advance up to ten borings using sonic core drilling equipment (COT-MW1 to COT-MW7) and hollow-stem auger (BNSF-MW1 to BNSF-MW3) operated by a licensed driller. Each boring will be approximately 8 inches in diameter. The target depth for borings and planned drilling technique is shown in Table 1.
- Borings will be telescoped if a semi-confining to confining silt layer is observed during drilling. Wells may be installed as pairs as necessary to evaluate groundwater conditions that will be encountered during construction.
- Soil samples will be collected from each boring for environmental and geotechnical analyses as described in Table 1.
- Each boring will be converted into a permanent groundwater monitoring well in accordance with Chapter 173-160 Washington Administrative Code (WAC) "Minimum Standards for Construction and Maintenance of Wells." The actual depth of the well screen will be based on the depth of groundwater encountered during drilling. The anticipated well screen interval at each boring is identified in Table 1.
- Newly installed monitoring wells will be developed to stabilize the sand pack and formation materials surrounding the well screen and to restore the hydraulic connection between the well screen and the surrounding soil.
- Groundwater samples will be collected for chemical analysis using low-flow sampling methods.
- Pressure transducers will be installed in each well to monitor and record water levels and pressure conditions.

4.0 FIELD PROTOCOLS

Field protocols are described in this section related to soil and groundwater sampling, well installation, survey and water level measurements.

4.1. Soil Sampling Methodology

Soil samples will be obtained to the full-depth explored regardless of the drilling method(s). Soil samples will be obtained at 2.5- to 5- foot depth intervals in each boring using standard penetration test (SPT) samplers general accordance with ASTM International (ASTM) D 1586. Continuous samples will be obtained between the SPT sampling intervals when using the sonic-drilling method. Continuous samples will not be obtained when using hollow stem auger methods, but will be obtained during SPT sampling at intervals of 2.5 to 5 feet.

The borings will be monitored by a representative of GeoEngineers who will visually classify the soil samples obtained during advancement of the borings, record SPT data, and perform field screening tests on soil samples collected for evidence of petroleum hydrocarbons and photoionizable vapors. The field representative will visually classify the soil in general accordance with ASTM Method D 2488 and record soil descriptions and other relevant field screening details (e.g., staining, debris, odors, etc.) in the field log. ASTM Method D 2488 is the visual-manual soil description method that corresponds to laboratory ASTM Method D 2487 (Unified Soil Classification System [USCS] method). Example field logs are included in Appendix A.

Discrete soil samples will be submitted for chemical analysis that meet the following criteria:

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- Every 5- to 10-foot depth interval within planned stormwater utility excavation area.
- Where field screening indicates the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- At the groundwater table if groundwater is encountered.
- At the top of confining layer(s) if encountered.

Select soil samples may be collected and retained by the analytical laboratory for follow-up analysis to further delineate the vertical extent of contaminated soil.

Soil samples to be analyzed for VOCs and gasoline-range petroleum hydrocarbons will be collected first at each sample location, directly from the sample sleeve using the 5035A sampling method. Remaining soil samples will be placed in a plastic bag and homogenized following collection of the soil samples for VOC and gasoline-range petroleum hydrocarbons analyses. The homogenized soil will be placed in the remaining sample containers provided by the analytical laboratory. Samples will be placed directly into a cooler with ice and logged on the chain-of-custody for secure transportation to the analytical laboratory as described in Section 6.0.

4.1.1. Field Screening

Field screening results will be recorded on the field logs and the results will be used as a general guideline to delineate areas of possible contamination. The following field screening methods will be used: (1) visual screening, (2) water sheen screening, and (3) headspace vapor screening.

4.1.1.1. VISUAL SCREENING

The soil will be observed for unusual color or staining that may be indicative of contamination.

4.1.1.2. WATER SHEEN SCREENING

This is a qualitative field screening method that can help identify the presence or absence of petroleum hydrocarbons. A portion of the soil sample will be placed in a plastic sheen pan containing water. The water surface will be observed for signs of sheen. The following sheen classifications will be used during field screening:

Classification	Identifier	Description
No Sheen	(NS)	No visible sheen on the water surface
Slight Sheen	(SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly
Moderate Sheen	(MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface
Heavy Sheen	(HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen

4.1.1.3. HEADSPACE VAPOR SCREENING

This is a semi-quantitative field screening method that can help identify the presence or absence of volatile chemicals. A portion of the sample is placed in a resealable plastic bag for headspace vapor screening as soon as possible following sample collection. Ambient air is captured in the bag. The bag is then sealed, left for approximately five minutes, and shaken gently for approximately 10 seconds to expose the soil to

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the air trapped in the bag. Vapors present within the sample bag's headspace are measured by inserting the probe of a photoionization detector (PID) through a small opening in the bag. A PID measures the concentration of organic vapors ionizable by a 10.6 electron volt lamp (standard) in parts per million (ppm) and quantifies organic vapor concentrations in the range between 0.1 ppm and 2,000 ppm (isobutylene-equivalent) with an accuracy of 1 ppm between 0 ppm and 100 ppm. The maximum ppm value will be recorded on the field report for each sample. The PID will be calibrated to fresh air of similar relative humidity experienced at the site and to 100 ppm isobutylene. The PID will be recalibrated if site conditions change (ambient temperature, relative humidity, etc.).

4.2. Telescoping

A semi-confining to confining silt layer is anticipated between 25 to 30 feet bgs in borings COT-MW1 to COT-MW7 based on our review of boring logs completed in the area. A semi-confining to confining silt layer is not anticipated to be observed in borings BNSF-MW1 to BNSF-MW3 based on our review of the Remedial Investigation/Feasibility Study completed for the nearby Sauros Cleanarama site in 2014.

The semi-confining to confining silt layer will likely be penetrated in borings COT-MW6 and COT-MW7 in order to reach a depth of 25 feet below the jacking pit (anticipated to be between 50 to 55 feet bgs). The borings COT-MW6 and COT-MW7 are planned to be telescoped through the anticipated semi-confining to confining silt layer. Two wells will need to be installed if the semi-confining to confining silt layer is observed at a shallower depth than the anticipated jacking pit (25 to 30 feet bgs) in order to observe groundwater conditions in the planned jacking pit without potentially causing cross-contamination between the shallow and deep aquifers. Telescoping is not planned on the remainder of the borings. The following process will be followed to telescope the wells.

- The borings will be telescoped between the two water bearing units if a semi-confining to confining layer is encountered and perched water is observed during sonic-core drilling. Telescoping will comprise driving an 8-inch steel casing into the semi-confining to confining layer. Then the 8-inch casing will be terminated at the semi-confining to confining layer to seal the 8-inch casing and allow for telescoping further down using a smaller diameter steel casing into the lower water bearing unit. The 8-inch casing will be lifted approximately 1 foot as the borehole is filled with at least 3 feet of bentonite. The bentonite will be hydrated with potable water and let sit for at least one hour. Water within the casing will be removed via a bailer or pump as necessary. The smaller diameter casing will be placed inside the larger casing. This will create a seal and reduce the likelihood of groundwater in the shallow aquifer traveling into the deeper aquifer.
- Explorations on the BNSF property will be advanced using hollow-stem auger drilling methods. The drilling method will be switched to sonic-core drilling methods if a semi-confining to confining silt layer is encountered and perched water is observed during hollow-stem auger drilling. The procedures for telescoping described above will be followed in this case to minimize the potential for cross-contamination between the two water-bearing units.

4.3. Well Installation

Drilling and construction of the monitoring wells will be conducted by a Washington State licensed driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC, Ecology 2006). Installation of the monitoring wells will be observed by a GeoEngineers representative who will maintain a detailed log of the construction materials and well depths. Wells will be constructed

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using 2-inch diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010 inch). Details on depths and construction of each proposed well are described in Section 3. However, the actual well depths will be based on field conditions observed at the time of drilling.

4.4. Permanent Monitoring Well Development

Newly installed groundwater monitoring wells will be developed prior to sampling. A field form will be completed with details describing location, condition, water levels, sediment depths, and product levels (if any) observed during inventory activities prior to beginning well development.

Each new groundwater monitoring well will be developed to stabilize the sand pack and formation materials surrounding the well screen and restore the hydraulic connection between the well screen and the surrounding soil. The depth to groundwater in each monitoring well will be measured prior to development using an electric water level indicator.

A surge block will be used to develop the wells by forcing water through the well screen and into the formation soils. A pump will be used to remove the purged water. Development will continue until a minimum of 10 casing volumes of water has been removed or the turbidity of the discharged water is relatively low. The goal of well development will be to reduce the turbidity content of the water to approximately 25 nephelometric turbidity units (NTU). The removal rate and volume of groundwater removed will be recorded on field forms during well development procedures (Appendix A). Well development water will be stored temporarily in drums as discussed in Section 8.0.

4.5. Permanent Groundwater Monitoring Well Groundwater Sampling Protocol

Groundwater samples will be collected from the newly installed monitoring wells and from an existing monitoring well located along the newly constructed Prairie Line Pedestrian Trail which extends parallel to Hood Street on a quarterly basis following installation. The depth to water will be measured and recorded in each well prior to sampling using an electronic water level indicator. Groundwater samples will be obtained using low-flow/low-turbidity sampling techniques to minimize the suspension of particulates in the samples. Groundwater samples will be obtained from monitoring wells using a peristaltic pump or decontaminated bladder pump with disposable bladder. Tubing will be placed at the mid-portion of the well screen interval or half way within the water column if the water column height is less than the screen length. Groundwater will be pumped at approximately 0.5 liters per minute or less. Groundwater will be pumped at a reduced rate to prevent drawdown of greater than 10 percent of the water column. The drawdown will be marked on the field logs if drawdown is necessary in order to obtain a sample.

A water quality measuring system with a flow-through-cell will be used to monitor the following water quality parameters during purging. Water quality parameters will include electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, oxidation-reduction potential and temperature. Turbidity will be measured using a turbidimeter.

Groundwater samples will be collected when the water quality parameters vary by less than 10 percent for three consecutive measurements or three well volumes have been removed. Field measurements will be documented on the field log (Appendix A). The flow-through-cell will be disconnected and the groundwater sample will be placed in laboratory-prepared containers following well purging activities.

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The water samples will be placed into a cooler with ice and logged on the chain-of-custody record using the procedures described in Section 6.0. The groundwater samples will be submitted for the chemical analyses. Purge water will be stored temporarily in drums as discussed in Section 8.0.

4.6. Groundwater Monitoring Well Survey

A licensed surveyor will perform an elevation and location survey of the new monitoring wells to the following vertical datum: City of Tacoma benchmark book published by City of Public Works, July 1, 1990, National Geodetic Vertical Datum (NGVD) 1929 and horizontal datum of North American Datum (NAD) 1983.

4.7. Transducer Installation and Monitoring

The purpose of the pressure transducer is to measure the water levels on a set frequency to develop a time-series of groundwater elevation data. The transducers will be set to record the water level on a 1-hour interval. The data from the transducers will be downloaded periodically. The groundwater level will be recorded with an electronic water level indicator each time the transducer is removed to download data.

5.0 CHEMICAL ANALYSIS

Soil samples from the newly installed monitoring wells will be analyzed for chemical analysis based on known historical operations in the area. We anticipate that up to three to five soil samples collected in each boring will be submitted for chemical analysis as described in Table 1. Chemical analysis may consist of one or more of the following including: Resource Conservation and Recovery Act (RCRA) 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by United States Environmental Protection Agency (EPA) method 6000/7000 series, petroleum hydrocarbon identification method by Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID with appropriate follow-up analysis using Ecology-approved method NWTPH-Gx and NWTPH-Dx as necessary, VOCs by EPA method 8260, and/or SVOCs by EPA method 8270SIM.

Groundwater samples will be submitted for chemical analysis as described in Table 1. Chemical analysis may consist of one or more of the following including: RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 200 series, gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons NWTPH-Dx as necessary, VOCs by EPA method 8260, and/or SVOCs by EPA method 8270SIM.

6.0 POLLUTION PREVENTION AND SITE RESTORATION PLAN

The pollution prevention, water runoff management and site restoration plan is described below. The drilling activities will be performed on paved surface or gravel roads. Therefore, substantial disturbance and runoff is not anticipated.

The drilling subcontractor will install temporary erosion and sediment control (TESC) using best management practice (BMP) measures to prevent off-site movement of sediment as necessary. TESC BMPs will be removed from the area for off-site disposal after completion of each boring. Other impact avoidance and minimization measures include, but are not limited to the following.

- Equipment staging and/or materials storage will be restricted to existing unvegetated areas.

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- Disturbance will be limited to those areas necessary for access to each boring location and drilling of each boring.
- Adequate materials and procedures will be available on site to respond to unanticipated weather conditions or accidental releases of materials (sediment, petroleum hydrocarbons, etc.). Such materials may include straw wattles, straw and absorbent pads.
- Construction equipment and vehicles will be properly maintained to reduce potential for leaking of petroleum products.
- Drill cuttings and excess drilling fluid will be placed in drums. The drums will be hauled off site and stored on a City of Tacoma property located at the City of Tacoma Engineering Department 326 East D Street in Tacoma, Washington. The drums will eventually be disposed at a disposal facility approved by the City of Tacoma.
- No excavation or mechanized land clearing shall occur.
- Spill cleanup materials will be stored on site with the drillers who will be trained in spill control procedures.
- Each monitoring well installed as part of the project will be decommissioned per Ecology following completion of the groundwater monitoring activities. Well decommissioning will likely occur prior to beginning construction activities for the new stormwater main.

7.0 FIELD DOCUMENTATION

The following section describes the sample labels, handling and record keeping.

7.1. Sample Containers and Labeling

The Field Coordinator will manage field protocols related to sample collection, handling and documentation. Soil and water samples will be placed in appropriate laboratory-prepared containers. Sample containers, holding times, and preservatives are listed in Table 2.

Sample containers for environmental samples will be labeled with the following information at the time of sample collection:

- Project number
- Sample name, which will include a reference to the location, sampling depth (if applicable)
- Date and time of collection
- Samplers initials
- Preservative type (if applicable)

Samples for geotechnical testing will be placed in a sealed plastic bag and will be labeled with the following information at the time of sample collection:

- Project number
- Boring designation

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- Sample name
- Sample depth
- Date of collection

The sample collection activities will be noted on the field logs. The Field Coordinator will monitor consistency between sample containers/labels, field logs, and chain of custody forms.

7.2. Sample Handling

Environmental samples will be placed in a clean plastic-lined cooler with ice after collection. The objective of the cold storage will be to attain a sample temperature of 2 to 6 degrees Celsius. Geotechnical samples will be stored at ambient temperature.

GeoEngineers' field personnel will provide for the security of samples from the time the samples are collected until the samples have been received by the courier service or laboratory personnel. A chain-of-custody form will be completed for each group of samples being shipped to the laboratory per standard chain-of-custody protocol. Samples will be transported and delivered to the analytical laboratory in the sample coolers. The samples will either be transported by field personnel, laboratory personnel, by courier service or shipping company.

7.3. Field Observations Documentation and Records

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will record information for each boring on field logs and will maintain a daily field report. Entries in the field logs will be made in pencil or water-resistant ink on water-resistant paper, and corrections will consist of line-out deletions. Individual logs and reports will become part of the project files at the conclusion of the field work.

At a minimum, the following information will be recorded during the collection of each sample.

- Sample location and description
- Sampler's type/name(s)
- Date and time of sample collection
- Sample matrix (soil or water)
- Type of sampling equipment used
- Field instrument (e.g., electronic water level indicator) measurements
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.)
- Preliminary sample descriptions (e.g., lithology, field screening results)
- Sample preservation

The following specific information will also be recorded in the field log for each boring or in a daily field report in addition to the sampling information identified above.

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- Sampling team members
- Time of arrival/entry on site and time of site departure
- Other personnel present at the site at the time of sampling
- Summary of pertinent meetings or discussions with contractor personnel
- Deviations from Work Plan and Health and Safety Plan (HASP) (included in Appendix B)
- Air monitoring results (as necessary)
- Changes in field personnel and responsibilities with reasons for the changes
- Levels of safety protection

The handling, use, and maintenance of field logs and reports are the Field Coordinator's responsibility.

7.4. Decontamination

The objective of the decontamination procedures described herein is to minimize the potential for cross-contamination between sample locations. Sampling equipment will be decontaminated in accordance with the following procedures before each sampling attempt or measurement.

- Brush equipment with a nylon brush to remove large particulate matter
- Rinse with distilled water
- Wash with non-phosphate detergent solution (Alconox® and distilled water)
- Rinse with distilled water

8.0 DISPOSAL OF INVESTIGATION-DERIVED WASTE MATERIALS

8.1. Soil

Soil cuttings generated from the soil borings will be stored in sealed and labeled 55-gallon drums. The drums will be stored on City of Tacoma property located at the City of Tacoma Engineering Department 326 East D Street in Tacoma, Washington. The drums will eventually be hauled away for disposal at a City of Tacoma-approved disposal facility.

If the results for a soil sample exceeds the "20 times" rule, the sample will be analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) to further evaluate disposal requirements. Each drum will be labeled with the following information:

- Material/media (i.e., soil, drill cuttings) contained in the drum
- Source of the material in the drum (i.e., investigation locations and depths where appropriate)
- Date material was generated
- Name and telephone number of the GeoEngineers contact person

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8.2. Decontamination Water

Decontamination water generated during the sampling activities will be placed in sealed and labeled 55-gallon drums. The drums will be stored on City of Tacoma property located at the City of Tacoma Engineering Department 326 East D Street in Tacoma, Washington. The drums will eventually be hauled away for disposal at a City of Tacoma-approved disposal facility.

The drum will be labeled with the following information:

- Material/media (i.e., water) contained in the drum
- Source of the material in the drum (i.e., purge water, decontamination water)
- Date material was generated
- Name and telephone number of GeoEngineers contact person

8.3. Incidental Waste

Incidental waste to be generated during sampling activities includes items such as gloves, plastic sheeting, sample tubing, paper towels and similar expended and discarded field supplies. These materials are considered *de minimis* and will be disposed in a local trash receptacle or county disposal facility.

9.0 QUALITY ASSURANCE AND QUALITY CONTROL

Environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality and that meet established objectives. QA/QC procedures will be implemented to identify that the precision, accuracy, representativeness, completeness and comparability (PARCC) of the data generated meet the specified data quality objectives within standard industry guidelines as described in Tables 2 through 6.

9.1. Field Quality Control

9.1.1. Field Duplicates

Field duplicates serve as a measure for precision. Under ideal field conditions, field duplicates (sometimes referred to as splits) are created by thoroughly mixing a volume of the sample matrix, placing aliquots of the mixed sample in separate containers and identifying one of the aliquots as the primary sample and the other as the duplicate sample. Field duplicates measure the precision and consistency of laboratory analytical procedures and methods as well as the consistency of the sampling techniques used by field personnel. No field duplicates will be collected during this investigation.

9.1.2. Trip Blanks

Trip blanks accompany samples for VOC analysis during field sampling and delivery to the laboratory. Trip blanks will be analyzed during this investigation only if VOCs are detected in the original data set to rule out sample containers and coolers as potential sources of the detections.

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9.2. Data Management and Documentation

Data logs and data report packages will be located in the project file system in GeoEngineers' Sharepoint. Laboratory data reports will include internal laboratory quality control checks and sample results. Data logs and packages anticipated to be generated during the investigation include laboratory data report packages, field report, field sampling data sheets, site plan of sample locations and chain-of-custody forms.

Analytical data will be supplied to GeoEngineers in both electronic data deliverable (EDD) format and PDF format. The PDF will serve as the official record of laboratory results. The EDDs will contain only data reported in the hard copy reports (e.g., only reportable results).

The EDD will be uploaded to a project database and reduced into summary tables for each group of analytes and media upon receipt of the analytical data. Upon completion of the summary tables, the accuracy of the data reduction will be verified using the hard copy of the data received from the laboratory. Any exceptions will be noted and corrections will be made.

9.3. Data Validation and Usability

Data validation will be performed upon receipt of the sample data from the laboratory and evaluated for usability.

10.0 HEALTH AND SAFETY AND TRAINING

A site-specific HASP has been developed for use during site characterization field activities. The HASP is included in Appendix B. The Field Coordinator will be responsible for implementing the HASP during field activities. The Project Manager will discuss health and safety issues with the Field Coordinator on a routine basis during the completion of field activities. On-site personnel will be current with BNSF Contractor Orientation training and 40-hour Hazwoper training when working on BNSF property. Additional BNSF training (Erailsafe and Railway Protection) are not required for this project because the field work activities will be located at least 25 feet away from the closest active railroad line

The Field Coordinator will conduct a Job Safety briefing each morning before beginning daily field activities. The Field Coordinator will terminate any work activities that do not comply with the HASP. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP for use by their employees.

11.0 SCHEDULE

The subsurface exploration activities including drilling and installation of the monitoring wells will hopefully begin in mid-December 2017 but is dependent on receiving the right-of way permits from City of Tacoma and the access permit from BNSF. Groundwater samples will be collected from each well following well installation and development. Pressure transducers will be placed in select wells for monitoring water levels. The design-build team will complete additional groundwater monitoring and download the data from the transducers in 2018. The schedule for completing the additional field investigation will be developed after the design-build team has been selected.

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Table 1

Summary of Planned Wells and Groundwater Monitoring

Jefferson Avenue and Hood Street Surface Water Interceptor Project

Tacoma, Washington

Location	Ecology Regulatory Authority	Monitoring Well ID	Drilling Methodology	Targeted Boring Depth	Targeted Boring Depth (feet bgs)	Well Screen Target	Anticipated Depth of Groundwater Level (feet bgs)	Approximate Well Screen Interval (feet bgs)	Anticipated Lithology of Well Screen	Purpose	Telescoping Planned	Soil Chemical Analysis[3]							Groundwater Chemical Analysis					Physical Analysis	
												VOCs[4]	Petroleum Hydrocarbons[5]			RCRA Metals[6 and 8]	SVOCs[7 and 8]	PCBs[9]	VOCs	Petroleum Hydrocarbons[5]		RCRA Metals[6 and 8]	SVOCs[7 and 8]	Grain Size Analysis	Moisture Content
													HCID	Gasoline-Range	Diesel and Lube Oil-Range					Gasoline-Range	Diesel and Lube Oil-Range				
Jefferson Avenue	UWT Agreed Order DE 11081	COT-MW1	Sonic Core with 5-foot SPT samples	2 feet below the pipe	25 feet or depth of semi-confining silt layer	Within potential pipe excavation	10 to 15	5 to 25	Ice Contact Deposits (Qvi)	Soil and groundwater conditions in pipe excavation	No	X		X					X	X				X	X
Jefferson Avenue	UWT Agreed Order DE 11081	COT-MW2	Sonic Core with 5-foot SPT samples	2 feet below the pipe	25 feet or depth of semi-confining silt layer	Within potential pipe excavation	10 to 15	5 to 25	Ice Contact Deposits (Qvi) or Former Drainage Channel	Soil and groundwater conditions in pipe excavation	No	X		X					X	X				X	X
Jefferson Avenue	UWT Agreed Order DE 11081	COT-MW3	Sonic Core with 5-foot SPT samples	2 feet below the pipe	25 feet or depth of semi-confining silt layer	Within potential pipe excavation	10 to 15	5 to 25	Ice Contact Deposits (Qvi)	Soil and groundwater conditions in pipe excavation	No	X		X					X	X				X	X
Jefferson Avenue	UWT Agreed Order DE 11081	COT-MW4	Sonic Core with 5-foot SPT samples	2 feet below the pipe	25 feet or depth of semi-confining silt layer	Within potential pipe excavation	10 to 15	5 to 25	Ice Contact Deposits (Qvi)	Soil and groundwater conditions in pipe excavation	No	X		X					X	X				X	X
Jefferson Avenue	UWT Agreed Order DE 11081	COT-MW5	Sonic Core with 5-foot SPT samples	2 feet below the pipe	25 feet or depth of semi-confining silt layer	Within potential pipe excavation	5 to 10	5 to 25	Ice Contact Deposits (Qvi)	Soil and groundwater conditions in pipe excavation	No	X		X					X	X				X	X
Pacific Avenue (S 17th Street)	None	COT-MW6	Sonic Core with 5-foot SPT samples	25 feet below the jacking pit	55	Within potential jacking pit	5 to 12	5 to 30	Ice Contact Deposits (Qvi)	Soil and groundwater conditions in and below jacking pit	Yes[1]	X	X	As follow-up	As follow-up		X	As follow-up	X	X	X	X		X	X
Pacific Avenue (Prairie Line Pedestrian Trail)	None	COT-MW7	Sonic Core - SPT samples collected at 5-foot depth intervals	25 feet below the jacking pit	50	Within potential jacking pit	10 to 20	5 to 25	Ice Contact Deposits (Qvi)	Soil and groundwater conditions in and below jacking pit	Yes[1]	X	X	As follow-up	As follow-up		X	As follow-up	X	X	X	X	X	X	X
Prairie Line Pedestrian Trail	None	PLT-MW2	N/A	N/A	N/A	N/A	N/A	N/A	Ice Contact Deposits (Qvi)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	X	X	X	X	X		
BNSF property	City of Tacoma/Sauros Agreed Order DE 11080	BNSF-MW1	Hollow Stem Auger - 2.5-foot depth interval SPT samples to bottom of jacking pit, then 5-foot depth intervals thereafter using SPT	25 feet below the jacking pit	65	Within potential jacking pit	15 to 20	10 to 40	PreFraser or Former Drainage Channel Fill	Soil and groundwater conditions in and below jacking pit and further define former drainage channel depth and groundwater level	No[2]	X	X	As follow-up	As follow-up	X	X	As follow-up	X	X	X	X	X	X	X
BNSF property	City of Tacoma/Sauros Agreed Order DE 11080	BNSF-MW2	Hollow Stem Auger - SPT samples collected at 2.5-foot depth intervals	10 feet below the groundwater	30	Across groundwater	20 to 25	15 to 30	PreFraser	Environmental and geotechnical soil sampling; groundwater monitoring and sampling	No[2]	X	X	As follow-up	As follow-up	X	X	As follow-up	X	X	X	X	X	X	X
BNSF property	None	BNSF-MW3	Hollow Stem Auger - SPT samples collected at 2.5-foot depth intervals to bottom of jacking pit, then 5-foot depth intervals thereafter using SPT	25 feet below the jacking pit	50	Within potential jacking pit	20 to 25	15 to 30	PreFraser	Soil and groundwater conditions in and below jacking pit	No[2]	X	X	As follow-up	As follow-up	X	X	As follow-up	X	X	X	X	X	X	X

Notes:

[1] Borings planned to be drilled using the sonic-core drilling method. If a semi-confining to confining layer is encountered and perched water is observed during drilling, the borings will be telescoped between the two water bearing units.

[2] Borings planned to be drilled with hollow-stem auger techniques. If a semi-confining to confining layer is encountered and perched water is observed during hollow-stem auger drilling, the drilling method will be switched to sonic-core drilling to minimize the potential for cross-contamination. The borings will be telescoped between the two water bearing units.

[3] Discrete soil samples will be submitted for chemical analysis that meet the following criteria: Every 5- to 10-foot depth interval within planned stormwater utility excavation area; Where field screening indicates the soil is impacted; Directly below potentially impacted soil to delineate the vertical extent; At the groundwater table if groundwater is encountered; At the top of confining layer(s) if encountered.

[4] Volatile organic compounds (VOCs) by EPA method 8260.

[5] Petroleum hydrocarbon identification method by Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID with appropriate follow-up analysis using Ecology-approved methods NWTPH-Gx and NWTPH-Dx as necessary.

[6] Resource Conservation Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by United States Environmental Protection Agency (EPA) method 6000/7000 (soil) or 200 series (groundwater).

[7] Semivolatile organic compounds (SVOCs) by EPA method 8270SIM (low level for PAHs).

[8] RCRA metals SVOCs will only be submitted in observed fill-like materials. Chemical analysis of RCRA metals and SVOCs is not planned on native materials except to obtain the vertical limit of contamination.

[9] Polychlorinated Biphenyls (PCBs) by EPA method 8082A will be submitted as follow-up analysis only if lube-oil range petroleum hydrocarbons are detected on select samples.

bgs = below ground surface
N/A = not applicable
SVOCs = semivolatile organic compounds
SPT = standard penetration test
VOCs = volatile organic compounds
PCBs = Polychlorinated Biphenyls
BNSF = BNSF Railway Company
HCID = hydrocarbon identification
Ecology = Washington State Department of Ecology
QVI = Ice Contact Deposits
RCRA = Resource Conservation Recovery Act
EPA = United States Environmental Protection Agency

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Table 2

Test Methods, Sample Containers, Preservation and Hold Times

Jefferson Avenue and Hood Street Surface Water Interceptor Project

Tacoma, Washington

Analysis	Method	Soil				Groundwater			
		Minimum Sample Size	Bottle Size	Preservation	Holding Times	Minimum Sample Size	Bottle Size	Preservation	Holding Times
Petroleum Hydrocarbon Identification	NWTPH-HCID	4 oz	4 oz glass with Teflon-lined lid	Cool 4°C	14 days	N/A	N/A	N/A	N/A
Gasoline-Range Petroleum Hydrocarbons	NWTPH-Gx	4 oz glass with Teflon-lined lid, 40 ml VOA (pre-weighted)	4 oz glass with Teflon-lined lid, 40 ml VOA (pre-weighted) or Encore Sampler	Cool 4°C	48 Hours to Freeze/ 14 days	80 mL	Two 40 mL VOA Vials	Cool ≤6°C HCl - pH<2	14 days preserved 7 days unpreserved
Diesel and Lube Oil-Range Petroleum Hydrocarbons	NWTPH-Dx	4 oz	4 oz glass with Teflon-lined lid	Cool 4°C	14 days	500 mL	Two 500 mL amber glass with Teflon-lined lid	Cool ≤6°C	7 days to extraction 40 days from extraction to analysis
Total RCRA Metals	EPA 6000/7000	4 oz	4 oz glass with Teflon-lined lid	Cool 4°C	180 days/ 28 days for Mercury	500 mL	1 L HDPE	HN03 - pH<2 (Dissolved metals preserved after filtration)	180 days (28 days for mercury)
Volatile Organic Compounds (VOCs)	EPA 8260B/ 5035A	Three 40 ml VOAs, 2 with stir bar or Encore Sampler	4 oz glass with Teflon-lined lid, 40 ml VOA (pre-weighted) or Encore Sampler	Cool 4°C	48 Hours to Freeze/ 14 days	120 mL	Three 40 mL VOA Vials	Cool ≤6°C HCl - pH<2	14 days preserved 7 days unpreserved
Semivolatile Organic Compounds (SVOCs)	EPA 8270D/SIM	4 oz	4 oz glass with Teflon-lined lid	Cool 4°C	14 days	500 mL	Two 500 mL amber glass with Teflon-lined lid	Cool ≤6°C	7 days to extraction 40 days from extraction to analysis

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Notes:

Extraction holding time is based on elapsed time from date of sample collection.
EPA = United States Environmental Protection Agency
˚C = degree Celsius
oz = ounce
N/A = not applicable
mL = milliliter
HDPE = high-density polyethylene

Table 3

Measurement Quality Objectives

Jefferson Avenue and Hood Street Surface Water Interceptor Project

Tacoma, Washington

Laboratory Analysis	Reference Method	Check Standard (LCS) %R Limits[2,3]		Matrix Spike (MS) %R Limits[3]		Surrogate Standards (SS) %R Limits [1,2,3]	MS Duplicate Samples or Lab Duplicate RPD Limits[4]	
		Soil	Water	Soil	Water	Soil/Water	Soil	Water
Gasoline-Range Petroleum Hydrocarbons	NWTPH-Gx	N/A	N/A	N/A	N/A	68 to 123	≤30% (DUP)	≤30% (DUP)
Diesel- and Heavy Oil-Range Petroleum Hydrocarbons	NWTPH-Dx	65 to 140	56 to 118	N/A	N/A	50 to 150	N/A	N/A
Volatile Organic Compounds (VOC)	EPA 8260C/5035A	66 to 129	64 to 140	60 to 122	69 to 133	76 to 131	≤18% (MS)	≤15% (MS)
Semivolatile Organic Compounds (SVOCs)	EPA 8270D SIM	57 to 141	41 to 135	38 to 140	41 to 135	39 to 131	≤34% (MS)	≤36% (MS)
Metals (As, Ba, Cd, Cr, Hg, Pb, Se, Ag)	EPA 6000/7000 Series (soil); EPA 200.8 (water)	80 to 120	80 to 120	75 to 125	75 to 125	N/A	≤20%	≤20%

Notes:

[1] Individual surrogate recoveries are compound specific.

[2] Recovery ranges are estimates.

[3] Percent Recovery Limits (%R Limits) are expressed as ranges based on laboratory control limits. Limits will vary for individual analytes.

[4] RPD control limits are only applicable if the concentrations are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the difference between the sample and the duplicate must be less than 5X the MRL for soil and water.

N/A = not applicable

LCS = laboratory control sample

MS/MSD = matrix spike/matrix spike duplicate

RPD = relative percent difference

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Table 4

Quality Control Samples - Type and Frequency

Jefferson Avenue and Hood Street Surface Water Interceptor Project

Tacoma, Washington

Samples Collected for Chemical Analytical Testing	Field QC		Laboratory QC			
	Field Duplicates	Trip Blanks	Method Blanks	LCS	MS/MSD	Lab Duplicates
Soil	10 percent of samples	If VOCs are detected in sample	1 per batch	1 per batch	1 per batch[1]	1 per batch[2]
Groundwater	1 per every sampling event	If VOCs are detected in sample	1 per batch	1 per batch	1 per batch[1 and 3]	1 per batch[2]

Notes:

[1] MS/MSD analyses are not completed on NWTPH-Gx and NWTPH-Dx analysis.

[2] Lab duplicates are not completed on VOCs, SVOCs, and PCB analysis because the MS/MSD serves as the lab duplicate sample.

[3] Two times the sample volume will be collected to provide adequate sample volume to perform MS/MSD analyses.

An analytical batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/MSD (or MS and lab duplicate).

No more than 20 field samples can be contained in one batch.

LCS = laboratory control sample

MS/MSD = matrix spike/matrix spike duplicate

QC = quality control

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Table 5

Analysis Methods and Target Reporting Limits for Soil Samples

Jefferson Avenue and Hood Street Surface Water Interceptor Project

Tacoma, Washington

Analyte	MTCA Method A Cleanup Level for Soil Unrestricted Land Use (mg/kg)	Target Reporting Limit (mg/kg)[1]
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx		
Gasoline-Range Petroleum Hydrocarbons	30/100	5.0
Diesel-Range Petroleum Hydrocarbons	2,000	25
Heavy Oil-Range Petroleum Hydrocarbons	2,000	50
Metals by EPA Methods 6000/7000 Series		
Arsenic	20	10
Cadmium	2	0.5
Chromium (Total)	NE	0.5
Chromium (VI) by EPA Method 7196A	19	1.0
Lead	250	5.0
Mercury by EPA Method 7471A	2	0.25
Volatile Organic Compounds by EPA Method 8260		
(cis) 1,2-Dichloroethene	NE	0.0010
(cis) 1,3-Dichloropropene	NE	0.0010
(trans) 1,2-Dichloroethene	NE	0.0010
(trans) 1,3-Dichloropropene	NE	0.0010
1,1,1,2-Tetrachloroethane	NE	0.0010
1,1,1-Trichloroethane	2	0.0010
1,1,2,2-Tetrachloroethane	NE	0.0010
1,1,2-Trichloroethane	NE	0.0010
1,1-Dichloroethane	NE	0.0010
1,1-Dichloroethene	NE	0.0010
1,1-Dichloropropene	NE	0.0010
1,2,3-Trichlorobenzene	NE	0.0010
1,2,3-Trichloropropane	NE	0.0010
1,2,4-Trichlorobenzene	NE	0.0010
1,2,4-Trimethylbenzene	NE	0.0010
1,2-Dibromo-3-chloropropane	NE	0.0050
1,2-Dibromoethane	NE	0.0010
1,2-Dichlorobenzene	NE	0.0010
1,2-Dichloroethane	NE	0.0010
1,2-Dichloropropane	NE	0.0010
1,3,5-Trimethylbenzene	NE	0.0010
1,3-Dichlorobenzene	NE	0.0010
1,3-Dichloropropane	NE	0.0010
1,4-Dichlorobenzene	NE	0.0010
2,2-Dichloropropane	NE	0.0010
2-Butanone	NE	0.0050
2-Chloroethyl Vinyl Ether	NE	0.0050
2-Chlorotoluene	NE	0.0010
2-Hexanone	NE	0.0050
4-Chlorotoluene	NE	0.0010
Acetone	NE	0.0050
Benzene	NE	0.0010
Bromobenzene	NE	0.0010
Bromochloromethane	NE	0.0010
Bromodichloromethane	NE	0.0010
Bromoform	NE	0.0010
Bromomethane	NE	0.0010
Carbon Disulfide	NE	0.0010
Carbon Tetrachloride	NE	0.0010
Chlorobenzene	NE	0.0010
Chloroethane	NE	0.0050
Chloroform	NE	0.0010
Chloromethane	NE	0.0050
Dibromochloromethane	NE	0.0010
Dibromomethane	NE	0.0010
Dichlorodifluoromethane	NE	0.0010
Ethylbenzene	6	0.0010
Hexachlorobutadiene	NE	0.0050
Iodomethane	NE	0.0050
Isopropylbenzene	NE	0.0010
m,p-Xylene	NE	0.0020
Methyl Isobutyl Ketone	NE	0.0050
Methyl t-Butyl Ether	0.1	0.0010
Methylene Chloride	0.02	0.0050
Naphthalene	5	0.0010
n-Butylbenzene	NE	0.0010
n-Propylbenzene	NE	0.0010
p-Isopropyltoluene	NE	0.0010
sec-Butylbenzene	NE	0.0010
Styrene	NE	0.0010
tert-Butylbenzene	NE	0.0010
Tetrachloroethene	0.05	0.0010
Toluene	7	0.0050
Total Xylene	9	0.0010
Trichloroethene	0.03	0.0010
Trichlorofluoromethane	NE	0.0010
Vinyl Acetate	NE	0.0050
Vinyl Chloride	NE	0.0010

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Analyte	MTCA Method A Cleanup Level for Soil Unrestricted Land Use (mg/kg)	Target Reporting Limit (mg/kg)[1]
Polycyclic Aromatic Hydrocarbons by EPA Method 8270-SIM		
Acenaphthene	NE	0.0067
Acenaphthylene	NE	0.0067
Anthracene	NE	0.0067
Benzo[a]anthracene	NE	0.0067
Benzo[a]pyrene	0.1	0.0067
Benzo[b]fluoranthene	NE	0.0067
Benzo[g,h,i]perylene	NE	0.0067
Benzo[j,k]fluoranthene	NE	0.0067
Chrysene	NE	0.0067
Dibenz[a,h]anthracene	NE	0.0067
Fluoranthene	NE	0.0067
Fluorene	NE	0.0067
Indeno[1,2,3-c,d]pyrene	NE	0.0067
1-Methylnaphthalene	NE	0.0067
2-Methylnaphthalene	NE	0.0067
Naphthalene	5	0.0067
Phenanthrene	NE	0.0067
Pyrene	NE	0.0067
Semivolatile Organic Compounds by EPA Method 8270		
(3+4)-Methylphenol (m,p-Cresol)	NE	0.033
1,2,4-Trichlorobenzene	NE	0.033
1,2-Dichlorobenzene	NE	0.033
1,2-Dinitrobenzene	NE	0.033
1,2-Diphenylhydrazine	NE	0.033
1,3-Dichlorobenzene	NE	0.033
1,3-Dinitrobenzene	NE	0.170
1,4-Dichlorobenzene	NE	0.033
1,4-Dinitrobenzene	NE	0.033
1-Methylnaphthalene	NE	0.033
2,3,4,6-Tetrachlorophenol	NE	0.033
2,3,5,6-Tetrachlorophenol	NE	0.033
2,3-Dichloroaniline	NE	0.033
2,4,5-Trichlorophenol	NE	0.033
2,4,6-Trichlorophenol	NE	0.033
2,4-Dichlorophenol	NE	0.033
2,4-Dimethylphenol	NE	0.830
2,4-Dinitrophenol	NE	0.170
2,4-Dinitrotoluene	NE	0.033
2,6-Dinitrotoluene	NE	0.033
2-Chloronaphthalene	NE	0.033
2-Chlorophenol	NE	0.033
2-Methylnaphthalene	NE	0.033
2-Methylphenol (o-Cresol)	NE	0.033
2-Nitroaniline	NE	0.033
2-Nitrophenol	NE	0.033
3,3'-Dichlorobenzidine	NE	0.330
3-Nitroaniline	NE	0.033
4,6-Dinitro-2-methylphenol	NE	0.170
4-Bromophenyl-phenylether	NE	0.033
4-Chloro-3-methylphenol	NE	0.033
4-Chloroaniline	NE	0.033
4-Chlorophenyl-phenylether	NE	0.033
4-Nitroaniline	NE	0.033
4-Nitrophenol	NE	0.033
Acenaphthene	NE	0.033
Acenaphthylene	NE	0.033
Aniline	NE	0.170
Anthracene	NE	0.033
Benzidine	NE	0.330
Benzo[a]anthracene	NE	0.033
Benzo[a]pyrene	0.1	0.033
Benzo[b]fluoranthene	NE	0.033
Benzo[g,h,i]perylene	NE	0.033
Benzo[j,k]fluoranthene	NE	0.033
Benzoic acid	NE	0.170
Benzyl alcohol	NE	0.033
bis(2-Chloroethoxy)methane	NE	0.033
bis(2-chloroethyl)ether	NE	0.033
bis(2-Chloroisopropyl)ether	NE	0.033
bis(2-Ethylhexyl)phthalate	NE	0.033
bis-2-Ethylhexyladipate	NE	0.033
Butylbenzylphthalate	NE	0.033
Carbazole	NE	0.033
Chrysene	NE	0.033
Dibenz[a,h]anthracene	NE	0.033
Dibenzofuran	NE	0.033
Diethylphthalate	NE	0.170
Dimethylphthalate	NE	0.033
Di-n-butylphthalate	NE	0.033
Di-n-octylphthalate	NE	0.033
Fluoranthene	NE	0.033
Fluorene	NE	0.033
Hexachlorobenzene	NE	0.033

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Analyte	MTCA Method A Cleanup Level for Soil Unrestricted Land Use (mg/kg)	Target Reporting Limit (mg/kg)[1]
Hexachlorobutadiene	NE	0.033
Hexachlorocyclopentadiene	NE	0.033
Hexachloroethane	NE	0.033
Indeno[1,2,3-c,d]pyrene	NE	0.033
Isophorone	NE	0.033
Naphthalene	5	0.033
n-Decane	NE	0.330
Nitrobenzene	NE	0.033
n-Nitrosodimethylamine	NE	0.033
n-Nitroso-di-n-propylamine	NE	0.033
n-Nitrosodiphenylamine	NE	0.033
n-Octadecane	NE	0.033
Pentachlorophenol	NE	0.170
Phenanthrene	NE	0.033
Phenol	NE	0.033
Pyrene	NE	0.033
Pyridine	NE	0.330
Polychlorinated biphenyls (PCBs) by EPA Method 8082		
Total PCBs	1	0.05

Notes:

[1] Laboratory reporting limits were obtained from OnSite Environmental, Inc., an Ecology-approved laboratory.

NWTPH = Northwest Total Petroleum Hydrocarbons

Gx = Gasoline-extended range

Dx = Diesel-extended range

mg/kg = milligram per kilogram

NE = not established

EPA = United States Environmental Protection Agency

MTCA = Model Toxics Control Act

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Table 6

Methods of Analysis and Target Reporting Limits for Groundwater Samples

Jefferson Avenue and Hood Street Surface Water Interceptor Project

Tacoma, Washington

Analyte	MTCA Method A Cleanup Level for Groundwater (µg/l)	Target Laboratory Reporting Limit[1] (µg/l)
Total Petroleum Hydrocarbons by NWTPH-Gx and NWTPH-Dx		
Gasoline-Range Petroleum Hydrocarbons	800/1000	100
Diesel-Range Petroleum Hydrocarbons	500	250
Oil-Range Petroleum Hydrocarbons	500	400
Metals by EPA Methods 200 series		
Arsenic	5	3.3
Cadmium	5	4.4
Chromium Total	50	11
Chromium (VI) by EPA Method 7196A	NE	10
Lead	150	1.1
Mercury by EPA Method 7470A	2	0.5
Volatile Organic Compounds by EPA Method 8260c		
(cis) 1,2-Dichloroethene	NE	0.2
(cis) 1,3-Dichloropropene	NE	0.2
(trans) 1,2-Dichloroethene	NE	0.2
(trans) 1,3-Dichloropropene	NE	0.2
1,1,1,2-Tetrachloroethane	NE	0.2
1,1,1-Trichloroethane	200	0.2
1,1,2,2-Tetrachloroethane	NE	0.2
1,1,2-Trichloroethane	NE	0.2
1,1-Dichloroethane	NE	0.2
1,1-Dichloroethene	NE	0.2
1,1-Dichloropropene	NE	0.2
1,2,3-Trichlorobenzene	NE	0.2
1,2,3-Trichloropropane	NE	0.2
1,2,4-Trichlorobenzene	NE	0.2
1,2,4-Trimethylbenzene	NE	0.2
1,2-Dibromo-3-chloropropane	NE	1.0
1,2-Dibromoethane	NE	0.2
1,2-Dichlorobenzene	NE	0.2
1,2-Dichloroethane	5	0.2
1,2-Dichloropropane	NE	0.2
1,3,5-Trimethylbenzene	NE	0.2
1,3-Dichlorobenzene	NE	0.2
1,3-Dichloropropane	NE	0.2
1,4-Dichlorobenzene	NE	0.2
2,2-Dichloropropane	NE	0.2
2-Butanone	NE	5.0
2-Chloroethyl Vinyl Ether	NE	1.0
2-Chlorotoluene	NE	0.2
2-Hexanone	NE	2.0
4-Chlorotoluene	NE	0.2
Acetone	NE	5.0
Benzene	5	0.2
Bromobenzene	NE	0.2
Bromochloromethane	NE	0.2
Bromodichloromethane	NE	0.2
Bromoform	NE	1.0
Bromomethane	NE	0.2
Carbon Disulfide	NE	0.2
Carbon Tetrachloride	NE	0.2
Chlorobenzene	NE	0.2
Chloroethane	NE	1.0
Chloroform	NE	0.2
Chloromethane	NE	1.0
Dibromochloromethane	NE	0.2
Dibromomethane	NE	0.2
Dichlorodifluoromethane	NE	0.2
Ethylbenzene	700	0.2
Hexachlorobutadiene	NE	0.2
Iodomethane	NE	1.0
Isopropylbenzene	NE	0.2
m,p-Xylene	NE	0.4
Methyl Isobutyl Ketone	NE	2.0
Methyl t-Butyl Ether	20	0.2
Methylene Chloride	5	1.0
Naphthalene	160	1.0
n-Butylbenzene	NE	0.2
n-Propylbenzene	NE	0.2
p-Isopropyltoluene	NE	0.2
sec-Butylbenzene	NE	0.2
Styrene	NE	0.2
tert-Butylbenzene	NE	0.2
Tetrachloroethene	5	0.2
Toluene	1,000	1.0
Total Xylene	1,000	0.2
Trichloroethene	5	0.2
Trichlorofluoromethane	NE	0.2
Vinyl Acetate	NE	2.0
Vinyl Chloride	0.2	0.2

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Analyte	MTCA Method A Cleanup Level for Groundwater (µg/l)	Target Laboratory Reporting Limit[1] (µg/l)
Polycyclic Aromatic Hydrocarbons by EPA Method 8270D-SIM		
Acenaphthene	NE	0.10
Acenaphthylene	NE	0.10
Anthracene	NE	0.10
Benzo[a]anthracene	NE	0.01
Benzo[a]pyrene	0.1	0.01
Benzo[b]fluoranthene	NE	0.01
Benzo[g,h,i]perylene	NE	0.01
Benzo[j,k]fluoranthene	NE	0.01
Chrysene	NE	0.01
Dibenz[a,h]anthracene	NE	0.01
Fluoranthene	NE	0.10
Fluorene	NE	0.10
Indeno[1,2,3-c,d]pyrene	NE	0.01
1-Methylnaphthalene	NE	0.10
2-Methylnaphthalene	NE	0.10
Naphthalene	160	0.10
Phenanthrene	NE	0.10
Pyrene	NE	0.10
Semivolatile Organic Compounds by EPA Method 8270		
(3+4)-Methylphenol (m,p-Cresol)	NE	1.0
1,2,4-Trichlorobenzene	NE	1.0
1,2-Dichlorobenzene	NE	1.0
1,2-Dinitrobenzene	NE	1.0
1,2-Diphenylhydrazine	NE	1.0
1,3-Dichlorobenzene	NE	1.0
1,3-Dinitrobenzene	NE	1.0
1,4-Dichlorobenzene	NE	1.0
1,4-Dinitrobenzene	NE	1.0
1-Methylnaphthalene	NE	1.0
2,3,4,6-Tetrachlorophenol	NE	1.0
2,3,5,6-Tetrachlorophenol	NE	1.0
2,3-Dichloroaniline	NE	1.0
2,4,5-Trichlorophenol	NE	1.0
2,4,6-Trichlorophenol	NE	1.0
2,4-Dichlorophenol	NE	1.0
2,4-Dimethylphenol	NE	1.0
2,4-Dinitrophenol	NE	10
2,4-Dinitrotoluene	NE	1.0
2,6-Dinitrotoluene	NE	1.0
2-Chloronaphthalene	NE	1.0
2-Chlorophenol	NE	1.0
2-Methylnaphthalene	NE	1.0
2-Methylphenol (o-Cresol)	NE	1.0
2-Nitroaniline	NE	1.0
2-Nitrophenol	NE	1.0
3,3'-Dichlorobenzidine	NE	1.0
3-Nitroaniline	NE	1.0
4,6-Dinitro-2-methylphenol	NE	5.0
4-Bromophenyl-phenylether	NE	1.0
4-Chloro-3-methylphenol	NE	1.0
4-Chloroaniline	NE	1.0
4-Chlorophenyl-phenylether	NE	1.0
4-Nitroaniline	NE	1.0
4-Nitrophenol	NE	1.0
Acenaphthene	NE	1.0
Acenaphthylene	NE	1.0
Aniline	NE	1.0
Anthracene	NE	1.0
Benzidine	NE	10
Benzo[a]anthracene	NE	1.0
Benzo[a]pyrene	0.1	1.0
Benzo[b]fluoranthene	NE	1.0
Benzo[g,h,i]perylene	NE	1.0
Benzo[j,k]fluoranthene	NE	1.0
Benzoic acid	NE	5.0
Benzyl alcohol	NE	1.0
bis(2-Chloroethoxy)methane	NE	1.0
bis(2-chloroethyl)ether	NE	1.0
bis(2-Chloroisopropyl)ether	NE	1.0
bis(2-Ethylhexyl)phthalate	NE	1.0
bis-2-Ethylhexyladipate	NE	1.0
Butylbenzylphthalate	NE	1.0
Carbazole	NE	1.0
Chrysene	NE	1.0
Dibenz[a,h]anthracene	NE	1.0
Dibenzofuran	NE	1.0
Diethylphthalate	NE	1.0
Dimethylphthalate	NE	1.0
Di-n-butylphthalate	NE	1.0
Di-n-octylphthalate	NE	1.0
Fluoranthene	NE	1.0
Fluorene	NE	1.0
Hexachlorobenzene	NE	1.0

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Analyte	MTCA Method A Cleanup Level for Groundwater (µg/l)	Target Laboratory Reporting Limit[1] (µg/l)
Hexachlorobutadiene	NE	1.0
Hexachlorocyclopentadiene	NE	1.0
Hexachloroethane	NE	1.0
Indeno[1,2,3-c,d]pyrene	NE	1.0
Isophorone	NE	1.0
Naphthalene	160	1.0
n-Decane	NE	20
Nitrobenzene	NE	1.0
n-Nitrosodimethylamine	NE	1.0
n-Nitroso-di-n-propylamine	NE	1.0
n-Nitrosodiphenylamine	NE	1.0
n-Octadecane	NE	1.0
Pentachlorophenol	NE	5.0
Phenanthrene	NE	1.0
Phenol	NE	1.0
Pyrene	NE	1.0
Pyridine	NE	1.0

Notes:

[1] MTCA Method B groundwater criteria shown because MTCA Method A groundwater cleanup level has not been established.

[2] Laboratory reporting limits were obtained from OnSite Environmental, Inc., a Washington State Department of Ecology-approved laboratory.

NE = not established

SM = Standard Method

µg/l = microgram per liter

EPA = United States Environmental Protection Agency

NWTPH = Northwest Total Petroleum Hydrocarbons

Gx = Gasoline-extended range

Dx = Diesel-extended range

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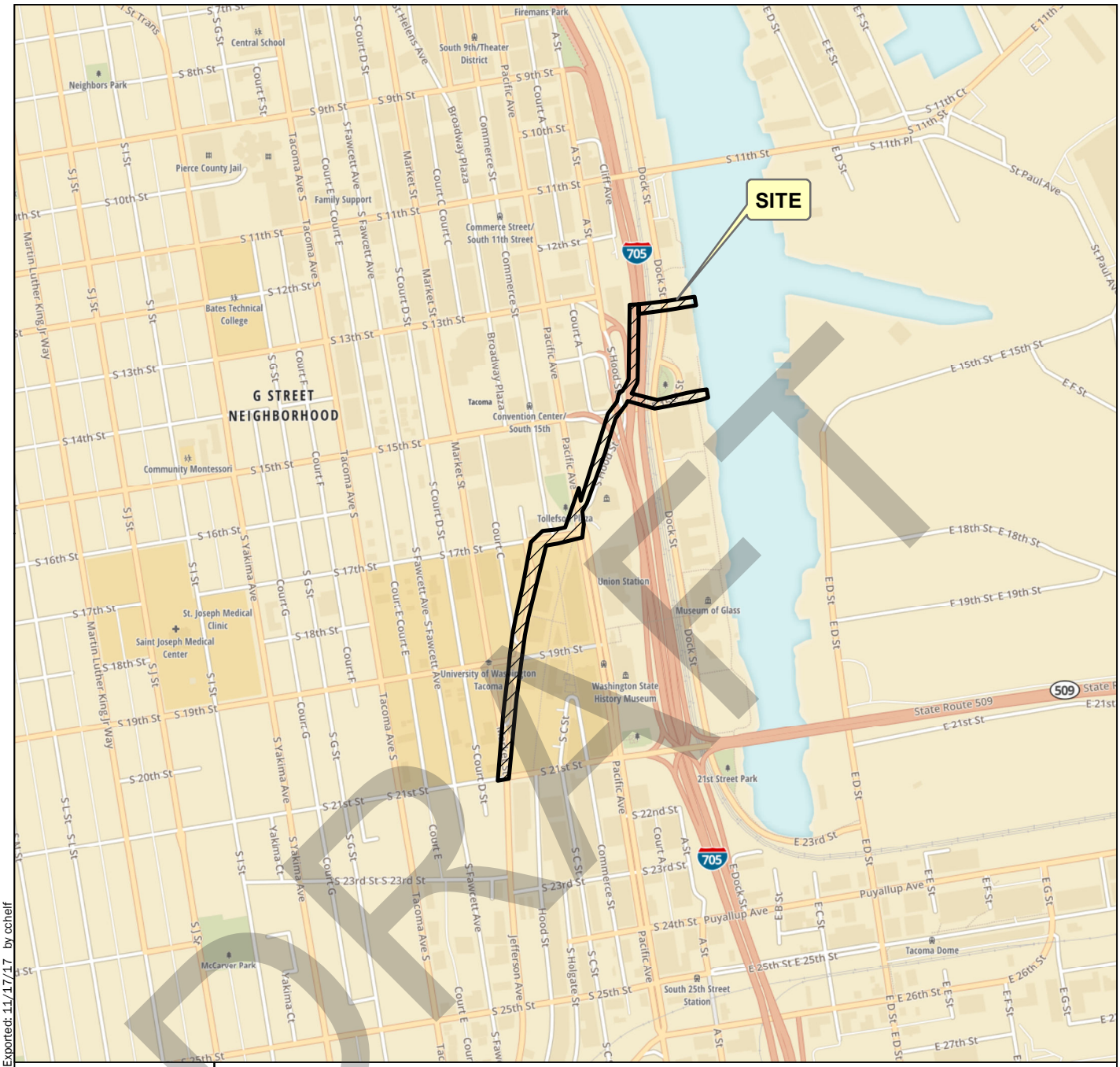

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N
W E
S

1,000 0 1,000

Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 10N

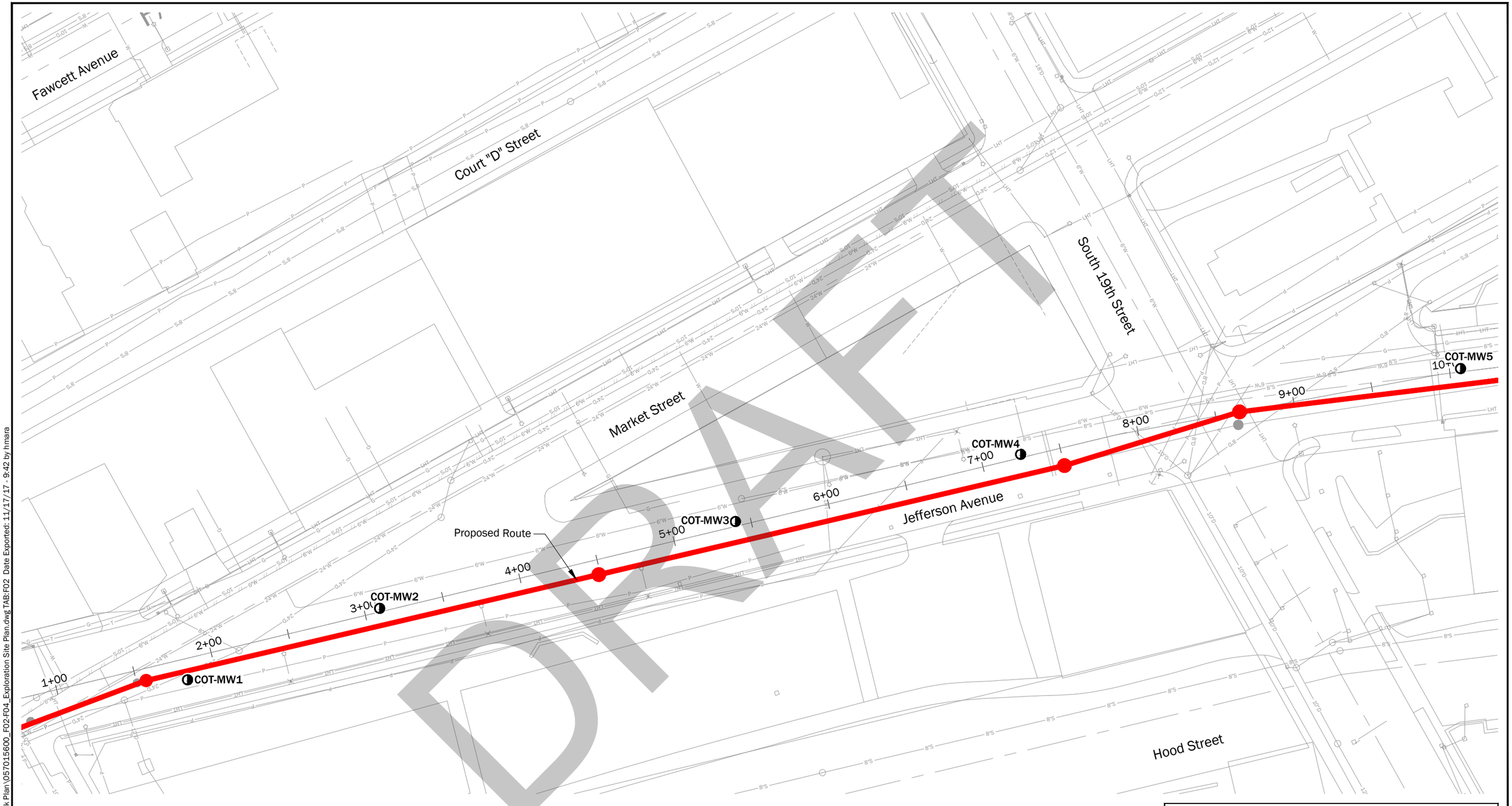
Vicinity Map

Jefferson Avenue & Hood Street
Surface Water Interceptor Project
Tacoma, Washington

GeoEngineers

Figure 1

P:\0\0570156\GIS\0570156600_F01_VicinityMapAgreedOrderWorkPlan.mxd Date Exported: 11/17/17 by cchelf



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Notes:

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Data Source: Background from City of Tacoma dated 10/16/17.

Vertical Datum: City of Tacoma Datum (NGVD 29).

Projection: NAD83 Washington State Planes, South Zone, US Foot.

Legend

- COT-MW1 — Planned Sonic Core Boring to be Completed as Monitoring Well
- Planned Stormwater Utility
- Anticipated Manhole Location

N E S W

60 0 60
Feet

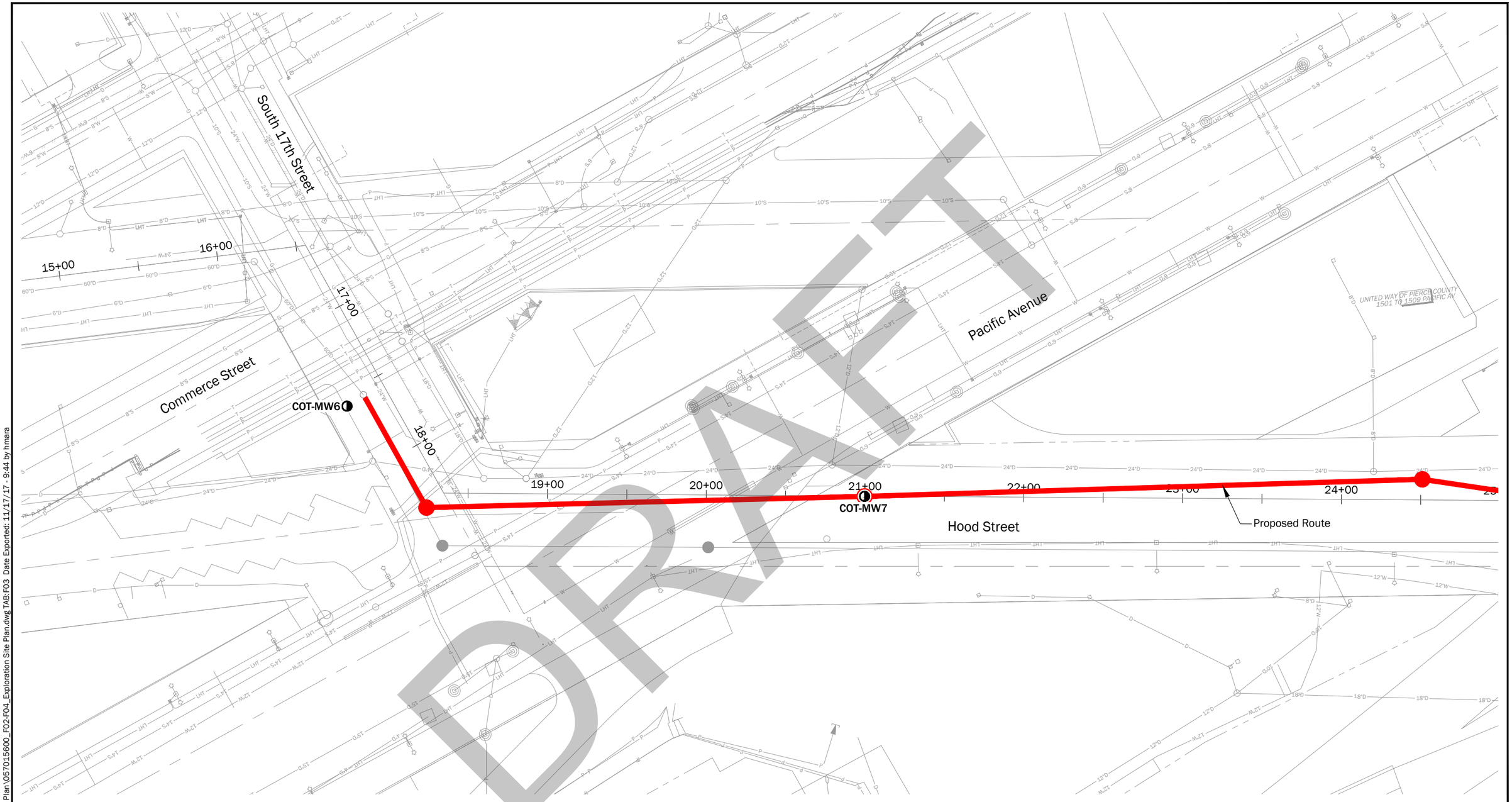
Site Plan of Planned Monitoring Wells (Jefferson Avenue)

Jefferson Avenue & Hood Street
Surface Water Interceptor Project
Tacoma, Washington

GeoEngineers

Figure 2

P:\0\0570156\CAD\00\Agreed Order Work Plan\057015600_F02-F04_Exploration Site Plan.dwg TAB:F02 Date Exported: 11/17/17 - 9:42 by hmara



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Notes:

1. The locations of all features shown are approximate.
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Data Source: Background from City of Tacoma dated 10/16/17.

Vertical Datum: City of Tacoma Datum (NGVD 29).

Projection: NAD83 Washington State Planes, South Zone, US Foot.

Legend

- COT-MW6 — Planned Sonic Core Boring to be Completed as Monitoring Well
- Planned Stormwater Utility
- Anticipated Manhole Location

N E S W

60 0 60
Feet

Site Plan of Planned Monitoring Wells (Pacific Avenue Area)

Jefferson Avenue & Hood Street
Surface Water Interceptor Project
Tacoma, Washington

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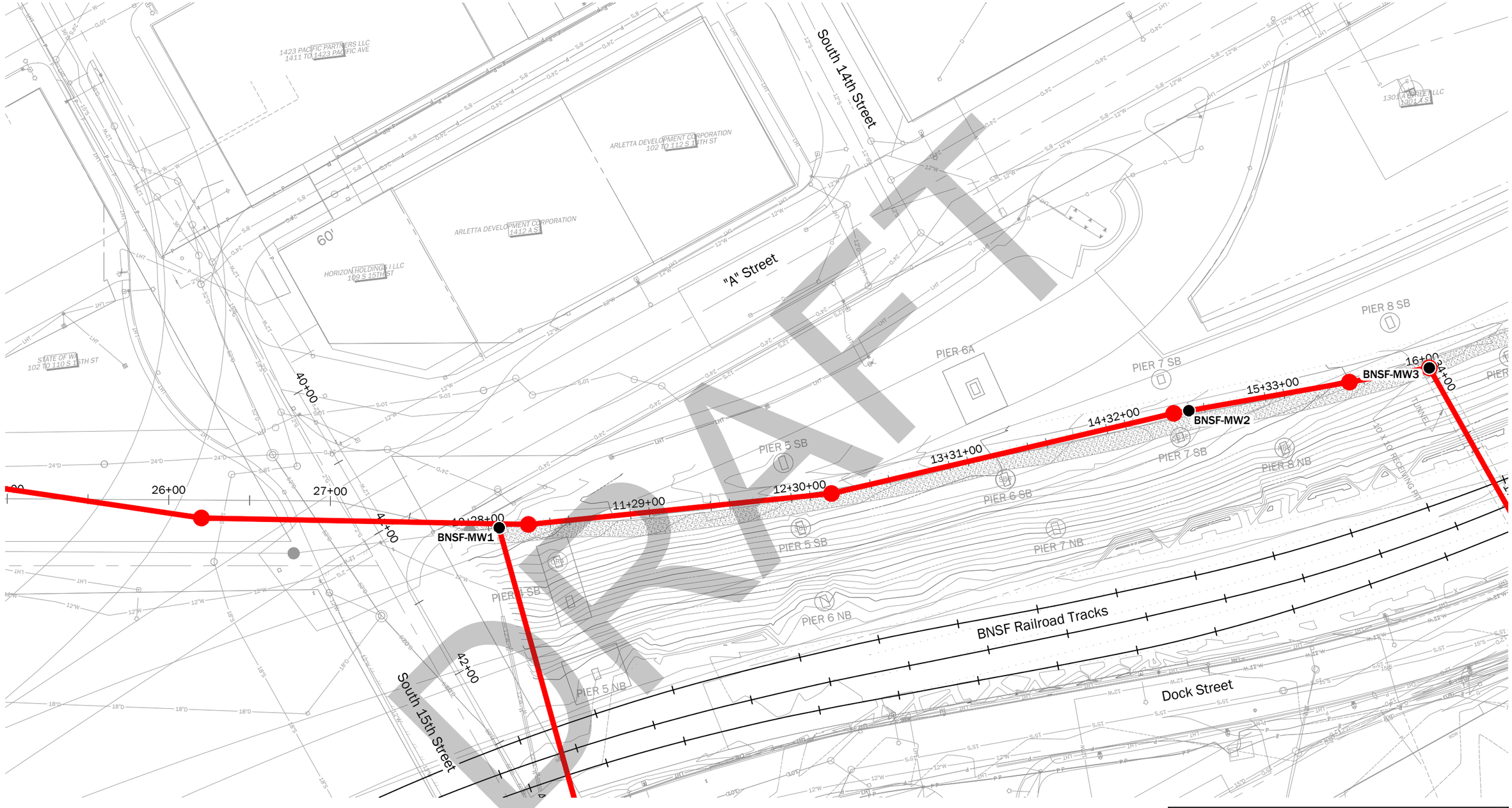
Figure 3

P:\0\0570156\CAD\00\Agreed Order Work Plan\0570156600_F02-F04_Exploration Site Plan.dwg TAB:F03 Date Exported: 11/17/17 - 9:44 by hmara



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Notes:

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Data Source: Background from City of Tacoma dated 10/16/17.

Vertical Datum: City of Tacoma Datum (NGVD 29).

Projection: NAD83 Washington State Planes, South Zone, US Foot.

Legend

- BNSF-MW1 ● Planned Hollow Stem Auger Boring to be Completed as Monitoring Well
- Planned Stormwater Utility
- ● Anticipated Manhole Location

60 0 60
Feet

Site Plan of Planned Monitoring Wells (BNSF Property)

Jefferson Avenue & Hood Street
Surface Water Interceptor Project
Tacoma, Washington

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Figure 4

P:\0\0570156\CAD\00\Agreed Order Work Plan\057015600_F02-F04_Exploration Site Plan.dwg TAB:F04 Date Exported: 11/17/17 - 9:46 by hmara

APPENDIX A
Example Field Forms

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Site Health & Safety Plan

Jefferson Avenue and Hood Street Surface Water Interceptor Project
Tacoma, Washington

for
City of Tacoma

November 20, 2017

GeoEngineers
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

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GEOENGINEERS, INC.
SITE HEALTH AND SAFETY PLAN
JEFFERSON AVENUE AND HOOD STREET SURFACE WATER INTERCEPTOR PROJECT
TACOMA, WASHINGTON
FILE NO. 0570-156-00

This Health and Safety Plan (HASP) is to be used in conjunction with the GeoEngineers, Inc. (GeoEngineers) Safety Programs. Together, the written safety programs and this HASP constitute the site safety plan for this site. This plan is to be used by GeoEngineers personnel on this site and must be available on site. If the work entails potential exposures to other substances or unusual situations, additional safety and health information will be included, and the plan will need to be approved by the GeoEngineers Health and Safety Program Manager. All plans are to be used in conjunction with current standards and policies outlined in the GeoEngineers Health and Safety Programs.

Liability Clause: If requested by subcontractors, this site HASP may be provided for informational purposes only. In this case, Form 1 shall be signed by the subcontractor. Please be advised that this site-specific HASP is intended for use by GeoEngineers employees only. Nothing herein shall be construed as granting rights to GeoEngineers' subcontractors or any other contractors working on this site to use or legally rely on this HASP. GeoEngineers specifically disclaims any responsibility for the health and safety of any person not employed by the company.

1.0 GENERAL PROJECT INFORMATION

Project Name:	Jefferson Avenue & Hood Street Stormwater Upgrade Tacoma, Washington
Project Number:	0570-156-00
Type of Project:	Subsurface Exploration
Start/Completion:	October 2017 – July 2018
Subcontractors:	TBD

Chain of Command	Title	Name	Telephone Numbers
1	**Project Manager**	Tricia DeOme	253-267-2114
2	**Site Safety Officer (SSO)**	Paul Robinette	253-278-0273
3	**Health and Safety Program Manager**	Jodie Sheldon	253-722-2427
4	**Field Personnel**	Paul Robinette	253-278-0273
5	**Client Assigned Site Supervisor**	NA	NA
6	**Subcontractor(s)**	TBD	TBD
7	**Current Owner**	City of Tacoma/BNSF	NA

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1.1. Functional Responsibility

Health and Safety Program Manager (HSM)

GeoEngineers' Health and Safety Program Manager (HSM) is responsible for implementing and promoting employee participation in the program. The HSM issues directives, advisories and information regarding health and safety to the technical staff. Additionally, the HSM has the authority to audit on-site compliance with HASPs, suspend work or modify work practices for safety reasons, and dismiss from the site any GeoEngineers or subcontractor employees whose conduct on the site endangers the health and safety of themselves or others.

Project Manager (PM)

A PM is assigned to manage the activities of various projects and is responsible to the principal-in-charge of the project. The PM is responsible for assessing the hazards present at a job site and incorporating the appropriate safety measures for field staff protection into the field briefing and/or Site Safety Plan. He or she is also responsible for assuring that appropriate HASPs complying with this manual are developed. The PM will provide a summary of chemical analysis to personnel completing the HASP. PMs shall also see that their project budgets consider health and safety costs. The PM shall keep the HSM informed of the project's health- and safety-related matters as necessary. The PM shall designate the project Site Safety Officer (SSO) and help the SSO implement the specifications of the HASP. The PM is responsible for communicating information in site safety plans and checklists to appropriate field personnel. Additionally, the PM and SSO shall hold a site safety briefing before any field activities begin. The PM is responsible for transmitting health and safety information to the SSO when appropriate.

Site Safety Officer/HAZWOPER (SSO)

The SSO will have the on-site responsibility and authority to modify and stop work, or remove personnel from the site if working conditions change that may affect on-site and off-site health and safety. The SSO will be the main contact for any on-site emergency situation. The SSO is First Aid and CPR qualified and has current Hazardous Waste Operations and Emergency Response (HAZWOPER) training. The SSO is responsible for implementing and enforcing the project safety program and safe work practices during site activities. The SSO shall conduct daily safety meetings, perform air monitoring as required, conduct site safety inspections as required, coordinate emergency medical care, and ensure personnel are wearing the appropriate personal protective equipment (PPE). The SSO shall have advanced field work experience and shall be familiar with health and safety requirements specific to the project. The SSO has the authority to suspend site activities if unsafe conditions are reported or observed.

Duties of the SSO include the following:

- Implementing the HASP in the field and monitoring compliance with its guidelines by staff.
- Being sure that all GeoEngineers field personnel have met the training and medical examination requirements. Advising other contractor employees of these requirements.
- Maintaining adequate and functioning safety supplies and equipment at the site.
- Setting up work zones, markers, signs and security systems, if necessary.
- Performing or supervising air quality measurements. Communicating information on these measurements to GeoEngineers field staff and subcontractor personnel.

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- Communicating health and safety requirements and site hazards to field personnel, subcontractors and contractor employees, and site visitors.
- Directing personnel to wear PPE and guiding compliance with all health and safety practices in the field.
- Consulting with the PM regarding new or unanticipated site conditions, including emergency response activities. If monitoring detects concentrations of potentially hazardous substances at or above the established exposure limits, notify/consult with the PM. Consult with the PM and the HSM regarding new or unanticipated site conditions, including emergency response activities. If field monitoring indicates concentrations of potentially hazardous substances at or above the established exposure limits, the HSM must be notified and corrective action taken.
- Documenting all site accidents, illnesses and unsafe activities or conditions, and reporting them to the PM and the HSM.
- Directing decontamination operations of equipment and personnel.

Field Employees

All employees working on-site that have the potential of coming in contact with hazardous substances or physical hazards are responsible for participating in the health and safety program and complying with the site-specific health and safety plans. These employees are required to:

- Participate and be familiar with the health and safety program as described in this manual.
- Notify the SSO that when there is need to stop work to address an unsafe situation.
- Comply with the HASP and acknowledge understanding of the plan.
- Report to the SSO, PM or HSM any unsafe conditions and all facts pertaining to incidents or accidents that could result in physical injury or exposure to hazardous materials.
- Participate in health and safety training, including initial 40-hour Occupational Safety and Health Administration (OSHA) course, annual 8-hour HAZWOPER refresher, and first aid/cardiopulmonary resuscitation (CPR) training.
- Participate in the medical surveillance program if applicable.
- Schedule and take a respirator fit test annually.
- Any field employee working on site may stop work if the employee believes the work is unsafe.

Contractors Under GeoEngineers Supervision

Contractors working on the site under GeoEngineers supervision or direct control that have the potential of coming in contact with hazardous substances or physical hazards shall have their own health and safety program that is in line with the site-specific health and safety plan.

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1.2. List of Field Personnel and Training

Name of Employee on Site	Level of HAZWOPER Training (24-/40-hr)	Date of 8-Hr Refresher Training	First Aid/ CPR	Date of Respirator Fit Test	BNSF Contractor Orientation
Paul Robinette	40	1/25/17	6/29/16	1/25/17	Pending
Roger Chang	40	7/15/16 (in progress)	7/14/16	7/19/16 (in progress)	Pending

1.3. Site Description

The proposed new underground stormwater conveyance (stormwater utility or alignment) is located approximately between South 21st Street and South 13th Street within the downtown area of Tacoma, Washington. The stormwater utility will be 60 inches in diameter. Both conventional cut and cover trenching and trenchless techniques are proposed for installation. The alignment generally extends from South 21st Street to the northeast along Jefferson Avenue to the intersection of Jefferson Avenue and 17th Street. The alignment continues east along 17th Street to the intersection with Pacific Avenue. From the intersection, the alignment will extend in the northeast direction to cross Pacific Avenue and continue along the proposed Prairie Line Trail until it reaches the elevated highway section, southbound State Route 705 (SR) Highway. The alignment will extend north under the elevated highway section for approximately 500 feet and then turn eastward toward the Thea Foss Waterway. The stormwater utility will cross under the existing railroad tracks and Dock Street until it reaches the proposed outfall location on the Thea Foss Waterway. We understand that trenchless methods are proposed along Pacific Avenue, where the alignment crosses the light rail tracks, and where the alignment crosses the railroad tracks and Dock Street, which run parallel to the Thea Foss Waterway.

Currently, there is a portion of the alignment that has been installed approximately between the intersection of Court C and Jefferson Avenue and South 17th Street and Pacific Avenue. We understand that the project goals include connection to either ends of this portion of the stormwater utility.

1.4. Work Plan

- Coordinate the location of subsurface utilities at the site. We will use a private locate service for the on-site utility locate.
- Obtain samples and complete further observations of subsurface conditions, as necessary, for the various purposes identified from our study. We anticipate this could include field screening, soil sampling, development of borings as monitoring wells and groundwater sampling.
- Manage soil cuttings and water generated during our subsurface investigations.

1.5. List of Field Activities

Check the activities to be completed during the project:

☒ Job Safety Briefing Form 4
☒ Site Reconnaissance
☒ Exploratory Borings
☐ Vapor Measurements
☐ Product Sample collection
☐ Soil Stockpile Testing

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☐ Construction Monitoring
☒ Surveying
☐ Test Pit Exploration
☒ Soil Sample Collection
☒ Groundwater Sampling
☒ Groundwater Depth and Free Product Measurement
☐ Remedial Excavation
☐ Recovery of Free Product
☒ Monitoring Well Installation
☒ Monitoring Well Development
☐ Underground Storage Tank (UST) Removal Monitoring
☐ Other: Click here to enter text.

2.0 EMERGENCY INFORMATION

Hospital Name and Address:	St. Joseph Medical Center 1717 S. J St, Tacoma, WA 98405
Phone Numbers (Hospital ER):	**Phone**: (253) 426-4101
Distance:	See attached
Route to Hospital: See attached	**Map to Hospital**: See attached
Ambulance:	9-1-1
Poison Control:	Seattle (206) 253-2121; Other (800) 732-6985
Police:	9-1-1
Fire:	9-1-1
Location of Nearest Telephone:	Cell phones are carried by field personnel.
Nearest Fire Extinguisher:	Located in the GeoEngineers vehicle on site.
Nearest First-Aid Kit:	Located in the GeoEngineers vehicle on site.

2.1. Standard Emergency Procedures

Get help

- Send another worker to phone 9-1-1 (if necessary)
- As soon as feasible, notify GeoEngineers' Project Manager

Reduce risk to injured person

- Turn off equipment
- Move person from injury location (if in life-threatening situation only)
- Keep person warm
- Perform CPR (if necessary)

Transport injured person to medical treatment facility (if necessary)

- By ambulance (if necessary) or GeoEngineers vehicle
- Stay with person at medical facility

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- Keep GeoEngineers Project Manager apprised of situation and notify Human Resources Manager of situation

3.0 HAZARD ANALYSIS

A hazard analysis has been completed as part of preparation of this HASP. The hazard analysis was performed taking into account the known and potential hazards at the site and surrounding areas, as wells as the planned work activities. The results of the hazard analysis are presented in this section. The hazard assessment will be evaluated each day before beginning work. Updates will be made as necessary and documented in the Job Safety Briefing form or daily field log.

The following are known applicable hazards.

3.1. Physical Hazards

☒ Drill rigs and Concrete Coring, including working inside a warehouse

☐ Backhoe

☐ Trackhoe

☐ Crane

☐ Front End Loader

☐ Excavations/trenching (1:1 slopes for Type B soil)

☐ Shored/braced excavation if greater than 4 feet of depth

☒ Overhead hazards/power lines

☒ Tripping/puncture hazards (debris on-site, steep slopes or pits)

☐ Unusual traffic hazard – Street traffic

☒ Heat/Cold, Humidity

☒ Utilities/utility locate

☒ Noise

☐ Other: Click here to enter text.

- Utility checklist will be completed as required for the location to prevent drilling or digging into utilities.
- Work areas will be marked with reflective cones, barricades and/or caution tape. High-visibility vests will be worn by on-site personnel to ensure they can be seen by vehicle and equipment operators.
- Field personnel will be aware at all times of the location and motion of heavy equipment in the area of work to ensure a safe distance between personnel and the equipment. Personnel will be visible to the operator at all times and will remain out of the swing and/or direction of the equipment apparatus. Personnel will approach operating heavy equipment only when they are certain the operator has indicated that it is safe to do so through hand signal or other acceptable means.
- Heavy equipment and/or vehicles used on this site will not work within 20 feet of overhead utility lines without first ensuring that the lines are not energized. This distance may be reduced to 10 feet, depending on the client and the use of a safety watch. Note: If it is later determined that overhead lines

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are a hazard on this job site, a copy the overhead lines safety section from the HASP Supplemental document shall be attached.

- Personnel will avoid tripping hazards, steep slopes, pits and other hazardous encumbrances. If it becomes necessary to work within 6 feet of the edge of a pit, slope or other potentially hazardous area, appropriate fall protection measures will be implemented by the Site Safety Officer in accordance with OSHA/DOSH regulations and the GeoEngineers Health and Safety Program.
- Cold stress control measures will be implemented according to the GeoEngineers Health and Safety Program to prevent frost nip (superficial freezing of the skin), frost bite (deep tissue freezing), or hypothermia (lowering of the core body temperature). Heated break areas and warm beverages shall be available during periods of cold weather.

3.2. Biological Hazards and Procedures

☐ Poison ivy or other vegetation	Click here to enter text.
☐ Insects or snakes	Click here to enter text.
☒ Hypodermic needles or other infectious hazards	Avoid
☒ Wildlife	Avoid
☐ Other: Click here to enter text.	Click here to enter text.

3.3. Ergonomic Hazard Mitigation Measures and Procedures

Avoiding Lifting Injuries

Back injuries often result from lifting objects that are too heavy or from using the wrong lifting technique. Keep your back healthy and pain-free by following common sense safety precautions.

- Minimize reaching by keeping frequently used items within arm's reach, moving your whole body as close as possible to the object.
- Avoid overextending by standing up when retrieving objects on shelves.
- Keep your back in shape with regular stretching exercises.
- Get help from a coworker or use a hand truck if the load is too heavy or bulky to lift alone.

Proper Lifting Techniques

- Face the load; don't twist your body. Stand in a wide stance with your feet close to the object.
- Bend at the knees, keeping your back straight. Wrap your arms around the object.
- Let your legs do the lifting.
- Hold the object close to your body as you stand up straight. To set the load down, bend at the knees, not from the waist.

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3.4. Engineering Controls

☐ Trench shoring (1:1 slope for Type B Soils)

☐ Location work spaces upwind/wind direction monitoring

☐ Other soil covers (as needed)

☐ Other (specify): Click here to enter text.

3.5. Physical Hazard Mitigation Measures or Procedures

- Work areas will be marked with reflective cones, barricades and/or caution tape, as necessary.
- Do not walk, step, sit or stand on any rail at any time (BNSF compliance).
- Finger rings may not be worn on site except in office areas when performing office tasks (BNSF compliance).
- Prior to placing equipment into service, the SSO will observe an equipment safety inspection by a trained and experienced equipment operator to ensure each piece of equipment meets standard equipment safety requirements. Equipment inspection records maintained by the owner and operator of the equipment at their office facility shall be made available to GeoEngineers upon request. Only experienced, proficient equipment operators will be used to operate heavy equipment. Personnel must possess the required operator's licensing or certification.
- Field personnel will be aware constantly of the location and motion of heavy equipment. A safe distance will be maintained between personnel and the equipment. Personnel will be visible to the operator at all times and will remain out of the swing and/or direction of the equipment apparatus. Personnel will approach operating heavy equipment only when they are certain the operator has indicated it is safe to do so.
- Heavy equipment and/or vehicles used on this site will not work within 15 feet of overhead utility lines without first ensuring that the lines are not energized or other approved measures are instituted.
- Personnel will avoid tripping hazards, steep slopes, pit and other hazardous encumbrances. If it becomes necessary to work within 6 feet of the edge of a pit, slope, pier or other potentially hazardous area, appropriate fall protection measures will be implemented by the SSO in accordance with OSHA/WISHA regulations and the GEI Safety Program manual.
- BNSF minimum distance from power lines are as follows:
    - 50 KV or below 10 feet
    - 50 KV - 200 KV 15 feet
    - 200 KV - 350 KV 20 feet
    - 350 KV - 500 KV 25 feet
    - 500 KV - 750 KV 35 feet
    - 750 KV - 1000 KV 45 feet

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4.0 BNSF PLAN REQUIREMENTS – SAFETY ACTION PLAN

BNSF engineering contractors are to complete a Safety Action Plan. This plan includes the following information:

- Identification of the BNSF project representative*;
- Recent accident history and areas of concern: e.g., hand tool use, material handling related injuries, equipment operations;
- Plans to address areas of concern;
- Verification of employee training;
- Emergency preparedness plans;
- Fire prevention plans;
- Job safety briefings;
- On-site safety assessments; and
- Forming safety committees.

To complete a Safety Action Plan, log onto www.contractororientation.com (with your user name and password) and select the Safety Action Plan link. Fill out the Safety Action Plan. Be sure to print the plan before you submit it. A copy of your completed safety action plan form will be submitted electronically. A hard copy of your completed safety action plan form is to be provided to your BNSF Project Representative, if requested. At least one hard copy needs to be available on site at all times.

Contractors are to conduct work practice/facility assessments (audits) of their operations at BNSF. The frequency of these assessments and participants are to be determined by contractor management/ supervision and stated in the Safety Action Plan submitted to BNSF. Assessment findings need to be documented and available for inspection by BNSF assessment groups, upon request.

***** A BNSF project representative is the BNSF employee who coordinates a contractor's work activities or is the BNSF interface for the contractor, while the contractor is on site, e.g., construction engineer, roadmaster, Structures supervisor or Signal supervisor.

5.0 BNSF PLAN REQUIREMENTS – JOB SAFETY BRIEFINGS (FORM 2)

A well-thought-out job briefing can positively affect the safety, quality and productivity of projects. A job safety briefing should include the following information:

- Review the job tasks to be accomplished;
- Inspect the job location/work area;
- Break each task into a step-by-step procedure addressing existing and potential hazards of each task and list precautionary measures that are to be implemented;
- Determine tool, equipment and material needs; and

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- Determine applicable safety rules and procedures.

Consider existing/potential hazards (not all inclusive):

- Weather conditions;
- Tools, equipment and materials to be used;
- Train, vehicular and pedestrian traffic;
- Overhead/underground hazards; and
- Slip/trip/fall hazards.

During the course of a job, should it become necessary to change plans or procedures, brief workers on these changes. Examples of changes:

- Changes in personnel*;
- Changes in weather conditions;
- Assignment changes; and
- Changes of equipment.

* When a person approaches the job-site, a representative from your work group needs to meet the person before he enters the immediate job-site. Determine the person's reasons for visiting the job-site and conduct a job safety briefing with the visitor(s). Visitors need to be referred to the employee-in-charge to receive track authority information, as applicable.

Follow-up activities need to be conducted in support of a job safety briefing. The follow-up is conducted to:

- Verify compliance with plans;
- Verify correct work methods are being used;
- Verify assigned responsibilities are being carried out; and
- Identify and address new hazards.

A Job Safety Briefing shall be completed every day prior to beginning field activities. The Job Safety Briefing will be updated when tasks or conditions change, as necessary.

6.0 BNSF EMERGENCY

Should an emergency situation arise, and your assessment indicates a need to stop the movement of trains and other on-track equipment, immediately attempt to contact **BNSF Emergency Number: 800-832-5452.**

Alternatively, the violent movement of arms would be taken as an indication by train engineers and the operators of other on-track equipment to **STOP.**

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7.0 BNSF REPORTING REQUIREMENTS

Contractors need to promptly advise their BNSF project representative of **all** work-related injuries/ illnesses. The BNSF project representative needs to, in turn, complete the BNSF Non-Employee Personal Injury form, and submit this form to the BNSF Accident Reporting Center. The BNSF Accident Reporting Center determines the Federal Railroad Administration (FRA) reportability and submits the required information to the FRA, as appropriate. Remember that contractors are responsible for meeting applicable OSHA reporting and recordkeeping requirements.

As is the case with work-related injuries/illnesses, all damage to railroad property needs to be promptly reported to the responsible BNSF project representative.

The license plate numbers of contractor highway vehicles are to be registered through the website www.contractororientation.com for safety and security reasons. The confirmation registration sign, indicating the company name/number associated with the vehicle, will be conspicuously displayed on the dashboard of the appropriate vehicle that has been registered. This requirement does not apply to rental vehicles or work equipment.

Copies of MSDSs need to be maintained on site at all times.

8.0 ROADWAY WORKER PROTECTION/ON-TRACK SAFETY

Railroad Workers Protection is typically required when working within 25 feet of tracks. Erailsafe training is for security clearance when working near active trains. Workers or equipment are **foul of the track** when closer than **4 feet** to the nearest rail of a main track/controlled siding/other track. Contractors need **specific authorization** from their BNSF project representative to work within **25 feet** of track centerline. A BNSF flagger will be present when contractor personnel or equipment may foul the track and individual train detection is not appropriate. If the work area is farther than 25 feet from any rail track, a lookout may be assigned to your work group.

The track for this project is abandoned and not subject to the above requirements.

8.1. Chemical Hazards

CHEMICAL HAZARDS (POTENTIALLY PRESENT AT SITE)

Compound/ Description	OSHA PEL Exposure Limit	WA-DOSH PEL Exposure Limit	ACGIH TLV Exposure Limits	NIOSH REL Exposure Limits	Exposure Routes	Toxic Characteristics	Hazard Type
Arsenic (inorganic metal, as As) Metal: Silver-gray or tin-white, brittle, odorless solid.	0.01 mg/m^3 (TWA)	0.01 mg/m^3 (TWA)	0.01 mg/m^3 (TWA)	0.002 mg/m^3 (15-minute Ceiling)	Inhalation, ingestion, skin and/or eye contact	Inorganic Arsenic: Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Metals

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Compound/ Description	OSHA PEL Exposure Limit	WA-DOSH PEL Exposure Limit	ACGIH TLV Exposure Limits	NIOSH REL Exposure Limits	Exposure Routes	Toxic Characteristics	Hazard Type
Cadmium as dust (Cadmium dust (as Cd)) Metal: Silver-white, blue-tinged lustrous, odorless solid.	0.005 mg/m³ (TWA) 9 mg/m³ (IDLH)	0.005 mg/m³ (TWA)	0.01 mg/m³ (TWA)	9 mg/m³ (IDLH)	Respiratory system, kidneys, prostate, blood	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	Metals
Lead (and inorganic compounds as lead) A heavy, ductile, soft, gray solid.	0.05 mg/m3 (TWA)	0.05 mg/m3 (TWA)	0.05 m/gm3 (TWA)	0.050 mg/m3 (TWA) 100 mg/m3 (IDLH)	Inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia, facial pallor, anorexia, weight loss, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, wrist and ankle paralysis, encephalopathy, kidney disease, irritated eyes, hypotension	Metals
Mercury (and inorganic compounds as mercury) Metal: Silver-white, heavy, odorless liquid.	0.1 mg/m3	0.1 mg/m3 (TWA) 0.3 mg/m3 (STEL) Vapor:0.05 mg/m3 (TWA) 0.15 mg/m3 (STEL)	0.5 mg/m3 (TWA)	Vapor: 0.05 mg/m3 (TWA) (skin) 0.1 mg/m3 (Ceiling) (skin) 10 mg/m3 (IDLH)	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes and skin, coughing, chest pain, difficulty breathing, bronchitis, pneumonitis, tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion), stomatitis, salivation, gastrointestinal disturbance, anorexia, weight loss, proteinuria	Metals
Benzene Colorless to light-yellow liquid with an aromatic odor.	1 ppm (TWA) 5 ppm (STEL)	1 ppm (TWA) 5 ppm (STEL)	0.5 ppm (TWA) 2.5 ppm (STEL)	0.1 ppm (TWA) 1 ppm (STEL) 500 ppm (IDLH)	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; confirmed human carcinogen	Petroleum, Volatile Organic Compounds

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Compound/ Description	OSHA PEL Exposure Limit	WA-DOSH PEL Exposure Limit	ACGIH TLV Exposure Limits	NIOSH REL Exposure Limits	Exposure Routes	Toxic Characteristics	Hazard Type
Gasoline Clear liquid with a characteristic odor. Motor fuel, motor spirits, natural gasoline. A complex mixture of volatile, hydrocarbons (paraffins, cycloparafinns & aromatics)	None established	300 ppm (TWA) 500 ppm (STEL)	None established	None Established	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, and mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; and headache, and dermatitis; confirmed animal carcinogen.	Petroleum
Diesel Fuel liquid with a characteristic odor	None established	None established	100 mg/m³ (as total hydrocarbons)	None established	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, and mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; and headache, and dermatitis; human carcinogen	Petroleum
Polycyclic aromatic hydrocarbons (PAH) (Coal tar pitch volatiles)	OSHA = TWA 0.2 mg/m³	0.2 mg/m³ (TWA) 0.6 mg/m³ (STEL)	0.2 mg/m³ (TWA)	0.1 mg/m³ (TWA) 80 mg/m³ (IDLH)	Inhalation, ingestion, skin and/or eye contact	Dermatitis, bronchitis, potential carcinogen	Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)

Note: If a State has established a PEL more restrictive than the OSHA limits, then the applicable State limit becomes the legal limit.

IDLH = immediately dangerous to life or health
OSHA = Occupational Safety and Health Administration
ACGIH = American Conference of Governmental Industrial Hygienists
mg/m³ = milligrams per cubic meter
ppm = parts per million
TWA = time-weighted average (over 8 hrs.)
PEL = permissible exposure limit
TLV = threshold limit value (over 10 hrs)
STEL = short-term exposure limit (15 min)

8.2. Summary of Selected Chemical Hazards

Carcinogenic Polycyclic Aromatic Hydrocarbons

Exposure to cPAHs can occur via inhalation of vapors, ingestion, and skin and eye contact. Skin contact can result in reddening or corrosion. Ingestion can cause nausea, vomiting, blood pressure fall, abdominal pain, convulsions and coma. Damage to the central nervous system can also occur. The U.S. Department of Health and Human Services (1989) has classified 15 PAHs compounds as having sufficient evidence for carcinogenicity, while the EPA (1990) has classified at least five of the identified PAHs as human carcinogens. There is no currently assigned PEL-TWA for cPAHs, but the closely related material coal tar is listed as coal tar pitch volatiles with a PEL (WA DOSH) for an 8-hour-TWA of 0.2 mg/m³, and a 15-minute STEL as 0.6 mg/m³.

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PAHs and cPAHs as soil contaminants can be irritating to eyes and mucous membranes. PAHs are also formed during combustion and are linked to lung cancers with exposure to combustion byproducts. Lymphatic cancers are reported in the literature with PAHs in the presence of carbon black.

Diesel Fuels

Diesel fuels are similar to fuel oils used for heating (fuel oils no. 1, no. 2, and no. 4). All fuel oils consist of complex mixtures of aliphatic and aromatic hydrocarbons. Diesel fuels predominantly contain a mixture of C10 through C19 hydrocarbons, which include approximately 64% aliphatic hydrocarbons, l-2% olefinic hydrocarbons, and 35% aromatic hydrocarbons. Workers may be exposed to fuel oils through their skin without adequate protection, such as gloves, boots, coveralls, or other protective clothing. Breathing diesel fuel vapors for a long time may damage your kidneys, increase your blood pressure, or lower your blood's ability to clot. Constant skin contact (for example, washing) with diesel fuel may also damage your kidneys. The International Agency for Research on Cancer (IARC) has determined that residual (heavy) fuel oils and marine diesel fuel are possibly carcinogenic to humans (Group 2B classification).

Gasoline, Automotive

Gasoline is a manufactured mixture that does not exist naturally in the environment. Gasoline is produced from petroleum in the refining process. Typically, gasoline contains more than 150 chemicals, including small amounts of benzene, toluene, xylene, and sometimes lead. How the gasoline is made determines which chemicals are present in the gasoline mixture and how much of each is present. The actual composition varies with the source of the crude petroleum, the manufacturer, and the time of year. The Department of Health and Human Services (DHHS) and the International Agency for Research on Cancer (IARC) have not classified automotive gasoline for carcinogenicity. The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV has established 300 ppm TWA; 500 ppm STEL as exposure limits.

Benzene

Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities. Benzene is classified as hydrocarbons (contain hydrogen and carbon atoms), Volatile organic compounds. It is a known human carcinogen Affected organ systems: hematological (blood forming), immunological (immune system), neurological (nervous system)

Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke. The EPA has set the maximum permissible level of benzene in drinking water at 5 parts benzene per billion parts of water (5 ppb). The Occupational Safety and Health Administration (OSHA) has set limits of 1 part benzene per million parts of workplace air (1 ppm) for 8 hour shifts and 40-hour work weeks.

8.3. Additional Hazards

See Job Safety Briefing for additional hazards.

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9.0 AIR MONITORING PLAN

An air monitoring plan has been prepared as part of development of this HASP. The air monitoring plan is based on the results of the chemical exposure assessment and the known and potential inhalation hazards on-site. The air monitoring plan addresses steps necessary to limit worker exposure. Non-occupational exposures are not addressed in this plan.

Work upwind if possible.

Check instrumentation to be used

☒ PID

☐ Dust Monitor

☐ Other (i.e., detector tubes or badges) Please specify: Click here to enter text.

Check monitoring frequency/locations and type (specify: work space, borehole, breathing zone):

☐ Continuous during soil disturbance activities or handling samples

☐ 15 minutes

☐ 30 minutes

☒ Hourly

9.1. Additional Personal Air Monitoring for Specific Chemical Exposure

Action Levels for Volatile Organic Chemicals

- The workspace will be monitored using a photoionization detector (PID). These instruments must be properly maintained, calibrated and charged (refer to the instrument manuals for details). Zero this meter in the same relative humidity as the area in which it will be used and allow at least a 10-minute warm-up prior to zeroing. Do not zero in a contaminated area.
- An initial vapor measurement survey of the site should be conducted to detect "hot spots" if contaminated soil is exposed at the surface. Vapor measurement surveys of the workspace should be conducted at least hourly or more often if persistent petroleum-related odors are detected. Additionally, if vapor concentrations exceed 5 parts per million (ppm) above background continuously for a 5-minute period as measured in the breathing zone, upgrade to Level C personal protective equipment (PPE) or move to a non-contaminated area.
- Standard industrial hygiene/safety procedure is to require that action be taken to reduce worker exposure to organic vapors when vapor concentrations exceed one-half the threshold limit value (TLV). Because of the variety of chemicals, the PID will not indicate exposure to a specific permissible exposure limit (PEL) and is therefore not a preferred tool for determining worker exposure to chemicals. If odors are detected, then employees shall upgrade to respirators with Organic Vapor cartridges and will contact the Health and Safety Program Manager for other sampling options.

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AIR MONITORING ACTION LEVELS

Contaminant	Activity	Monitoring Device	Frequency of Monitoring Breathing Zone	Action Level	Action
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors	Background to 5 ppm in breathing zone	Use Level D or Modified Level D PPE.
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors	5 to 50 ppm in breathing zone	Upgrade to Level C PPE.
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes	> 50 ppm in breathing zone	Stop work and evacuate the area. Contact Health and Safety Program Manager for guidance.
Combustible Atmosphere	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes	>10% LEL or >1,000 ppm	Depends on contaminant. The PEL is usually exceeded before the lower explosive limit (LEL).
Combustible Atmosphere	Environmental Remedial Actions	PID or 4-gas meter	Start of shift; prior to excavation entry; every 30 to 60 minutes	>10% LEL or >1,000 ppm	Stop work and evacuate the site. Contact Health and Safety Program Manager for guidance.
Oxygen Deficient/ Enriched Atmosphere	Environmental Remedial Actions Confined Spaces	Oxygen meter or 4-gas meter	Start of shift; prior to excavation entry; every 30 to 60 minutes	<19.5 >23.5%	Continue work if inside range. If outside range, evacuate area and contact Health and Safety Program Manager.

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10.0 SITE CONTROL PLAN

Work zones will be considered to be within 50 feet of the drill rig, backhoe, or other equipment. Employees should work upwind of the machinery if possible. To the extent practicable, use the buddy system. Do not approach heavy equipment unless you are sure the operator sees you and has indicated it is safe to approach. All personnel from GeoEngineers and subcontractor(s) should be made aware of safety features during each morning's safety tailgate meeting (drill rig shutoff switch, location of fire extinguishers, cell phone numbers, etc.). For medical assistance, see Section 3.0 above.

Do not leave unattended equipment within 25 feet of track centerline, unless obtaining specific approval from the responsible BNSF Project Representative. Under no circumstances is equipment to be left where it is within 8.5 feet of track centerline, or otherwise could be struck by a train, or materials on a train, or on-track equipment.

10.1. Site Work Zones

An exclusion zone, contamination reduction zone, and support zone should be established around working areas. Personnel leaving the facility or on break should exit the exclusion zone through the contamination reduction zone. The contamination reduction zone, at a minimum, should consist of garbage bags into which used PPE should be disposed. Personnel should wash hands at the Facility before eating or leaving the facility. Site work zones are explained in detail in Figure 1, Hazwoper Work Zones.

Hot zone/exclusion zone: *Within 10 feet of borings or excavations.*

Method of delineation/excluding non-site personnel

☐ Fence

☐ Survey Tape

☒ Traffic Cones

☐ Other: Click here to enter text.

10.2. Buddy System

Personnel on-site should use the buddy system (pairs), particularly whenever communication is restricted. If only one GeoEngineers employee is on site, a buddy system can be arranged with subcontractor/ contractor personnel.

10.3. Site Communication Plan

Positive communications (within sight and hearing distance or via radio) should be maintained between pairs on-site, with the pair remaining in proximity to assist each other in case of emergencies. The team should prearrange hand signals or other emergency signals for communication when voice communication becomes impaired (including cases of lack of radios or radio breakdown) and an agreed upon location for an emergency assembly area.

In instances where communication cannot be maintained, you should consider suspending work until it can be restored. If this is not an option, the following are some examples for communication:

- Hand gripping throat: Out of air, can't breathe.
- Gripping partner's wrist or placing both hands around waist: Leave area immediately, no debate.
- Hands on top of head: Need assistance.
- Thumbs up: Okay, I'm all right; or, I understand.
- Thumbs down: No, negative.

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10.4. Emergency Action

In the event of an emergency, employees with convene in a designated area Identified on the Job Hazard Analyses Form (JHA) Form 4. Employees should communicate with others working on site and the PM to determine the Emergency Action Plan for each site. All personnel from GeoEngineers and subcontractor(s) should be made aware of the Emergency Action for the site at each morning's safety tailgate meeting (drill rig shutoff switch, location of fire extinguishers, cell phone numbers, etc.). For medical assistance, see Section 3.0 above.

10.5. Decontamination Procedures

Decontamination, at a minimum, should include removing and disposing of PPE when exiting the exclusion zone; and washing your hands. Decontamination may also consist of removing outer protective gloves and washing soiled boots and gloves using bucket and brush provided on-site in the contamination reduction zone. If needed, inner gloves will then be removed, and respirator, hands and face will be washed in either a portable wash station or a bathroom facility at the site. Employees will perform decontamination procedures and wash before eating, drinking or leaving the site.

10.6. Waste Disposal or Storage

Used PPE is to be placed in a plastic bag for disposal.

Drill cutting/excavated sediment disposal or storage

☐ On site, pending analysis and further action

☐ Secured (list method): Click here to enter text.

☒ Other (describe destination, responsible parties): Location to be determined, pending analysis and further action.

11.0 PERSONAL PROTECTIVE EQUIPMENT

After the initial and/or daily hazard assessment has been completed the appropriate personal protective equipment (PPE) will be selected to ensure worker safety. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted before the start of site operations. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted before the start of site operations.

Site activities include handling and sampling solid subsurface material (material may potentially be saturated with contaminated materials and groundwater). Depth-to-groundwater measurements will be performed as well. Site hazards include potential exposure to hazardous materials, and physical hazards such as trips/falls, heavy equipment, and contaminant exposure.

Air monitoring will be conducted to determine the level of respiratory protection.

- Half-face combination organic vapor/high efficiency particulate air (HEPA) or P100 cartridge respirators will be available on site to be used as necessary. P100 cartridges are to be used only if PID measurements are below the site action limit. P100 cartridges are used for protection against dust, metals and asbestos, while the combination organic vapor/HEPA cartridges are protective against both dust and vapor. Ensure that the PID or TLV will detect the chemicals of concern on-site.

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- Level D PPE, unless a higher level of protection is required, will be worn at all times on the site. Potentially exposed personnel will wash gloves, hands, face and other pertinent items to prevent hand-to-mouth contact. This will be done prior to hand-to-mouth activities including eating, smoking, etc.
- Adequate personnel and equipment decontamination will be used to decrease potential ingestion and inhalation.

11.1. Additional BNSF PPE Requirements

Hardhats need to be worn at all times except when in office areas - performing office related activities, when in highway vehicles, or when in the enclosed cabs (doors and windows closed) of equipment. ANSI Z89. 1 is to be shown on a decal inside of approved hardhats. "Cowboy hat" type hardhats are not to be used on site.

Safety shoes meeting the requirements of the applicable ASTM standards need to be worn at all times except when in office areas performing office related tasks. Safety shoes need to be above-the-ankle, lace-up boots with a well-defined heel, and safety toe. The safety toe may be steel or composite material.

Eye protection needs to be worn at all times except when in office areas performing office tasks or when in highway vehicles on paved roads or with windows up. The marking ANSI Z87.1 appears on one of the temple bars of items of approved safety eyewear. An engraved monogram at the top center of safety glasses lenses, plain or prescription indicates that the lenses are in fact safety lenses. Safety glasses are to have permanently affixed side shields. Yellow lenses tints are not acceptable as they may affect the ability to distinguish colors. Reflective/mirrored lenses are also not to be worn when on site.

ANSI Level II or III orange, retro-reflective work wear needs to be worn by engineering contractor personnel at all times when on site.

Check applicable personal protection gear to be used

☒ Hardhat (if overhead hazards, or client requests)

☒ Steel-toed boots (if crushing hazards are a potential or if client requests)

☒ Safety glasses (if dust, particles, or other hazards are present or client requests)

☒ Reflective vest (if working near traffic or equipment)

☒ Hearing protection (if it is difficult to carry-on a conversation 3 feet away)

☐ Rubber boots (if wet conditions)

Gloves (specify)

☒ Nitrile

☐ Latex

☐ Liners

☐ Leather

☐ Other (specify) Click here to enter text.

Protective clothing

☐ Tyvek (if dry conditions are encountered, Tyvek is sufficient) (modified Level D or Level C)

☐ Saranex (personnel shall use Saranex if liquids are handled or splash may be an issue) (modified Level D or Level C)

☒ Cotton (Level D)

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☐ Rain gear (as needed) (Level D)

☐ Layered warm clothing (as needed) (Level D)

Inhalation hazard protection

☐ Level D (no respirator)

☐ Level C (respirators with organic vapor/HEPA P100 filters)

☐ Level B (Self Contained Breathing Apparatus— STOP, Consult the HSM)

11.2. Personal Protective Clothing Inspections

PPE clothing ensembles designated for use during site activities shall be selected to provide protection against known or anticipated hazards. However, no protective garment, glove or boot is entirely chemical-resistant, nor does any PPE provide protection against all types of hazards. To obtain optimum performance from PPE, site personnel shall be trained in the proper use and inspection of PPE. This training shall include the following:

- Inspect PPE before and during use for imperfect seams, non-uniform coatings, tears, poorly functioning closures or other defects. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Inspect PPE during use for visible signs of chemical permeation such as swelling, discoloration, stiffness, brittleness, cracks, tears or other signs of punctures. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Disposable PPE should not be reused after breaks unless it has been properly decontaminated.

11.3. Respirator Selection, Use and Maintenance

If respirators are required, site personnel shall be trained before use on the proper use, maintenance and limitations of respirators. Additionally, they must be medically qualified to wear respiratory protection in accordance with 29 CFR 1910.134. Site personnel who will use a tight-fitting respirator must have passed a qualitative or quantitative fit test conducted in accordance with an OSHA-accepted fit test protocol. Fit testing must be repeated annually or whenever a new type of respirator is used. Respirators will be stored in a protective container.

11.4. Respirator Cartridges

If the action levels identified in the Air Monitoring Action Levels Table in Section 5.0, are exceeded, site personnel should don respiratory protection appropriate for the known or suspected chemical of concern. For most sites, a half-face or full-face air purifying respirator with a National Institute for Occupational Safety and Health (NIOSH)-approved organic vapor/HEPA P100 combination cartridge (Level C), will be appropriate for the known or suspected chemicals of concern. Monitoring frequency should be continuous while using Level C respiratory protection. The SSO closely monitor personnel using respiratory protection, including observing for signs of fatigue or respiratory distress, the potential for cartridge breakthrough or increased resistance to inhalation, and the need for changes in the level of respiratory protection based on air monitoring. The frequency and duration of breaks should be increased for personnel working in respiratory protection. If at any time on-site air monitoring indicates Level B respiratory protection is warranted, personnel should leave the exclusion zone and consult with the HSM.

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If site personnel are required to wear air-purifying respirators, the appropriate cartridges shall be selected to protect personnel from known or anticipated site contaminants. The respirator/cartridge combination shall be approved and NIOSH-certified. A cartridge change-out schedule shall be developed based on known site contaminants, anticipated contaminant concentrations and data supplied by the cartridge manufacturer related to the absorption capacity of the cartridge for specific contaminants. Site personnel shall be made aware of the cartridge change-out schedule prior to the initiation of site activities. Site personnel shall also be instructed to change respirator cartridges if they detect increased resistance during inhalation or detect vapor breakthrough by smell, taste or feel, although breakthrough is not an acceptable method of determining the change-out schedule.

11.5. Respirator Inspection and Cleaning

The Site Safety Officer shall periodically (weekly) inspect respirators at the project site. Site personnel shall inspect respirators prior to each use in accordance with the manufacturer's instructions. In addition, site personnel wearing a tight-fitting respirator shall perform a positive and negative pressure user seal check each time the respirator is donned, to ensure proper fit and function. User seal checks shall be performed in accordance with the GeoEngineers respiratory protection program or the respirator manufacturer's instructions.

12.0 ADDITIONAL ELEMENTS

12.1. Cold Stress Prevention

Working in cold environments presents many hazards to site personnel and can result in frost nip (superficial freezing of the skin), frost bite (deep tissue freezing), or hypothermia (lowering of the core body temperature).

The combination of wind and cold temperatures increases the degree of cold stress experienced by site personnel. Site personnel shall be trained on the signs and symptoms of cold-related illnesses, how the human body adapts to cold environments, and how to prevent the onset of cold-related illnesses. Heated break areas and warm beverages shall be provided during periods of cold weather.

12.2. Heat Stress Prevention

Keep workers hydrated in a hot outdoor environment requires more water be provided than at other times of the year. When employee exposure is at or above an applicable temperature listed in the Heat Stress table below, Project Managers will ensure that:

- A sufficient quantity of drinking water is readily accessible to employees at all times; and
- All employees have the opportunity to drink at least one quart of drinking water per hour.

HEAT STRESS

Type of Clothing	Outdoor Temperature Action Levels
Nonbreathing clothes including vapor barrier clothing or PPE such as chemical resistant suits	52°
Double-layer woven clothes including coveralls, jackets and sweatshirts	77°
All other clothing	89°

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12.3. Emergency Response

Indicate what site-specific procedures you will implement.

- Personnel on-site should use the "buddy system" (pairs).
- Visual contact should be maintained between "pairs" on site, with the team remaining in proximity to assist each other in case of emergencies.
- If any member of the field crew experiences any adverse exposure symptoms while on site, the entire field crew should immediately halt work and act according to the instructions provided by the SSO.
- Wind indicators visible to all on-site personnel should be provided by the SSO to indicate possible routes for upwind escape. Alternatively, the SSO may ask on-site personnel to observe the wind direction periodically during site activities.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated should result in the evacuation of the field team, contact of the PM, and reevaluation of the hazard and the level of protection required.
- If an accident occurs, the Site Safety Officer and the injured person are to complete, within 24 hours, an Accident/Exposure Report (Form 3) for submittal to the PM, the HSPM, and HR. The PM should ensure that follow-up action is taken to correct the situation that caused the accident or exposure.

13.0 MISCELLANEOUS

13.1. Personnel Medical Surveillance

GeoEngineers employees are not in a medical surveillance program because they do not fall into the category of "Employees Covered" in OSHA 1910.120(f)(2), which states that a medical surveillance program is required for the following employees:

(1) All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year;

(2) All employees who wear a respirator for 30 days or more a year or as required by state and federal regulations;

(3) All employees who are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and

(4) Members of HAZMAT teams.

13.2. Sampling, Managing and Handling Drums and Containers

Drums and containers used during the cleanup shall meet the appropriate Department of Transportation (DOT), OSHA and U.S. Environmental Protection Agency (EPA) regulations for the waste that they contain. Site operations shall be organized to minimize the amount of drum or container movement. When practicable, drums and containers shall be inspected and their integrity shall be ensured before they are moved. Unlabeled drums and containers shall be considered to contain hazardous substances and handled

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accordingly until the contents are positively identified and labeled. Before drums or containers are moved, all employees involved in the transfer operation shall be warned of the potential hazards associated with the contents.

Drums or containers and suitable quantities of proper absorbent shall be kept available and used where spills, leaks or rupturing may occur. Where major spills may occur, a spill containment program shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred. Fire extinguishing equipment shall be on hand and ready for use to control incipient fires.

13.3. Entry Procedures for Tanks or Vaults (Confined Spaces)

GeoEngineers employees shall not enter confined spaces to perform work unless they have been properly trained and with hands-on experience in the use of retrieval equipment. If a project requires confined space entry, please include a copy of the confined space permit and include the training documentation in this HASP.

Trenches greater than 4 feet in depth with the potential for buildup of a hazardous atmosphere are considered confined spaces.

13.4. Sanitation

No sanitary facilities are available on site. Use local public facilities.

13.5. Lighting

Work is anticipated to be performed during daylight hours. Work may extend slightly into the evening provided adequate lighting is used (e.g., portable flood lights).

14.0 DOCUMENTATION TO BE COMPLETED FOR HAZWOPER PROJECTS

- Daily Field Log
- Form 1 – Health and Safety Pre-Entry Briefing and Acknowledgment of Site Health and Safety Plan for use by employees, subcontractors and visitors
- Form 2 – JHA/Safety Meeting Record
- Form 3 – Accident/Exposure Report Form

Note: The Field Log is to contain the following information:

- Updates on hazard assessments, field decisions, conversations with subcontractors, client or other parties, etc.;
- Air monitoring/calibration results, including: personnel, locations monitored, activity at the time of monitoring, etc.;
- Actions taken;
- Action level for upgrading PPE and rationale; and
- Meteorological conditions (temperature, wind direction, wind speed, humidity, rain, snow, etc.).

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15.0 APPROVALS

1. Plan Prepared

Tricia DeOme/Jodie Sheldon	November 20, 2017
Signature	Date

2. Plan Approval

	November 20, 2017
PM Signature	Date

3. Health & Safety Officer

Jodie Sheldon	November 20, 2017
HSM Signature	Date

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FORM 1
HEALTH AND SAFETY PRE-ENTRY BRIEFING AND ACKNOWLEDGEMENT OF THE SITE HASP FOR GEOENGINEERS' EMPLOYEES, SUBCONTRACTORS AND VISITORS
JEFFERSON AVENUE AND HOOD STREET SURFACE WATER INTERCEPTOR PROJECT
TACOMA, WASHINGTON
FILE NO. 0570-156-00

Inform employees, contractors and subcontractors or their representatives about:

- The nature, level and degree of exposure to hazardous substances they're likely to encounter;
- All site-related emergency response procedures; and
- Any identified potential fire, explosion, health, safety or other hazards.

Conduct briefings for employees, contractors and subcontractors, or their representatives as follows:

- A pre-entry briefing before any site activity is started.
- Additional briefings, as needed, to make sure that the Site-specific HASP is followed.
- Make sure all employees working on the Site are informed of any risks identified and trained on how to protect themselves and other workers against the Site hazards and risks.
- Update all information to reflect current sight activities and hazards.
- All personnel participating in this project must receive initial health and safety orientation. Thereafter, brief tailgate safety meetings will be held as deemed necessary by the Site Safety Officer.
- The orientation and the tailgate safety meetings shall include a discussion of emergency response, site communications and site hazards.

(All of GeoEngineers' Site workers shall complete this form, which should remain attached to the HASP and be filed with other project documentation). Please be advised that this site-specific HASP is intended for use by GeoEngineers employees only. Nothing herein shall be construed as granting rights to GeoEngineers' subcontractors or any other contractors working on this site to use or legally rely on this HASP. GeoEngineers specifically disclaims any responsibility for the health and safety of any person not employed by the company.

I hereby verify that a copy of the current HASP has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge an understanding of the safety procedures and protocol for my responsibilities on Site. I agree to comply with all required, specified safety regulations and procedures.

Print Name **Signature** **Date**

_____

_____

_____

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FORM 2
JHA/BNSF SAFETY BRIEFING RECORD
JEFFERSON AVENUE AND HOOD STREET SURFACE WATER INTERCEPTOR PROJECT
TACOMA, WASHINGTON
FILE NO. 0570-156-00

Project Name: Jefferson and Hood **File No:** 0570-156-00	**Date:**	**Site Location:** 17th and Pacific

Development Team:	**Position/Title:**	**Reviewed by:**	**Position/Title:**
Tricia DeOme	Project Manager	Jodie Sheldon	Safety Manager

Minimum Required Safety Precautions: (see critical actions for task-specific requirements)

PPE	**Equipment**	**Tools**	**Actions**
☒ Hard Hat	☒ Safety Beacons (if needed)	☒ Cell Phone/Satellite	☒ Equipment Inspection
☒ Eye Protection	☒ Safety Cones (if needed)	☒ Digital Camera	☒ Vehicle Inspection
☒ Hearing Protection	☒ First Aid Kit	☒ Paper Maps	☒ Buddy System
☒ Gloves	☒ Fire Extinguisher	☐ GPS	
☒ High Visibility Vest	☒ Eye Wash/Drinking Water	☐ Compass	
☒ Steel Toe Boots	☒ Personal Flotation Device	☐ Flashlight	
☒ Rubber Boots	☐ Spill Kit	☐ Whistle	

Job Steps	**Potential Hazards**	**Critical Actions to Mitigate Hazards**
Pre-Job Activities	Unfamiliar locations, congestion, unpaved roads, Mechanical Failure, Flat Tires Vehicle Fire, Exhaust Leaks, Vehicle Collision, Internal Projectiles	■ Inspect the vehicle before departure: ▪ Check for tire cuts, fluid leaks, flat tires, body damage, windshield cracks, and other damage. ▪ Check lights, wipers, fluid levels, and seat belts. ■ Study the area maps, photos and use GPS and compass skills. Identify the safest spot to park field vehicles.
Familiarize crew with the task and location of site	Unaware of the job site hazards and steps to prevent injury. Appropriate personnel protective equipment not worn. Other Hazards	■ Conduct a tailgate safety meeting discussing the jobs, the hazards and actions that will be taken to prevent injury. ■ Discuss "Stop Work Authority" as it applies to each site member. ■ Discuss appropriate PPE including high visibility clothing such as reflective vest. ■ Notify attendant and/or site owner/manager of work activities and location. ■ Discuss appropriate PPE including high visibility clothing such as reflective vest. ■ Set up exclusion zone surrounding work area.
Traveling on Foot	Falls, Foot Injuries, and Stress and Impact Injuries	■ Identify and use safe travel routes. Do not exceed physical abilities or equipment design. ■ Use pack equipment properly. Carry weight on hips, not back. ■ Warm up and stretch the appropriate muscle groups before and after hitting the trail. ■ Test and use secure footing. Move cautiously and deliberately. Never run. ■ In heavy undergrowth, particularly off-trail, slow down and watch carefully. ■ Carry tools on the downhill side. ■ Wear safety-toed boots with good, non-skid soles that are tall enough to support ankles.

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General Work	Slips, trips, falls, and other general working hazards	■ Discuss "Stop Work Authority" as it applies to each site member. ■ Discuss appropriate PPE for each work task. ■ Notify attendant and/or site owner/manager of work activities and location. ■ Set up exclusion zone surrounding work area. ■ Remove or put cones around trip hazards. ■ Keep work surfaces dry when possible. ■ Wear appropriate gloves for materials to be handled. ■ Be aware of your surroundings and ensure proper footing. ■ Maintain visual and verbal communication with all construction personnel.
Rig Mobilization and Rig-Up	Struck-by, caught-in-between, poor visibility, backing, slopes, rough terrain, equipment roll over, overhead and underground utilities, and other unknown surroundings	■ Cross all hills and obstructions head on. ■ Heavy equipment should be equipped with back-up alarm or horn to be used when backing, along with use of a spotter. ■ Stay clear of operating equipment and rig when moving. ■ Do not move rig with mast raised. ■ Set riggers prior to raising mast. ■ Evaluate ground stability to ensure safe conditions prior to the start of work. ■ Clear all underground utilities before breaking ground (public and private). ■ Position rig to avoid overhead utilities by distance defined by voltage and local regulations. ■ Maintain visual and verbal communication with the drill crew.
Drilling and Sampling	Sharp edges, pinch points, rotating parts, overhead tooling and loads, noise, flying debris, and lifting/carrying	■ Keep boring workspace free of excess material and debris. ■ Remove all trip hazards by keeping materials/objects organized and out of walkways around the drill rig and support equipment. ■ Wear appropriate PPE including steel toe boots, non-slip rubber boots for wet/slick/muddy surfaces, gloves, hard hat, safety glasses, and hearing protection. ■ Establish communication system between workers involved in moving/attaching tooling and other loads. ■ Stay clear of caught-in-between locations and rotating parts. ■ Do not stand directly beneath lifted tooling and other loads. ■ Use proper lifting technique, at least 2 people to lift and carry sections; use mechanical lift devices whenever possible; bend and lift with legs, not back. ■ Carry samples close to your body and at waist height. Make several trips if necessary and be aware of your surroundings when walking.
Physical Hazards	Traffic (including pedestrian)	■ Notify attendant and/or site owner/manager of work activities and location. ■ Watch out for moving vehicles and equipment. Inspect area behind vehicle prior to backing and/or use a spotter. ■ Use flaggers and traffic control measures (cones, signs, flags) as necessary. ■ Set up exclusion zone surrounding work area. ■ Be alert to potential hazards that may be created by others. ■ Work within the line of sight of the equipment operator and maintain visual contact when approaching. Wear appropriate PPE including a high visibility vest.
	Heat stress	■ Take breaks as needed. ■ Consume adequate food and beverages. ■ Avoid caffeine drinks such as coffee and energy drinks. ■ If possible, adjust work schedule to avoid heat stresses.
Biological Hazards	Insects, snakes, and other wildlife and vegetation	■ Inspect work areas when arrive at site to identify hazard(s). ■ Use insect repellant as necessary. ■ If employee has bee sting allergy, carry epi-pen. ■ Use caution when opening enclosures. ■ Identify potential for poison ivy/oak/sumac. ■ Stay alert and safe distance away from biological hazards.

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		■ Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps if probability of encountering.
Environmental Hazards	Hydraulic leaks and spills, wetlands and other sensitive areas, trash, and drilling fluid containment	■ Ensure equipment is properly maintained and does not leak. ■ Clean up environmental spills using spill kits to absorb the contaminated soil. ■ Properly dispose of material following I.A.W. local and environmental requirements. ■ Stay within approved access routes and workspaces. ■ Do not enter restricted areas, included wetlands and other marked habitats. ■ General housekeeping; contain trash items and secure loose items when working. ■ Contain all drilling fluid and cuttings in 5-gallon buckets and 55-gallon drums. ■ Place plastic sheeting for designated staging areas for the buckets and drums.
Weather Hazards	Lightning, temperature extremes	■ Check weather forecast daily. ■ Prepare for inclement weather when forecasted as appropriate. ■ Wear rain gear or seek cover for inclement weather conditions. ■ Shut down operations when lightning is seen/thunder is heard in the region, and seek shelter (cab up). ■ Wait 30 minutes after last lightning strike before resuming operations. ■ Determine evacuation routes and shelter for weather extremes. ■ Wear appropriate clothing for anticipated climate/temperatures.
Communication	No communication in case of emergency	■ Verify cell phone is working. ■ Maintain communication with Project Manager throughout job task. ■ Learn the location of geographic dead spots and find alternative transmission locations. ■ Verify location and contact numbers for emergency medical assistance or 911. ■ Maintain clear communication with drill crew daily. ■ Maintain clear communication with security guards daily.
	Emergency	■ **Dial 911** ■ Notify the site safety office/general contractor (if applicable). ■ Notify the P/A and PM as soon as necessary emergency notifications have been made and it is safe to do so. ■ Summarize the incident in an email to the PM and Health and Safety Manager. ■ Hospital map (attached).

Required Control Measures: (check the box when complete)
☒ Perform a daily vehicle inspection (first aid kit, fire extinguisher).
☒ Perform a daily equipment inspection (mechanical operation).
☒ Drive defensively looking out for the other drivers.
☒ Conduct a tailgate safety meeting covering appropriate items on this AHA.
☒ Use a Safety Watch to monitor equipment Minimum Approach Distance (MAD) and to keep personnel clear if needed.
☒ Wear Personal Protective Equipment (PPE), minimum Standard Level D for all work tasks.
☒ Ensure training is current (First Aid, CPR, defensive driving, etc.).
☒ Conduct Task Safety Assessments throughout the job.
☒ Do not work alone; stick with at least one other crew member along the pipeline alignment.
☐
☐
☐

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Additional Comments:
GeoEngineers Contacts: Site Personnel: OTHER MENTIONABLE ITEMS, JOB STEPS, HAZARDS, ACTIONS, OR CONTROL MEASURES: Perform a Task Safety Assessment (TSA) as tasks change.

DAILY RECORD OF SAFETY MEETINGS

Signature	Date	Signature	Date

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FORM 3
ACCIDENT/EXPOSURE REPORT FOR
JEFFERSON AVENUE AND HOOD STREET SURFACE WATER INTERCEPTOR PROJECT
FILE NO. 0570-156-00

To (Supervisor): _____ From (Employee): _____

Telephone (with area code): _____

Name of injured or ill employee: _____

Date of accident: Time of accident: Exact location of accident:

Narrative description of accident/exposure (circle one):

Medical attention given on site:

Nature of illness or injury and part of body involved: Lost Time? Yes ☐ No ☐

Probably Disability (check one):

Fatal	Lost work day with days away from work	Lost work day with days of restricted activity	No lost work day	First Aid only
☐	☐	☐	☐	☐

Corrective action taken by reporting unit and corrective action that remains to be taken (by whom and when):

Employee Signature: Date:

Name of Supervisor:

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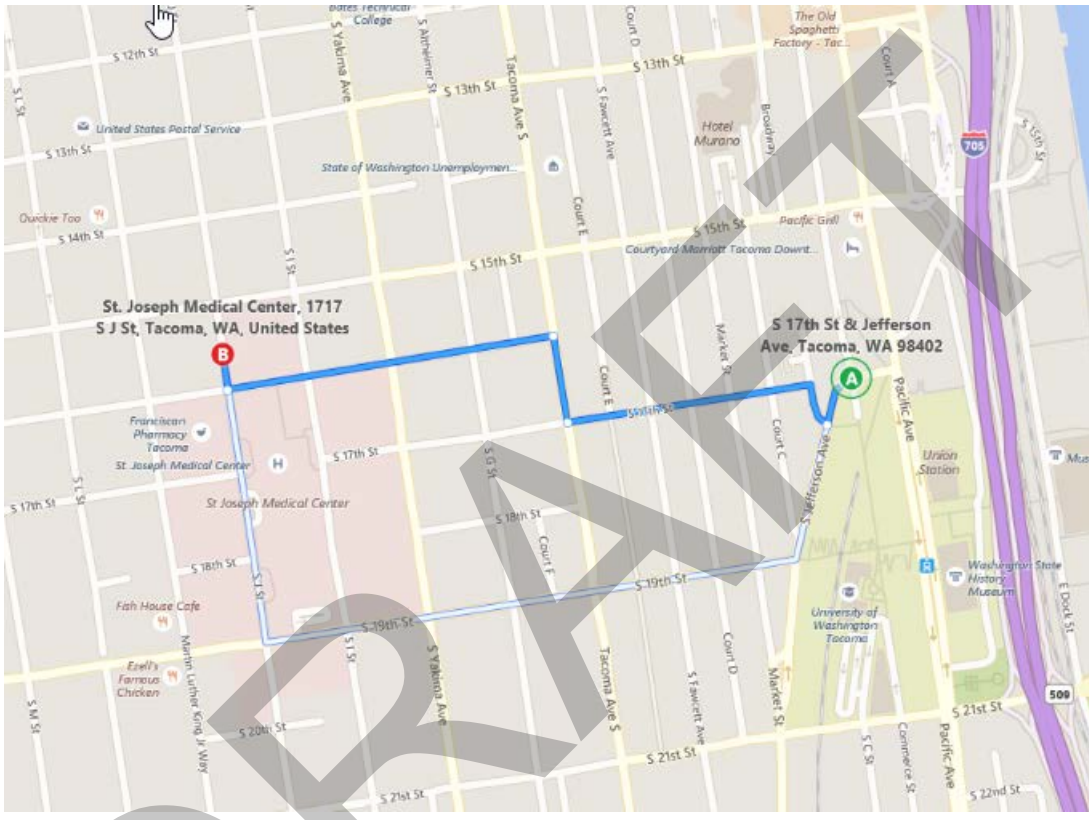
ATTACHMENT
HOSPITAL ROUTE
JEFFERSON AVENUE AND HOOD STREET SURFACE WATER INTERCEPTOR PROJECT
TACOMA, WASHINGTON
FILE NO. 0570-156-00



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APPENDIX B
Health and Safety Plan

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GeoEngineers

1101 Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Field Report

	Project:		File Number:
			Date:
	Owner:	Time of Arrival:	Report Number:
Prepared by:	Location:	Time of Departure:	Page:
Purpose of visit:	Weather:	Travel Time:	Permit Number:

Upon arrival to the site I assessed personal safety hazards: ☐ Yes or ☐ Referred to Site Safety Plan and Safety Tailgate if applicable

Safety Hazards Were Addressed by : ☐ Staying Alert to Construction and Equipment Hazards ☐ Other (describe)

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☐ **THIS FIELD REPORT IS PRELIMINARY**

A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.

FIELD REPRESENTATIVE **DATE**

☐ **THIS FIELD REPORT IS FINAL**

A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.

REVIEWED BY **DATE**

This report presents opinions formed as a result of our observation of activities relating to our services only. We rely on the contractor to comply with the plans and specification throughout the duration of the project irrespective of the presence of our representative. Our work does not include supervision or direction of the work of others. Our firm will not be responsible for job or site safety of others on this project. DISCLAIMER: Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Attachments:

Distribution:

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LOCATION OF BORING

North Arrow

Datum

Elevation

Job No.	Project Name	Boring No.
Drilling Method:		Location
Hammer Data:		
Auger Data:		
Drilling Equipment:		
Sampling Method:		Sheet of

Drilling Time

Water Level:				Start		Finish
Time:						
Date:				Date		Date
Casing Depth:						

SURFACE CONDITIONS:

SAMPLER TYPE	INCHES DRIVEN / INCHES RECOVERED	DEPTH OF CASING	SAMPLE NO. / SAMPLE DEPTH	BLOW/FT.	NUMBER OF RINGS	DEPTH IN FEET	GROUP SYMBOL	SOIL DESCRIPTION	Other Tests/Notes
						0			
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						0			
						1			
						2			
						3			
						4			
						5			
						6			
						7			
						8			
						9			
						0			

DRILLING CONTR. _____

LOGGED BY _____ CHK'D BY _____

DATE _____

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GROUNDWATER SAMPLE COLLECTION FORM

Project _____ Job No. _____ Collector _____ Sample Time _____ Sample ID _____

PURGE DATA

Well Condition: Secure [ ] Yes [ ] No Describe Damage _____

(Padlock brand and number) _____

Depth to Water (from top of well casing) _____

Depth to Base of Well _____ Height of Water Column _____

Well Casing Type/Diameter _____

One Casing Volume (gal.) _____

Purge Method Pump (type) _____ Bailer (type) _____

Gallons Purged _____

(Remove minimum of 3 well volumes or until field parameters stabilize)

Purge Water Storage/Disposal _____

(Drum identification, sample analysis, sample results, storage location, etc.) _____

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2			
3			
4			
6			
8			

SAMPLING DATA

Date Collected (mo/dy/yr) _____

Sample Location and Depth _____ Time Collected _____

Tidal Cycle NA [ ] High Tide at _____ Low Tide at _____ Weather _____

Sample type (Groundwater, Product, Other) _____

Sample Collected with [ ] Bailer [ ] Pump [ ] Other _____

Made of [ ] Stainless Steel [ ] PVC [ ] Teflon [ ] Disposable LDPE [ ] Other _____

Sampler Decon Procedure _____

Sample Description (color, free product thickness, odor, turbidity, etc.) _____

FIELD PARAMETERS

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (S/ m)	Turbidity (NTU)	Dissolved O2 (mg/l)	Temperature (deg C)	Salinity (%)	TDS (g/l)	Seawater Potential (σ_t)	ORP (mV)

Meters Used for Measurement _____

pH/Con./DO Instrument Calibration [ ] Yes [ ] No Spectrophotometer _____ E-Tape _____

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance **ml/min purge rate**

Analyses, Number and Volume of Sample Containers _____

Duplicate Sample Number(s) _____

Comments: (Filtered, Not Filtered, Calculations, etc.) _____

Signature _____ Date _____ Page 1 of

Check if additional information on back [ ]

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GROUNDWATER SAMPLE COLLECTION FORM

Project ____________________ Job No. __________ Collector ________ Sample Time ________ Sample ID ____________

FIELD PARAMETERS (cont.)

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (__S/__m)	Turbidity (NTU)	Dissolved O2 (mg/l)	Temperature (deg C)	Salinity (%)	TDS (g/l)	Seawater Potential (σ_t)	ORP (mV)

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