Public Works and Government Services Canada

Requisition No.: EZ897-210530

Buy and Sell ID No.: _____

Specifications for

Title: Environmental Drilling

Location: Alaska Highway

Project No. R.111999.001/002 Date: July 10, 2020

APPROVED BY:

Birk, Raman Digitally signed by: Birk, Raman DN: CN = Birk, Raman C = CA O = GC OU = PWGSC-TPSGC Date: 2020.07.08 18:43:10 -07'00'

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Project Manager Date

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Canada

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1.4.1. Work to be performed under the Contract includes, but is not limited to, the following items, including all ancillary Work, covered further in the Contract:

1.4.1.1. Mobilization of all equipment to a Starting Site as indicated. Onward movement to a series of sites as indicated which will be drilled as they are prepared and not in a linear geographical order. The drilling portion of the work will end at the Final Drilling Site as indicated.

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1.4.1.3.4. Material identified, by Departmental Representative, as not contaminated may be used as backfill.

1.5. Locations

1.5.1. A number of sites adjacent to the Alaska Highway in the Province of British Columbia are identified on drawings. . Approximately 10 to 15 sites will be selected for intrusive investigation from this list. The current site locations are shown on Drawings.

1.5.2. Sites include:

1.5.2.1. Active highway maintenance yards.

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1.5.2.3. Abandoned airstrips.

1.5.2.4. Military Fuel Depots.

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1.6. Project/Site Conditions

1.6.1. Contractor must provide personnel and equipment with appropriate experience for site conditions. Contractor to provide specialized material handling, health and safety, and environmental protection procedures, and must have knowledge of appropriate regulations.
1.6.2. Work at Site involves Work with Contaminated Material. Complete list of anticipated contaminants and concentration levels on the Site available separately in Appendices and/or Drawings.
1.6.3. Existing condition on the Site identified according to Drawings. Annexes provided for reference purposes only.

1.7. Other Contracts

1.7.1. Other contracts may currently be in progress at Sites.
1.7.2. Other contracts may include:
1.7.2.1. Environmental and other consultants.
1.7.2.2. Owners and operators of active sites.
1.7.2.3. Site users as identified in Contract Documents.
1.7.3. Further contracts may be awarded while the Contract is in progress.
1.7.4. Cooperate with other contractors in carrying out their respective works and carry out directions from Departmental Representative.
1.7.5. Coordinate Work with that of other contractors. If any part of Work under the Contract depends on its proper execution or result upon Work of another contractor, report promptly to Departmental Representative, verbally and in writing, any defects which can interfere with proper execution of this Work.

1.8. Contractor's Use of Site

1.8.1. Use of Site:
1.8.1.1. For the sole benefit of Canada.
1.8.1.2. Exclusive and only for completion of the execution of Work.
1.8.1.3. Assume responsibility of Prime Contractor and control for assigned premises for performance of this Work.
1.8.1.4. Be responsible for coordination of all Work activities onsite, including the Work of other contractors engaged by the Departmental Representative.
1.8.2. There are no pre-existing arrangements for access or encroachment on neighbouring properties. Offsite access, occupancy, or encroachment is the responsibility of the Contractor.
1.8.3. Perform Work in accordance with Contract. Ensure Work is carried out in accordance with schedule accepted by Departmental Representative.
1.8.4. Do not unreasonably encumber Site with material or equipment.
1.8.5. Accommodate common areas with other Site users, including roadways.
1.8.6. Segregate Contractor's work area from common areas to prevent unintentional multiple employer worksite, as required.

1.9. Existing Permits

1.9.1. Existing Permits and Authorizations are included in the Annexes:
1.9.1.1. None

1.9.2. Contractor assumes responsibility for relevant portions of existing permits.
1.9.3. Changes to existing permits must be accepted by Departmental Representative. Changes to existing permits responsibility of Contractor, including resubmission to regulators as determined by the Contractor's Qualified Professional. Contractor assumes all responsibility for changed permits.
1.9.4. Permits required other than the existing permits responsibility of Contractor.

1.10. Schedule Requirements

1.10.1. Work to be initiated: as soon as practical.
1.10.2. Pre-Mobilization Submittals: at least 10 Working Days prior to mobilization to Site, Submit all documents required for mobilization, including at a minimum the Contractor's site-specific project Health and Safety Plan and emergency procedures.
1.10.3. Site Works: Final Completion no later than 1 November 2020 .
1.10.4. Completion of the Work: no later than 1 December 2020. Includes all final Submittals including as-built documents, the Certificate of Completion, and the Statutory Declaration at Final Completion.

1.11. Hours of Work

1.11.1. Restrictive as follows:
1.11.1.1. Working Days are Monday to Saturday.
1.11.1.2. Working Hours are 07:00 to 17:00.
1.11.2. Work outside of Working Days and Working Hours is at Department Representative's sole discretion, and must be accepted in writing by Departmental Representative by Submission.
1.11.3. Be responsible for Site outside of Working Days and Working Hours and have a continuous presence on Site as required, in accordance with the Contract, or as directed by the Departmental Representative, to ensure:
1.11.3.1. Protection of health and safety for potentially hazardous activities (eg open boreholes).
1.11.3.2. Site security for Sites in urban environments.
1.11.3.3. Maintenance of environmental monitoring and protection measures for Sites in urban environments or with sensitive neighbouring properties.

1.12. Security Clearances

1.12.1. Not Used.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. Advisory: notices, instructions, or directions issued by the Departmental Representative to the Contractor.

1.2.2. Certificate of Completion: see General Conditions.

1.2.3. Change Order: PWGSC form issued by the Departmental Representative to the Contractor as per the relevant Contemplated Change Notice.

1.2.4. Classification: material (including soil and water) categorized into different classes based on Environmental Quality Criteria. Includes Hazardous Waste Quality, Waste Quality, Non-Contaminated Quality. Sub-classification based on specific parameters as identified in Contract. Re-classification must have approval of Departmental Representative.

1.2.5. Confirmation Samples: soil and sediment samples collected from the base and walls of the excavation by the Departmental Representative to confirm that the remedial objectives for the Work have been met.

1.2.6. Contaminated Material: material where substances occur at concentrations that: (i) are above background levels and pose, or are likely to pose, an immediate or long-term hazard to human health or the environment, or (ii) exceed the levels specified in policies and regulations. Includes Soil, Sediment, Water, Debris, and Organic Matter. Includes Hazardous Waste Quality and Waste Quality. Does not include Non-Contaminated Quality Material. Relevant regulations, unless otherwise in accordance with the Contract or as directed by the Departmental Representative, include:

1.2.6.1. Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines*, the CCME *Canada-wide Standard for Petroleum Hydrocarbons (PHC) in Soil*, and the Federal Contaminated Sites Action Plan (FCSAP) *Guidance Document on Federal Interim Groundwater Quality Guidelines for Federal Contaminated Sites*.

1.2.6.2. BC *Hazardous Waste Regulation*, BC *Contaminated Sites Regulation*, and BC *Approved Water Quality Guidelines*.

1.2.6.3. Yukon *Special Waste Regulation*, Yukon *Contaminated Sites Regulation*.

1.2.7. Contaminated Soil Extents: lateral and vertical extents of Contaminated Soil to be remediated to meet remediation objectives. Does not include Topsoil, Overburden, or other Non-Contaminated Quality Soil excavated incidentally. Extents, including contaminants and concentrations, on Drawings are approximate and may vary based on field observations or Confirmation Samples.

1.2.8. Contaminated Water Treatment Plant: a temporary onsite or existing offsite facility located in Canada that is designed, constructed and operated for the

handling or processing of Contaminated Water in such a manner as to change the physical, chemical or biological character or composition of the water to lower than the site-specific remedial objective, Discharge Approval, and in compliance with all regulations.

1.2.9. Contemplated Change Notice: PWGSC form issued by the Departmental Representative to the Contractor requesting Contractor to provide a quote, which may result in a Change Order.

1.2.10. Contract: see General Conditions.

1.2.11. Contract Amount: see General Conditions.

1.2.12. Contractor: see General Conditions.

1.2.13. Departmental Representative: see General Conditions.

1.2.14. Discharge Approval: permit, certificate, approval, license, or other required form of authorization issued by appropriate federal agency, province, territory, or municipality having jurisdiction and authorizing discharge.

1.2.15. Disposal Facility: an offsite facility specifically used to introduce Contaminated Soil into the environment for the purpose of final burial.

1.2.16. Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.

1.2.17. Environmental Protection: prevention, control, mitigation, and restoration of pollution and habitat or environmental disruption during construction. Control of Environmental Pollution and Damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; vibrations; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.18. Environmental Protection Plan: plan developed by the Contractor to ensure Environmental Protection and prevent Environmental Pollution and Damage identifying all environmental risks and mitigation measures, including: personnel requirements, emergency contacts, Environmental Protection methods, procedures, and equipment, and emergency response including a Spill Control Plan.

1.2.19. Environmental Quality Criteria: numerical material criteria used on Site based on Standards and/or Guidelines specified by the Canadian Council of Ministers of the Environment and/or BC *Contaminated Sites Regulation* or Yukon *Contaminated Sites Regulation*, as applicable, using appropriate Land Use and Site-specific Factors.

1.2.20. Excavation Extents: lateral and vertical extents of Soil to be excavated to meet Contaminated Soil Extents, as determined by Contractor's Qualified Professional. Includes Overburden. Extents on Drawings are approximate and may vary based on field observations or Confirmation Samples.

1.2.21. Extension of Time: see General Conditions.

1.2.22. Extension of Time on Contracts: PWGSC form requesting an Extension of Time.
1.2.23. Facility Authority:
1.2.23.1. For facilities within provincial or territorial jurisdiction: the relevant provincial or territorial ministry.
1.2.23.2. For facilities on First Nation reserve land in Canada not subject to the First Nation Land Management regime: Indigenous and Northern Affairs Canada.
1.2.23.3. For facilities on First Nations land in Canada subject to the First Nation Land Management Act regime: the relevant First Nation Council. Documentation must be provided that the facility is on land subject to the First Nation Land Management Act regime.
1.2.23.4. For facilities in the United States of America: either or both of the Environmental Protection Agency and the relevant State, as appropriate.
1.2.24. Final Completion: see General Conditions.
1.2.25. Final Excavation Limits: lateral and vertical extents of excavation as determined by Contractor's Qualified Professional Surveyor. Includes Contaminated Soil, Topsoil, Overburden, or other Non-Contaminated Quality Soil excavated incidentally including Temporary Sloping and Shoring.
1.2.26. Hazardous Waste Quality: Contaminated material which meets the applicable Regulatory definition of Hazardous Waste.
1.2.27. Land Treatment Facility (LTF): equivalent of Soil Treatment Facility.
1.2.28. Landfill Facility: an offsite facility specifically used to introduce Non-Contaminated Quality Material into the environment for the purpose of final burial.
1.2.29. Master Plan: baseline schedule determined by Contractor compliant with Schedule Requirements. Duration for any portion of the Work based on Master Plan.
1.2.30. Material: Soil, Sediment, Water, Debris, and Organic Matter. Includes Topsoil, Overburden, Oversize Debris, cleared and grubbed vegetation, other vegetation, litter, rubbish, cobbles, boulders, excess construction material, lumber, steel, plastic, concrete, asphalt and other waste material.
1.2.31. Materials Source Separation Program: consists of a series of ongoing activities to separate reusable and recyclable waste into categories from other types of waste at point of generation.
1.2.32. National Master Specifications: the Specifications are subdivided in accordance with the current 6 digit National Master Specifications System; the first 2 digits are the Division, the last 4 digits are the Section. A Division may consist of the Work of more than 1 Subcontractor; responsibility for determining which Subcontractor provides the labour, material, equipment and services required to complete the Work rests solely with the Contractor
1.2.33. Non-Contaminated Quality Material: material that does not exceed applicable Environmental Quality Criteria. Includes Soil, Sediment, Water, Debris, and Organic Matter.

1.2.34. Onsite Soil Treatment Facility (Onsite STF): a facility constructed and operated on property under the control of PWGSC specifically used to bioremediate Contaminated Soil originating only from federal Sites.
1.2.35. Overburden: Non-Contaminated Quality Soil excavated incidentally as required above or adjacent to Contaminated Soil. Includes Topsoil.
1.2.36. Oversize Debris: Waste that is required to be excavated and is: larger than 1 cubic metre or larger than 2 metres in one dimension, cannot be removed with a typical excavator with bucket, and requires the use of special equipment (e.g., saws, hydraulic cutters, excavator hammers, vibratory pile extractors). Includes bedrock, boulders, pilings, pipes, building structures, and concrete foundations.
1.2.37. Prime Contractor: see General Conditions "Contractor", BC Occupational Health and Safety Regulations "Prime Contractor", and Yukon Occupational Health and Safety Act "Constructor".
1.2.38. Progress Payment: see General Conditions.
1.2.39. Progress Survey: Survey conducted using equipment such as tape measurements, non-differential GPS, theodolite, or truck counts. Not a survey conducted by a Qualified Professional Surveyor.
1.2.40. PWGSC: Public Works and Government Services Canada (also known as PSPC: Public Services and Procurement Canada). Representative of Canada with control of the Site.
1.2.41. Qualified Professional: a person who is registered in relevant jurisdiction with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (ie no "in training" designations). Includes:
1.2.41.1. Association of the Chemical Profession of British Columbia.
1.2.41.2. British Columbia College of Applied Biology.
1.2.41.3. British Columbia Institute of Agrologists.
1.2.41.4. Engineers and Geoscientists British Columbia.
1.2.41.5. Engineers Yukon.
1.2.42. Qualified Professional Surveyor: a person who is registered in relevant jurisdiction with his or her appropriate professional college/association, acts under that professional college/association's code of ethics, and is subject to disciplinary action by that professional college/association, and through suitable education, experience, accreditation and knowledge can be reasonably relied on to provide advice within his or her area of expertise. Only full membership will be considered to be a Qualified Professional (ie no "in training" designations). Includes:
1.2.42.1. Association of British Columbia Land Surveyors.
1.2.42.2. Association of Canada Lands Surveyors.

1.2.42.3. Applied Science Technologists & Technicians of British Columbia registered in Site Improvements Surveys.
1.2.42.4. Engineers and Geoscientists British Columbia.
1.2.43. Quote: Quotation for Design Change or Additional Work. Contractor's cost proposal issued to the Departmental Representative as per the relevant Contemplated Change Notice. May be either a Lump Sum Arrangement or a Unit Price Arrangement.
1.2.44. Remediation by Excavation: complete excavation of Contaminated Soil and incidental Non-Contaminated Quality Soil to the Site boundaries for the purpose of remediating the Site to meet numerical standards. Includes full treatment and disposal. Does not include risk assessment or risk management of material onsite. Does not include encapsulation or solidification in place.
1.2.45. Request For Information: notice or other communication issued by the Contractor to the Departmental Representative.
1.2.46. Sewage: liquid waste which is not suitable for direct discharge to the environment, and which must be either treated offsite or discharged to a sanitary sewer. Includes water from hand basin, shower, personal hygiene facilities, or other liquid waste from sanitary facilities.
1.2.47. Site: work area available to Contractor according to Drawings. Does not include shared or public areas, including common roads.
1.2.48. Soil: unconsolidated mineral or organic material, rock, fill, and sediment deposited on land, and other solid material excavated incidentally. Includes Topsoil and Overburden. Includes cobbles and boulders.
1.2.49. Soil Treatment Facility: facility for bioremediating contaminated soil. Includes Treatment Cells, Staging Cells, and ancillary Access Roads.
1.2.50. Special Waste: equivalent of Hazardous Waste.
1.2.51. Subcontractor: see General Conditions.
1.2.52. Submit/Submittals: documents from the Contractor to the Departmental Representative as: required by Contract; stipulated in permit, certificate, approval, license, or any other form of authorization; by convention or industry practice. Submittals are final only after review and accepted in writing by Departmental Representative.
1.2.53. Substantial Performance: see General Conditions.
1.2.54. Superintendent: see General Conditions
1.2.55. Supplier: see General Conditions.
1.2.56. Topsoil: Overburden excavated incidentally above Contaminated Soil Extents that is a surface organic layer to facilitate vegetation growth.
1.2.57. Transfer/Interim Storage Facility: an offsite facility specifically used to transfer or short term storage Contaminated Soil during offsite transport.
1.2.58. Treat: handling or processing of Contaminated Material in such a manner as to change the physical, chemical or biological character or composition of Contaminated Material such that it becomes Non-Contaminated Quality and is suitable for final Discharge or Disposal. Treatment includes filtering, bioremediation, thermal desorption, and incineration. Treatment does not

include blending, mixing, or dilution. Material sent to a Treatment Facility must be Treated as follows:

1.2.58.1. Water must be Treated to meet requirements of a valid and subsisting Discharge Approval held by the Treatment Facility.

1.2.58.2. Soil must be Treated to meet (i) less than Waste Quality and (ii) requirements of the subsequent Disposal Facility.

1.2.59. Treatment Facility: an offsite facility specifically used to treat Contaminated Soil or Contaminated Water. Treatment Facility may treat soil, sediment, or water. All material Treated at a Treatment Facility must be considered Contaminated Material until final Discharge or Disposal.

1.2.60. Waste Quality: material that exceeds applicable Environmental Quality Criteria but is not Hazardous Waste.

1.2.61. Wastewater: Non-Contaminated Quality Water that is not Sewage.

1.2.62. Work: see General Conditions.

1.3. Action and Informational Submittals

1.3.1. Permits: at least 10 Working Days prior to mobilization to Site, Submit copies of all permits, certificates, approvals, or any other form of authorizations and all reporting required.

1.3.2. Daily Work Records: at the end of each shift Submit daily Work records, during onsite Work. Include:

1.3.2.1. Quantities for each Description of Work identified in the Unit Price Table and Change Orders.

1.3.2.2. Description of Work performed.

1.3.2.3. Current Site conditions.

1.3.2.4. General information including: date, time shift started and ended, Subcontractor(s) onsite, Health and Safety items, and Environmental Protection items.

1.3.2.5. Signature of Superintendent.

1.3.3. Cash Flow: with each Progress Payment, Submit a cash flow forecast. Include:

1.3.3.1. Calculation of planned cost versus actual cost and schedule forecasting and cash flow projections on a monthly basis, indicating anticipated value of future Progress Payments, for each Description of Work identified in the Unit Price Table.

1.3.3.2. Progress Payments will not be processed until cash flow has been accepted by the PSPC Departmental Representative.

1.3.4. Coordination Meeting Minutes and Drawings: at least 5 Working Days prior to relevant Work commencing, Submit final meeting minutes and drawings from coordination with Subcontractors.

1.3.5. Quality Management Plan: within 10 Working Days after Contract award, Submit a quality management plan. Include:

1.3.5.1. Details on planned review, inspection and testing to provide Quality Assurance and Quality Control for the Work.

1.3.5.2. Subcontractors responsible for review, inspection and testing.

1.3.5.3. Schedule of submittals of review, inspection and testing results.

1.3.6. Review, Inspection, and Testing Results: within 5 Working Days of receipt, Submit all results of reviews, inspection, and testing performed as part of the Work, including laboratory reports and sampling chains of custody.

1.4. Laws and Regulations

1.4.1. Generally, provincial, territorial and municipal laws, regulations, bylaws and other requirements do not apply to federal lands, works or undertakings. Soil, sediment, water or other materials that are removed from federal lands may become subject to provincial, territorial or municipal laws and regulations.

1.4.2. Provincial, territorial or municipal standards may be used in relation to federal lands only as guidelines for the purpose of establishing remediation goals and objectives. The term "standards" is used in this part in order to maintain consistency in terminology throughout this document, and does not imply that standards contained in provincial, territorial or municipal laws and regulations apply on Federal lands, activities or undertakings.

1.5. Green Requirements

1.5.1. Use only environmentally responsible green materials/products with no Volatile Organic Compounds (VOC) emissions or minimum VOC emissions of indoor off-gassing contaminants for improved indoor air quality – subject of acceptance of Submittal of Materials Safety Data Sheet (MSDS) Product Data.

1.5.2. Use materials/products containing highest percentage of recycled and recovered materials practicable – consistent with maintaining cost effective satisfactory levels of competition.

1.5.3. Adhere to waste reduction requirement for reuse or recycling of waste materials, not including soil or water, thus diverting materials from Landfill Facility.

1.6. Smoking Environment

1.6.1. Smoking on the Site is not permitted.

1.7. System of Measurement

1.7.1. The metric system of measurement (SI) will be employed on the Contract.

1.8. Documents Required

1.8.1. Maintain 1 copy each of the following posted at the job Site:

1.8.1.1. General Conditions.

1.8.1.2. Drawings.

1.8.1.3. Specifications.

1.8.1.4. Addenda or other modifications to Contract.

1.8.1.5. Change orders.

1.8.1.6. Current Work schedule.

1.8.1.7. Reviewed and final Shop Drawings Submittals.

1.8.1.8. One set of record Shop Drawings and Specifications for “as-built” purposes.

1.8.1.9. Reviewed and accepted Submittals.
1.8.1.10. Health and Safety documents, including all daily toolbox meetings, Notice of Project, and utility clearances.
1.8.1.11. Environmental Protection Plan.
1.8.1.12. Final Meeting Minutes, Agendas and associated attachments.
1.8.1.13. Permits and other approvals.

1.9. Setting out of Work

1.9.1. Assume full responsibility for and execute complete layout of Work to locations, lines and elevations according to Drawings.
1.9.2. Provide devices needed to layout and construct Work.
1.9.3. Provide such services and devices in accordance with the Contract to facilitate Departmental Representative's inspection of Work.

1.10. Works Coordination

1.10.1. Designate one person to be responsible for review of Contract and Shop Drawings and managing coordination of Work.
1.10.2. Convene meetings between Subcontractors whose Work interfaces and ensure awareness of areas and extent of interface required.
1.10.3. Provide each Subcontractor with complete Drawings and Specifications for Contract, to assist them in planning and carrying out their respective work.
1.10.4. Develop coordination drawings when required, illustrating potential interference between Work of various trades and distribute to affected parties.
1.10.5. Facilitate meeting and review coordination drawings. Ensure Subcontractors agree and sign off on coordination drawings.
1.10.6. Publish minutes of each meeting.
1.10.7. Submit a copy of coordination drawings and meeting minutes as directed by the Departmental Representative.
1.10.8. Submit Shop Drawings and order of prefabricated equipment or rebuilt components only after coordination meeting for such items has taken place.
1.10.9. Work coordination:
1.10.9.1. Ensure cooperation with trades in order to facilitate general progress of Work and avoid situations of spatial interference.
1.10.9.2. Ensure that each trade provides all other trades reasonable opportunity for Final Completion of Work and in such a way as to prevent unnecessary delays, cutting, patching and removal or replacement of completed Work.
1.10.9.3. Ensure disputes between Subcontractors are resolved.
1.10.10. Failure to coordinate Work is responsibility of Contractor.

1.11. Record Keeping

1.11.1. Advisory: Contractual correspondence from the Departmental Representative to the Contractor. Does not include Change Documents. To be sequentially numbered. Include cross references to applicable Request For Information. The

status of the Contractor, including the function of Prime Contractor, must not change by reason of any Advisory.

1.11.2. Request For Information: Contractual correspondence from Contractor to the Departmental Representative. Includes Submittals. Does not include Change Documents. Must be sequentially numbered. Include cross references to applicable Advisory. Status of the Contractor, including the function of Prime Contractor, must not change by reason of any Request For Information.

1.11.3. Maintain adequate records to support information provided to Departmental Representative.

1.11.4. Maintain bills of ladings for minimum of 300 Working Days from date of shipment or longer period required by applicable law or regulation.

1.12. Change Documents

1.12.1. Change Documents do not relieve Contractor of any obligation.

1.12.2. Change Documents do not change the Contractor's responsibility for methods, means and sequences.

1.12.3. Change Documents do not change by any reason the status of the Contractor, including the function of Prime Contractor or as supervisor.

1.12.4. Change Documents include:

1.12.4.1. Change Order: There may be a change to the Contract Amount by reason of any Change Order. No Extension of Time for completion of the Work by reason of any Change Order.

1.12.4.2. Contemplated Change Notice: No increase to the Contract Amount by reason of any Contemplated Change Notice. No Extension of Time for completion of the Work by reason of any Contemplated Change Notice.

1.12.4.3. Extension of Time on Contracts: There may be a change to the completion of the Work by reason of an Extension of Time on Contracts. No increase to the Contract Amount by reason of any Extension of Time on Contracts.

1.12.4.4. Quote: No increase to the Contract Amount by reason of any Quote. No Extension of Time for completion of the Work by reason of any Quote.

1.13. Inspection

1.13.1. Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Site, allow access to such Work whenever it is in progress. Work at locations other than Site includes offsite Facilities.

1.13.2. Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative or applicable law.

1.13.3. If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work.

1.13.4. Departmental Representative will order part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction.

2. PART 2 - PRODUCTS

2.1. Asbestos Containing Materials Prohibition

2.1.1. Any material containing any degree of asbestos is banned from use in any and all sites, designs and projects.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Pre-Mobilization Submittals will be paid in accordance with lump sum price established for all Preconstruction Meetings, final design, planning, health and safety, and other Submittals in accordance with the Contract or required and accepted by the Departmental Representative as in accordance with the Contract prior to mobilization to Site. Also includes Preconstruction Condition Survey and Preconstruction As-Built Documents.

1.1.2. Mobilization to Starting Site will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Works to the Starting Site.

1.1.3. Mobilization between drilling sites will be paid as a rate per km between one drilling site to the next. Mobilization includes mobilizing all necessary equipment, materials, supplies, facilities, and personnel associated with the Work to next site.

1.1.4. Demobilization from Final Drilling Site will be paid in accordance with lump sum price established for demobilizing all equipment and personnel associated with the Works from the Site. Includes decontaminating all equipment prior to removal from Final Drilling Site.

1.1.5. Sustainment will be paid as a single rate per person per day.

1.1.6. Daily Travel includes travel between the drill site and the sleeping accommodations and includes all necessary equipment, materials, supplies, facilities, and personnel associated with the Work.

Closeout Submittals will be paid in accordance with lump sum price established for Final Site Inspection (for Certificate of Completion purposes), Closeout Meetings, Postconstruction Condition Survey and final As-Built Documents as directed by the Departmental Representative.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Breakdown of Lump Sum Prices: at least 5 Working Days prior to submitting the first Progress Payment, Submit a breakdown of the Contract lump sum prices including labour, material and time, in detail as directed by the Departmental Representative and aggregating Contract Amount.

1.4. Examination

1.4.1. Determine condition of existing Site and requirements to make the Site suitable for Work.

1.5. Mobilization and Demobilization

1.5.1. Move all personnel, equipment, supplies, and incidentals to and from the Site.

1.6. Protection of Features

1.6.1. Protect existing features with temporary barriers and enclosures as required by applicable local regulations.

1.6.2. Protect natural and man-made features required to remain undisturbed. Protect existing trees and other prominent natural features from damage unless otherwise required or located in an area to be occupied by new construction. Protect existing structures, including roads, walls, and buildings.

1.6.3. Protect above ground and buried utilities that are required to remain undisturbed or in continuous operation during the Work.

1.6.4. Protect features from surface water damage by temporary structures to divert flow as appropriate.

1.6.5. Protection of Monitoring Wells

1.6.5.1. Protect all monitoring wells unless specifically confirmed by Departmental Representative.

1.6.5.2. Protect all monitoring wells outside area of surface disturbance, including Contaminated Soil Extents.

1.6.5.3. Protect monitoring wells within area of surface disturbance, including Contaminated Soil Extents, as identified in Contract.

1.6.5.4. Replace or repair protected monitoring wells damaged by Work using methods, means, and sequences as directed by the Departmental Representative at Contractor's expense.

1.6.6. Security and Safety:

1.6.6.1. Provide safety measures to ensure worker and public safety.

1.6.6.2. Ensure Site is secure during onsite Work, provide, install, and remove fencing, temporary hoarding, and other security measures as appropriate.

1.7. Existing Utility Services

1.7.1. Size, depth and location of existing utilities and structures as provided in Contract are for guidance only. Completeness and accuracy are not guaranteed.

1.7.2. Departmental Representative establishes location and extent of service lines in area of Work and notify Contractor prior to commencing Work. All utilities entering Site must be confirmed prior to subsurface disturbance (ie do not rely on as-built documents). As appropriate, Departmental Representative confirm locations of buried utilities by independent utility locator and using hand test excavations or hydrovac methods.

1.7.3. Contractor confirms location of buried utilities by hand test excavations when necessary and as directed by Departmental Representative.

1.7.4. Maintain and protect from damage all utilities and structures encountered, unless Work involves temporarily breaking, rerouting, or connecting existing utilities.

1.7.5. Where unknown utilities are encountered, immediately verbally notify Departmental Representative and confirm findings in writing.

1.7.6.

1.8. Completion Documents

1.8.1. Submit as directed by the Departmental Representative, a written certificate that the following have been performed:

1.8.1.1. Work has been completed, and inspected and accepted by the Departmental Representative, in accordance with the Contract.

1.8.1.2. Treatment and Disposal of treatable soils have been completed and Disposal of all other soils has been completed.

1.8.1.3. Damage has been repaired, deficiencies have been completed, missing items have been provided, and non-conformance has been corrected, in the opinion of the Departmental Representative.

1.8.2. Defective products will be rejected, regardless of previous inspections. Replace defective products.

1.8.3. Prepare all documentation required as part of any permits or other authorizations obtained or otherwise the responsibility of the Contractor.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Tailgate Safety Meetings paid as a rate per person per hour.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Preconstruction Meeting Minutes: within 2 Working Days of the Preconstruction Meeting, Submit meeting minutes.

1.3.2. Progress Meeting Minutes: within 2 Working Days of a Progress Meeting, Submit meeting minutes. Submit revised minutes within 2 Working Days of receiving comments by Departmental Representative.

1.3.3. Information for Progress Meetings: at least 2 Working Days prior to scheduled Progress Meetings, Submit all information in accordance with the Contract for Progress Meetings. Include:

1.3.3.1. Agenda for the proposed Progress Meeting.

1.3.3.2. Updated Project Schedule.

1.3.3.3. Copies of transport manifests and disposal receipts for all materials removed from Site.

1.3.3.4. Other information as directed by the Departmental Representative or relevant to agenda for upcoming progress meeting.

1.3.4. Final Site Inspection: within 2 Working Days of the Final Site Inspection, Submit meeting minutes.

1.3.5. Closeout Meetings: within 2 Working Days of the Closeout Meeting, Submit meeting minutes.

1.4. Administrative

1.4.1. Schedule and administer project meetings throughout the progress of the Work weekly and at the call of the Departmental Representative.

1.4.2. Prepare agenda for meetings.

1.4.3. Submit written notice with agenda of each meeting 2 Working Days in advance of meeting date as directed by the Departmental Representative.

1.4.4. Provide physical space and make arrangements for meetings, or arrange for teleconference meetings, as directed by Departmental Representative.

1.4.5. Preside at meetings.

1.4.6. Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

1.4.7. Maintain records of meeting minutes for a minimum of 2 years after Work is completed.

1.4.8. Representative of Contractor, Subcontractor(s) and Supplier(s) attending meetings must be qualified and authorized to act on behalf of party each represents.

1.5. Preconstruction (Kickoff) Meeting

1.5.1. Within 5 Working Days after award of Contract, request a meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities.
1.5.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
1.5.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
1.5.4. Agenda to include:
1.5.4.1. Appointment of official representative of participants in the Work, including Contractor's Superintendent and Departmental Representative.
1.5.4.2. Schedule of Work including Master Plan.
1.5.4.3. Schedule of Submittals including premobilization Submittals including Insurance, Contract Security, Health and Safety Plan, and Environmental Protection Plan.
1.5.4.4. Requirements for temporary facilities.
1.5.4.5. Site security, Health and Safety, Environmental Protection, coordination with other Site users including consultants and other contractors.
1.5.4.6. Change orders, procedures, approvals required, administrative requirements.
1.5.4.7. Monthly Progress Payments, administrative procedures, hold backs.
1.5.4.8. Appointment of inspection and testing agencies or firms.
1.5.4.9. List of Subcontractor(s).

1.6. Progress Meetings

1.6.1. During course of Work schedule progress meetings weekly subject to approval by Departmental Representative.
1.6.2. Contractor, Superintendent, major Subcontractor(s) involved in Work, and Departmental Representative are to be in attendance.
1.6.3. Agenda to include:
1.6.3.1. Review and acceptance of minutes of previous meeting.
1.6.3.2. Review health and safety, including incidents, near misses, and corrective measures.
1.6.3.3. Review Environmental Protection, including incidents, near misses, and corrective measures.
1.6.3.4. Review contractual compliance.
1.6.3.5. Review regulatory compliance.
1.6.3.6. Review communications, problems or concerns with community.
1.6.3.7. Review of Work progress since previous meeting.
1.6.3.8. Field observations, problems, conflicts.
1.6.3.9. Updated progress schedule detailing activities planned over next 2 week

period. Include review of progress with respect to previously established dates for starting and stopping various stages of Work.

1.6.3.10. Problems which impede construction schedule.
1.6.3.11. Corrective measures and procedures to regain projected schedule.
1.6.3.12. Revision to construction schedule.
1.6.3.13. Progress schedule, during succeeding Work period.
1.6.3.14. Review submittal schedules: expedite as required.
1.6.3.15. Maintenance of quality standards.
1.6.3.16. Quantities of material transported, treated, and disposed.
1.6.3.17. Review proposed changes for effect on construction schedule and on Final Completion date.
1.6.3.18. Other business.
1.6.4. Submit draft Progress Meeting Minutes for review and comment by Departmental Representative. Incorporate comments into final Progress Meeting Minutes.

1.7. Toolbox Meetings

1.7.1. During the course of the Work, schedule daily toolbox (tailgate) meetings at the start of each Work shift. Multiple meetings are required if the Contractor works multiple shifts within a 24-hour period.
1.7.2. All on Site workers to attend, including Contractor, Superintendent, major Subcontractor(s), and environmental consultants. Departmental Representative may attend.
1.7.3. Agenda to include:
1.7.3.1. Planned Work activities and environmental considerations for that shift, including hazards, mitigation measures, and emergency procedures.
1.7.3.2. Review previous relevant incident or near-miss reports, both from Site and other Sites.
1.7.3.3. Coordination activities, and roles and responsibilities, required between Contractor, Subcontractor(s), Departmental Representative, other contractor(s) including environmental consultant, site users, and protection of general public and offsite resources.
1.7.3.4. Health and Safety items, including PPE requirements.
1.7.3.5. Environmental Protection items, including emergency equipment.

1.8. Final Site Inspection

1.8.1. Perform site inspection at each drilling site prior to mobilizing to the next site or demobilizing from the work program.
1.8.2. Demobilize following final inspection by Departmental Representative.
1.8.3. Conduct final inspection once all work is completed for the site before proceeding to the next site.
1.8.4. Departmental Representative and Contractor conduct final inspection.
1.8.5. Inspection to include removal of all temporary equipment, materials, supplies, and facilities.

1.8.6. Contractor corrects all damage, deficiencies, missing items, and non-conformance prior to mobilization to the next site.
1.8.7. If required, and in the opinion of the Departmental Representative, perform another Final Site Inspection after resolving all documented damage, deficiencies, missing items, and non-conformance.

1.9. Closeout Meeting
1.9.1. Within 10 Working Days of completion of the Work, request a meeting to review the project.
1.9.2. Departmental Representative, Contractor, Superintendent, major Subcontractor(s), field inspectors and supervisors must be in attendance.
1.9.3. Establish time and location of meeting subject to approval by Departmental Representative and notify parties concerned at least 3 Working Days before meeting.
1.9.4. Agenda to include:
1.9.4.1. Review Certificate of Completion.
1.9.4.2. Review final payment.
1.9.4.3. Identify lessons learned.
1.9.4.4. Perform Contractor Performance Evaluation Report Form.

2. PART 2 - PRODUCTS

2.1. Not Used
2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used
3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. As per individual specification sections.

1.4. General

1.4.1. Submission details to be commensurate for type of Work and Site conditions. Details depend on Work performed and Contractor's methods, means, and sequences.

1.4.2. Contractor’s responsibility for errors and omissions in Submittals is not relieved by the Departmental Representative’s review of Submittals.

1.4.3. Notify Departmental Representative in writing at time of Submittals, identifying deviations from requirements of Contract and stating reasons for deviations.

1.4.4. Contractor’s responsibility for deviations in Submittals from requirements of Contract is not relieved by the Departmental Representative’s review of Submittals unless Departmental Representative gives written acceptance of specific deviations.

1.4.5. Make any changes in Submittals which Departmental Representative requires to be in accordance with the Contract and resubmit.

1.4.6. Notify Departmental Representative in writing, when resubmitting, of any revisions other than those directed by the Departmental Representative.

1.4.7. Do not proceed with Work until relevant Submittals are finalized and have been accepted.

1.4.8. Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to Submit in ample time is responsibility of Contractor.

1.4.9. Review Submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each Submittal has been checked and coordinated with requirements of Work and Contract. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

1.4.10. Verify field measurements and affected adjacent Work are coordinated.

1.4.11. Adjustments made on Submittals by the Departmental Representative will not result in an increase the Contract Amount nor an Extension of Time for completion of the Work.

1.4.12. Keep one final copy of each Submittal onsite.

1.5. Submission Requirements

1.5.1. Coordinate each Submittal with the requirements of the Work and the Contract. Individual Submittals will not be reviewed until:

1.5.1.1. Submittals are complete.

1.5.1.2. All related information is available.

1.5.2. Allow 10 Working Days for Departmental Representative's review of each Submittal, unless otherwise specified. No Standby Time charges or increases to Contract Amount or Extension of Time for Departmental Representative's review.

1.5.3. All Submittals are to be sent to Departmental Representative in duplicate as a hardcopy and in electronic format compatible with Departmental Representative's software.

1.5.4. Submittals must include:

1.5.4.1. Date and revision dates.

1.5.4.2. Project title and number.

1.5.4.3. Name and address of:

1.5.4.3.1. Subcontractor.

1.5.4.3.2. Supplier.

1.5.4.3.3. Manufacturer.

1.5.4.4. Signature of Superintendent, certifying approval of Submittals, verification of field measurements and in accordance with the Contract.

1.5.4.5. Contractor's Qualified Professional to sign and seal Submittals in accordance with the Contract or as required by the nature of the Submittal. Submittals to include at a minimum 1 hard copy of original ink sealed document.

1.5.4.6. Details of appropriate portions of Work as applicable.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not Used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Contaminated Soil and Water Management Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit methods, means, and sequences for Contaminated Soil and Contaminated Water Management onsite for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include

1.3.1.1. Personnel and equipment decontamination.

1.3.1.2. Segregation of different Classifications.

1.4. Sequencing and Scheduling

1.4.1. Commence Work involving contact with Contaminated or potentially Contaminated Soil or Water after all applicable Environmental Protection procedures (including those identified in Contaminated Soil and Water Management Plan and Environmental Protection Plan) and facilities (including those identified in Site Layout) are operational and accepted by Departmental Representative.

1.4.2. Plan work sequencing and traffic patterns to prevent contamination of clean areas due to traffic or debris.

1.5. Drums

1.5.1. Storage of drill cuttings: 200 L steel drums or 1 m^3 soil bag meeting Transportation of Dangerous Goods Act, closable lids / coverings, complete with labels for marking contents and date filled.

1.5.2. Storage of purged groundwater: 200 L plastic or steel drums with removable lids.

1.6. Personnel Decontamination Facility

1.6.1. Provide an area or areas close to the workers' changing facilities to enable workers and other personnel leaving areas such as exclusion area to remove deleterious and Contaminated Soils from boots, clothing and skin surfaces.

1.6.2. Be responsible for ensuring that all materials, chemicals, protective clothing, wash water and deleterious materials are collected, treated and disposed of in accordance with applicable environmental standards and regulations.

1.6.3. Personnel Decontamination Facility to be available for use by persons other than the Contractor's workers and Subcontractors, including federal employees, other contractor(s), and environmental agencies. Provide use of facilities to other persons.

1.7. Equipment Decontamination

1.7.1. At minimum, perform following steps during equipment decontamination: mechanically remove packed dirt, grit, and debris by scraping and brushing without using steam or high-pressure water to reduce amount of water needed and to reduce amount of contaminated rinsate generated.

1.7.2. If required, as directed by the Departmental Representative, use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate. Pay particular attention to tire treads, equipment tracks, springs, joints, sprockets, and undercarriages. Scrub surfaces with long handle scrub brushes and cleaning agent. Rinse off and collect cleaning agent. Air dry equipment in clean area before removing from Site or travelling on clean areas. Perform assessment as directed by the Departmental Representative to determine effectiveness of decontamination.

1.7.2.1. Take appropriate measures necessary to minimize drift of mist and spray during decontamination including provision of wind screens.

1.7.2.2. Collect decontamination wastewater and sediment which accumulate in decontamination location. Treat collected wastewater as Contaminated Water. Manage decontamination sediment as Waste Quality.

1.7.3. In the opinion of the Departmental Representative, each piece of equipment must be inspected by the Departmental Representative after decontamination and prior to travel on clean areas or demobilization from Site. Perform additional decontamination as required in the opinion of the Departmental Representative.

1.7.4. Furnish and equip personnel engaged in equipment decontamination with protective equipment including suitable disposable clothing, respiratory protection, and face shields.

1.8. Progress Decontamination

1.8.1. Decontaminate equipment after working in potentially contaminated Work areas and prior to subsequent Work or travel on clean areas.

1.9. Final Decontamination

1.9.1. Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially Contaminated Soil prior to demobilization from Site.

1.10. Contaminated Soil and Water Management

1.10.1. Remove all Contaminated Soil and Water within Work areas in accordance with the Contract and as directed by the Departmental Representative. Remove Non-

Contaminated Quality Soil and Water incidental to the Work or as directed by the Departmental Representative.

1.10.2. Material and Water will be Classified by the Departmental Representative based on insitu results, field observations, field measurements, and/or ex-situ characterization. Departmental Representative responsible for Classification. Contractor cannot re-Classify material.

1.10.3. Handle (including Excavate, Transport, Treat, and Dispose) material separately into the classifications in accordance with the Contract or as directed by the Departmental Representative. Take necessary precautions to avoid mixing of different classifications. Do not blend, or mix and dilute, different material Classifications.

1.10.4. Contractor responsible for Transportation, Treatment, and Disposal based on Classification by Departmental Representative. Contractor responsible for material blended, or mixed and diluted, based on re-Classification by Departmental Representative. No increases to Contract Amount or Extension of Time due to material blended, or mixed and diluted.

1.10.5. Material characterization (eg sampling and testing) of parameters additional to information provided in Contract as required by the Contractor (eg for Transportation, Treatment Facility or Disposal Facility purposes) responsibility of Contractor.

1.10.6. Material segregation additional to Contract as required for Transportation, Treatment Facility or Disposal Facility responsibility of Contractor.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

PSPC Update on Asbestos Use
Effective April 1, 2016, all Public Services and Procurement Canada (PSPC) contracts for new construction and major rehabilitation will prohibit the use of asbestos-containing materials.

COVID 19
All contractors shall follow Canadian Construction Association COVID-19 - Standardized Protocols for All Canadian Construction Sites, Provincial Regulations, and Federal Site Specific COVID 19 Procedures.

1. PART 1 - GENERAL

1.1. Measurement Procedures
1.1.1. Not Used.

1.2. Definitions
1.2.1. See 01 11 55.

1.3. Action and Informational Submittals
1.3.1. Submit to Departmental Representative Submittals listed for review.
1.3.2. Work affected by Submittal must not proceed until review is complete.
1.3.3. Site Specific Health and Safety Plan: within 7 Working Days after Contract award and prior to mobilization to Site, Submit a health and safety plan. Include:
1.3.3.1. Results of site-specific safety hazard assessment.
1.3.3.2. Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
1.3.4. Submit digital copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.
1.3.5. Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
1.3.6. Submit copies of incident and accident reports.
1.3.7. Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 10 days after receipt of comments from Departmental Representative.
1.3.8. Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.
1.3.9. Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.3.10. On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
1.3.11. Submit:
1.3.11.1. Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
1.3.11.2. Emergency Procedures.
1.3.11.3. Notice of Project.

1.4. References

1.4.1. Government of Canada:
1.4.1.1. Canada Labour Code - Part II.
1.4.1.2. Canada Occupational Health and Safety Regulations.
1.4.2. National Building Code of Canada (NBC):
1.4.2.1. Part 8, Safety Measures at Construction and Demolition Sites.
1.4.3. The Canadian Electric Code (as amended).
1.4.4. Canadian Standards Association (CSA) as amended:
1.4.4.1. CSA Z797-2009 Code of Practice for Access Scaffold.
1.4.4.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.
1.4.4.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
1.4.4.4. CSA Z1006-10 Management of Work in Confined Spaces
1.4.4.5. CSA Z462 Workplace Electrical Safety Standard.
1.4.5. National Fire Code of Canada 2010 (as amended):
1.4.5.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
1.4.5.2. FCC No. 302, Standard for Welding and Cutting.
1.4.6. American National Standards Institute (ANSI):
1.4.6.1. ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
1.4.7. Health Canada/Workplace Hazardous Materials Information System (WHMIS)
1.4.7.1. Material Safety Data Sheets (MSDS).
1.4.8. Canadian Construction Association
1.4.8.1. COVID-19 Standardized Protocols for All Canadian Construction Sites
1.4.9. Province of British Columbia (as appropriate):
1.4.9.1. Workers Compensation Act Part 3-Occupational Health and Safety.
1.4.9.2. Occupational Health and Safety Regulation.
1.4.10. Yukon Territory (as appropriate):
1.4.10.1. Occupational Health and Safety Act.
1.4.10.2. Workers' Compensation Act.
1.4.10.3. Occupational Health and Safety Regulation

1.5. Worker's Compensation Board Coverage

1.5.1. Comply fully with the relevant Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the Final Completion of the Work.
1.5.2. Maintain Workers coverage as required by relevant acts and regulations during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.6. Compliance with Regulations

1.6.1. Conduct a site-specific hazard assessment based on review of Contract documents, required work, and project site. Identify any known and potential health risks and safety hazards.
1.6.2. Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
1.6.2.1. Primary requirements:
1.6.2.1.1. Contractor’s safety policy.
1.6.2.1.2. Identification of applicable compliance obligations.
1.6.2.1.3. Definition of responsibilities for project safety / organization chart for project.
1.6.2.1.4. General safety rules for project including COVID 19 protocols.
1.6.2.1.5. Job-specific safe work procedures.
1.6.2.1.6. Inspection policy and procedures.
1.6.2.1.7. Incident reporting and investigation policy and procedures.
1.6.2.1.8. Occupational Health & Safety Committee / Representative procedures.
1.6.2.1.9. Occupational Health & Safety meetings.
1.6.2.1.10. Occupational Health & Safety communications and record keeping procedures.
1.6.2.2. Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the site work.
1.6.2.3. List hazardous materials to be brought on site as required by work.
1.6.2.4. Indicate Engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
1.6.2.5. Identify personal protective equipment (PPE) to be used by workers.
1.6.2.6. Identify personnel and alternates responsible for site safety and health.
1.6.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
1.6.3. Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.
1.6.4. Revise and update Health and Safety Plan as required and re-submit to the Departmental Representatives.
1.6.5. Departmental Representative’s review: the review of Site-Specific Health & Safety Plan by Public Services and Procurement Canada (PSPC) shall not relieve the Contractor of responsibility for errors or omissions in final Site

Specific Health and Safety Plan or of responsibility for meeting all requirements of construction and contract documents.

1.7. General Requirements – Site Specific Safety Plan (SSSP/HASP)

1.7.1. Develop written site Specific Safety Plan based on hazard assessment prior to commencing any site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

1.7.2. Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns..

1.8. Filing of Notice

1.8.1. The Prime Contractor must complete and submit a Notice of Project as required by Provincial or Territorial authorities.

1.8.2. Provide copies of all notices to the Departmental Representative.

1.9. Safety Assessment

1.9.1. Perform site specific safety hazard assessment related to project.

1.10. Meetings

1.10.1. Attend health and safety pre-construction meetings and all subsequent meetings call by the Departmental Representative.

1.11. Regulatory Requirements

1.11.1. Do Work in accordance with Regulatory Requirements.

1.12. Responsibility

1.12.1. Assume responsibility as the Prime Contractor for work under this contract.

1.12.2. Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

1.12.3. Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.13. Compliance Requirements

1.13.1. Comply with the CCA COVID-19 – Standardized Protocols for All Canadian Construction Sites.

1.13.2. Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations

1.13.3. Comply with the B.C. Workers Compensation Act and Worksafe B.C. Occupational Health and Safety Regulations.

1.13.4. The most stringent will apply..

1.14. Unforeseen Hazards

1.14.1. When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Safety Officer and follow procedures in accordance with Acts and Regulations of Territory having jurisdiction and advise Departmental Representative verbally and in writing.

1.15. Health and Safety Coordinator

1.15.1. The Health and Safety Coordinator must:

1.15.1.1. Be responsible for completing all health and safety training, ensure that personnel that do not successfully complete the required training are not permitted to enter the site to perform the work.

1.15.1.2. Be responsible for implementing, daily enforcing, and monitoring the Site Specific Safety Plan (SSSP) or Health and Safety Plan (HASP).

1.15.1.3. Be on site during execution of work.

1.16. Posting of Documents

1.16.1. Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Territory having jurisdiction, and in consultation with Departmental Representative.

1.17. Correction of Non-Compliance

1.17.1. Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.

1.17.2. Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.

1.17.3. Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

1.18. Work Stoppage

1.18.1. Give precedence to safety and health of public and site personnel and protection of environment over cost and schedule considerations for Work.

1.19. Powder Actuated Devices

1.19.1. Use powder actuated devices only after receipt of written permission from Departmental Representative.

1.20. General Conditions

1.20.1. Provide safety barricades and lights around work site as required to provide a safe working environment for workers and protection for pedestrian and vehicular traffic.

1.20.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.

1.20.2.1. Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
1.20.2.2. Secure site at nighttime or provide security guard as deemed necessary to protect site against entry.

1.21. Project/Site Conditions

1.21.1. Work at site will involve contact with:
1.21.1.1. Multi-employer work site.
1.21.1.2. Federal employees and general public.
1.21.1.3. Energized electrical services.
1.21.1.4. Working from heights.
1.21.1.5. Working in open exposed to unpredictable weather.
1.21.1.6. High volumes of vehicular and pedestrian traffic.
1.21.1.7. Contaminants identified in Contract Documents and environmental reports.

1.22. Utility Clearances

1.22.1. Departmental Representative is responsible for utility clearance and will provide supporting documentation to contractor prior to drilling.
1.22.2. Contractor is responsible for reviewing utility clearance and confirming that it is sufficient for their needs prior to drilling.
1.22.3. The Contractor will not rely solely upon the Reference Drawings or other information provided for utility locations.

1.23. Regulatory Requirements

1.23.1. Comply with specified codes, acts, bylaws, standards, and regulations to ensure safe operations at site (the most stringent will apply).
1.23.2. In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

1.24. Work Permits

1.24.1. Obtain specialty permit(s) related to project before start of work.

1.25. Emergency Procedures

1.25.1. List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e., names / telephone numbers) of:
1.25.1.1. Designated personnel from own company.
1.25.1.2. Regulatory agencies applicable to work and as per legislated regulations.
1.25.1.3. Local emergency resources.
1.25.1.4. Departmental Representatives.
1.25.2. Include the following provisions in the emergency procedures:

1.25.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency
1.25.2.2. Evacuate all workers safely.
1.25.2.3. Check and confirm the safe evacuation of all workers.
1.25.2.4. Notify the fire department or other emergency responders.
1.25.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
1.25.2.6. Notify Departmental Representatives.
1.25.3. Provide written rescue / evacuation procedures as required for, but not limited to:
1.25.3.1. Work at high angles.
1.25.3.2. Work in confined spaces or where there is a risk of entrapment.
1.25.3.3. Work with hazardous substances.
1.25.3.4. Underground work.
1.25.3.5. Work on, over, under, and adjacent to water.
1.25.3.6. Workplaces where there are persons who required physical assistance to be moved.
1.25.4. Design and mark emergency exit routes to provide quick and unimpeded exit.

1.26. Hazardous Products

1.26.1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representatives and in accordance with the Canada Labour Code.
1.26.2. Where use of hazardous and toxic products cannot be avoided:
1.26.2.1. Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as per Section 01 33 00.
1.26.2.2. In conjunction with Departmental Representative, schedule to carry out work during “off hours” when tenants have left the building.
1.26.2.3. Provide adequate means of ventilation in accordance with Section 01 51 00.
1.26.2.4. The contractor shall ensure that the product is applied as per manufacturers recommendations.
1.26.2.5. The contractor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.

1.27. Asbestos Hazard

1.27.1. Carry out any activities involving asbestos in accordance with applicable Provincial Regulations.
1.27.2. Removal and handling of asbestos will be performed as indicated on the PSPC website.

1.28. PCB Removals

1.28.1. Mercury-containing fluorescent tubes and ballasts which contain polychlorinated biphenyls (PCBs) are classified as hazardous waste.
1.28.2. Removal, handle, transport, and dispose of as indicated on the PSPC website.

1.29. Removal of Lead Containing Paint

1.29.1. All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.
1.29.2. Carry out demolition activities involving lead-containing paints in accordance with applicable Provincials Regulations.

1.30. Electrical Safety Requirements

1.30.1. Comply with authorities and ensure that when installation new facilities or modifying existing facilities, all electrical personnel are completed familiar with existing and new electrical circuits and equipment and their operation.
1.30.1.1. Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.
1.30.1.2. Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

1.31. Electrical Lockout

1.31.1. Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.
1.31.2. Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request / authorization form. Have procedures for review upon request by the Departmental Representatives.
1.31.3. Keep the documents and lockout tags at the site in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representatives or by any authorized safety representative.

1.32. Overloading

1.32.1. Ensure no part of work is subjected to a load which will endanger its safety or will cause permanent deformation.

1.33. Falsework

1.33.1. Design and construction falsework in accordance with CSA S269.1-1975 (R2003).

1.34. Scaffolding

1.34.1. Design, construct, and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 and BC Occupational Health and Safety Regulations.

1.35. Confined Spaces

1.35.1. Carry out with confined spaces in compliance with Provincial Regulations.

1.36. Powder Actuated Devices

1.36.1. Use powder-actuated devices in accordance with ANSI A10.3 only after receipt of written permission from the Departmental Representative.

1.37. Fire Safety and Hot Work

1.37.1. Obtain Departmental Representative's authorization before any welding, cutting or any other hot work operations can be carried out on site.

1.37.2. Hot work includes cutting / melting with use of torch, flame heating roofing kettles, or other open flame devices and grinding with equipment which procedures sparks.

1.38. Fire Safety Requirements

1.38.1. Store oily / paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.

1.38.2. Handle, store, use, and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.38.3. Portable gas and diesel fuel tanks are not permitted on most federal work site. Approval from the DR is required prior to any gas or diesel tank being brought onto the work site.

1.39. Fire Protection and Alarm System

1.39.1. Fire protection and alarm shall not be:

1.39.1.1. Obstructed.

1.39.1.2. Shut off.

1.39.1.3. Left inactive at the end of a working day or shift.

1.39.2. Do not use fire hydrants, standpipes and hose systems for purposes other than firefighting.

1.39.3. Be responsible / liable for costs incurred from the fire department, the building owner and the tenants, resulting from false alarms.

1.40. Unforeseen Hazards

1.40.1. Should any unforeseen or peculiar safety-related factor, hazard or condition become evident during performance of the work, immediately stop work and advise the Departmental Representative verbally and in writing.

1.41. Posted Documents

1.41.1. Post legible versions of the following documents on site:

1.41.1.1. Site Specific Health and Safety Plan

1.41.1.2. Sequence of work

1.41.1.3. Emergency procedures
1.41.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
1.41.1.5. Notice of Project
1.41.1.6. Floor plans or site plans
1.41.1.7. Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
1.41.1.8. Workplace Hazardous Materials Information System (WHMIS) documents.
1.41.1.9. Material Safety Data Sheets (MSDS)
1.41.1.10. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.
1.41.2. Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.
1.41.3. Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

1.42. Meetings

1.42.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.
1.42.2. Ensure all site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:
1.42.2.1. Sign-in of all attendees.
1.42.2.2. Planned Work activities and environmental considerations for that shift.
1.42.2.3. Hazards associated with these Work activities, including environmental hazards (eg potential for hypothermia, heat exhaustion, heat stroke).
1.42.2.4. Appropriate job-specific safe work procedures.
1.42.2.5. Required personal protective equipment (PPE).
1.42.2.6. Appropriate emergency procedures.
1.42.2.7. Review recent accidents on Site, including near misses.
1.42.3. Retain records of all health and safety meetings onsite during Work, and retain as corporate records for a minimum of 7 years after Work is completed.

1.43. Hazardous Occurrence Investigation, Recording and Reporting (HOIRR)

1.43.1. Hazard includes:
1.43.1.1. Any source of potential damage, harm or adverse effects on life, health, property or environment at work. It refers to any biological, chemical, ergonomic, physical, psychosocial and safety factor that is reasonably likely to cause harm or damage to humans, other organisms, or the environment in the absence of its control. Sometimes a hazard is referred to as being the actual harm or the health effect it caused rather than the hazard. For example

the disease tuberculosis might be called a hazard by some but in general the tuberculosis-causing bacteria would be considered the "hazard" or "hazardous biological agent". Exposure to tuberculosis would be the hazardous incident. For types of Hazards refer to Annex 3 of the Standard on Hazard Prevention Program.

1.43.2. Hazardous Occurrence includes:

1.43.2.1. An event occurring at a PWGSC managed building or worksite, or through the course of an employee's work that results in, or has the potential to result in, a fatality, injury, illness, exposure to a hazardous substance or property damage or an escapement of a hazardous material. For the purpose of investigating, recording and reporting hazardous occurrences, the following are included under this term: disabling injuries, minor injuries and near-misses.

1.43.3. Hazardous Occurrence Investigation and Reporting Procedures:

1.43.3.1. Includes information regarding the person involved and the basic circumstances surrounding the hazardous occurrence.

1.43.3.2. Provides a detailed and thorough description of the hazardous occurrence and the sequence of events.

1.43.3.3. Indicates corrective measures that have been taken since the occurrence.

1.43.3.4. Requires the appointment of a qualified investigator.

1.43.3.5. Provides recommendations for additional corrective measures, if required.

1.43.4. Fatal or Serious Accidents Procedures:

1.43.4.1. Call emergency number to advise the police organization having jurisdiction to secure the scene and investigate the matter.

1.43.4.2. Advise the Departmental Representative of the fatality or serious accident within 1 hour.

1.43.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.

1.43.4.4. Unless authorized to do so, do not allow anyone to remove or in any way interfere with or disturb any wreckage, article or thing related to the incident except to the extent necessary to: save a life, prevent injury or relieve human suffering in the vicinity; maintain an essential public service; or prevent unnecessary damage to or loss of property.

1.44. Personal Protective Equipment Program

1.44.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing as appropriate:

1.44.1.1. Donning and doffing procedures.

1.44.1.2. PPE selection based upon Site hazards.

1.44.1.3. PPE use and limitations of equipment.

1.44.1.4. Work mission duration, PPE maintenance and storage.

1.44.1.5. PPE decontamination and disposal.

1.44.1.6. PPE inspection procedures prior to, during, and after use.

1.44.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
1.44.1.8. Medical surveillance requirements for personnel assigned to work at Site.
1.44.1.9. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment.
1.44.1.10. Site control measures employed at Site including site map, site work zones, use of 'buddy system', site communications including site security, alerting means for emergencies, standard operating procedures or safe work practices, and identification of nearest medical assistance.
1.44.1.11. Decontamination procedures for both personnel and equipment.
1.44.1.12. Emergency response requirements addressing: pre-emergency planning, personnel roles, lines of authority and communication, emergency recognition and prevention, safe distances and places of refuge, site security and control, evacuation routes and procedures, decontamination procedures not covered under decontamination section, emergency medical treatment and first aid, emergency alerting and response procedures, critique of response and follow-up, PPE and emergency equipment, site topography, layout, prevailing weather conditions, and procedures for reporting incidents to local, provincial, or federal agencies.
1.44.1.13. Written respiratory protection program for project activities.
1.44.1.14. Procedures dealing with heat and/or cold stress.
1.44.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.45. Offsite Contingency and Emergency Response Plan

1.45.1. Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.
1.45.2. Plan must provide immediate response to serious site occurrence such as explosion, fire, or migration of significant quantities of toxic or hazardous material from Site.

1.46. Personnel Health, Safety, and Hygiene

1.46.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
1.46.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
1.46.3. Personal Protective Equipment:
1.46.3.1. Ensure all site personnel are furnished with appropriate PPE.
1.46.3.2. Unless identified otherwise in site-specific health and safety plan, minimum PPE to include: industrial protective headwear, high-visibility safety apparel, and protective footwear.

1.46.3.3. Ensure that safety equipment and protective clothing is kept clean and maintained.
1.46.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
1.46.4.1. Ensure industrial protective headwear is of appropriate CSA Standard and meets other appropriate standards.
1.46.4.2. Ensure high-visibility safety apparel is of appropriate CSA Standard and meets other appropriate standards.
1.46.4.3. Ensure protective footwear is of appropriate CSA Standard and meets other appropriate standards.
1.46.4.4. Dispose of or decontaminate PPE worn onsite at end of each workday.
1.46.4.5. Decontaminate reusable PPE before reissuing.
1.46.4.6. Ensure site personnel have passed respirator fit test prior to entering potentially volatile contaminated work areas, as appropriate.
1.46.4.7. Ensure facial hair does not interfere with proper respirator fit.
1.46.5. Respiratory Protection:
1.46.5.1. Provide site personnel with extensive training in usage and limitations of, and qualitative fit testing for, air purifying and supplied-air respirators in accordance with specified regulations.
1.46.5.2. Develop, implement, and maintain respirator program.
1.46.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.
1.46.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
1.46.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.
1.46.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.
1.46.5.7. Ensure appropriate respiratory protection during Work activities. As minimum requirement, ensure that persons entering potentially contaminated work areas are supplied with and use appropriate respiratory protection.
1.46.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
1.46.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
1.46.7.1. Suitable containers for storage and disposal of used disposable PPE.
1.46.7.2. Potable water and suitable sanitation facility.
1.46.8. Emergency and First-Aid Equipment:
1.46.8.1. Locate and maintain emergency and first-aid equipment in appropriate location onsite including first-aid kit to accommodate number of site personnel; portable emergency eye wash; two 9 kg ABC type dry chemical fire extinguishers.
1.46.9. Site Communications:

1.46.9.1. Identify, provide and implement appropriate dedicated communication devices for Site and post emergency numbers near dedicated devices.
1.46.9.2. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
1.46.9.3. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
1.46.9.4. Furnish selected personnel with 2-way radios.
1.46.9.5. Safety Meetings: conduct mandatory daily safety meetings for personnel, and additionally as required by special or Work-related conditions; include refresher training for existing equipment and protocols, review ongoing safety issues and protocols, and examine new site conditions as encountered. Hold additional safety meetings on as-needed basis.

2. PART 2 - PRODUCTS

2.1. Not Used
2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used
3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. Not used.

1.2. Definitions

1.2.1. See 01 11 55.

1.3. Action and Informational Submittals

1.3.1. Environmental Protection Plan: within 10 Working Days after Contract award and prior to mobilization to Site, Submit a plan detailing protection of the environment. Include:

1.3.1.1. Comprehensive overview of known or potential environmental issues to be addressed during Work.

1.3.1.2. Identify requirements that plan complies with. Includes: permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.

1.3.1.3. Communications identifying emergency contact list and conditions for implementing emergency contact. Emergency contact to include: Contractor emergency response team including Superintendent; Departmental Representative and alternate, and other contractor(s) and individuals as directed by the Departmental Representative; and federal, provincial, and municipal emergency contacts.

1.3.1.4. Work Area showing proposed activity in each portion of areas, such as exclusion zone(s), decontamination zone(s) and clean zone(s), and identifying areas of limited use or non-use. Ensure plan includes measures for marking limits of use areas and methods for protection of features to be preserved within authorized Work areas.

1.3.1.5. Drawings showing locations of proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials onsite.

1.3.1.6. Historical, Archaeological, Cultural Resources, Biological Resources and Valued Habitat Protection identifying methods, means, and sequences for preventing, monitoring, and controlling protection of historical, archaeological, cultural resources, biological resources and valued habitat. Include procedures if previously unknown historical, archaeological, cultural, and biological resources are discovered during Work. Includes Species At Risk.

1.3.1.7. Non-Contaminated Quality Soil and Water Management including onsite handling to manage Solid Waste, Sewage, and Wastewater.

1.3.1.8. Non-Contaminated Quality Soil Transport and Disposal including transportation frequency and identifying offsite disposal facilities to manage

Solid Waste. Copy of permit, certificate, approval, license, or other required form of authorization issued by a Facility Authority for the disposal of relevant Non-Contaminated Material.

1.3.1.9. Traffic Management Plan including signage and traffic control personnel for Site ingress and egress. Traffic Management Plan, vehicles and vehicle traffic must comply with all federal, provincial, and municipal laws and regulations.

1.3.1.10. Noise Control identifying methods, means, and sequences for preventing, monitoring, and controlling noise for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: noise does not comply with appropriate levels, or if there are public complaints.

1.3.1.11. Vibration Control identifying methods, means, and sequences for preventing, monitoring, and controlling vibration for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; in accordance with the Contract; in accordance with recommendations from the Contractor's Qualified Professional. Include thresholds and procedures if: vibration does not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.

1.3.1.12. Vapours, Dust, and Particulate Control identifying methods, means, and sequences for preventing, monitoring, and controlling vapours, dust and other airborne particulates for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Include thresholds and procedures if: vapours, dust, and particulates do not comply with appropriate levels, there are public complaints, or if onsite or offsite damage occurs.

1.3.1.13. Spill Control identifying methods, means, and sequences for preventing, monitoring, and controlling spills for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract. Identify reporting requirements for spills. Identify locations and contents of spill kits.

1.3.1.14. Erosion and Sediment Control identifying methods, means, and sequences for preventing, monitoring, and controlling onsite surface water, erosion and sedimentation for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or municipal requirements; and in accordance with the Contract.

1.3.1.15. Work in or Adjacent to Waterways Control, as required, identifying methods, means, and sequences for preventing, monitoring, and controlling work in or adjacent to waterways for compliance with: applicable permits, certificates, approvals, or any other form of authorizations; other federal, provincial, or

municipal requirements; and in accordance with the Contract. Include measures for protection of fish and wildlife during Work in or Adjacent to Waterways including isolation and dewatering of work zones and monitoring. Include coordination with owner's Environmental Consultant for fish and wildlife salvage prior to Work in or Adjacent to Waterways.

1.3.1.16. Monitoring requirements for general compliance with Environmental Protection Plan.

1.3.1.17. Environmental Protection Plan must be signed and sealed by Contractor's Qualified Professional, as required by potential impact to environment by Contractor's methods, means and sequences.

1.3.2. Submit amended Environmental Protection Plan if there are changes to the assumed site conditions, changes to the Work procedures, or in the event that any methods and procedures are inadequate as directed by the Departmental Representative.

1.3.3. Submit Spill and Response Report for all Spills. Include: description of spill (location, time, quantity and quality), notifications (including copies of any reports forwarded to regulatory agencies), and describe any remediation activities (time, quantity, quality, and fate of spill impacted material). Include environmental analytical results for spill or other environmental testing.

1.3.4. After hours work: at least 5 Working Days prior to commencing after hours work Submit a schedule showing requested dates, times, and reasons for after hours work. Approval will only be granted for reasons valid, if request can be reasonably accommodated by other contractors and Site users, and third parties are not adversely affected, in the sole opinion of the Departmental Representative.

1.4. Cleaning

1.4.1. Maintain cleanliness of Work and surrounding Site to comply with federal, provincial, and municipal fire and safety laws, ordinances, codes, and regulations applicable to the performance of the Work.

1.4.2. Ensure cleanup of the Work areas each day after Final Completion of Work.

1.5. Site Clearing and Plant Protection

1.5.1. Minimize stripping of Topsoil and vegetation. Use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction.

1.5.2. Restrict tree and plant removal to areas in accordance with the Contract or as directed by the Departmental Representative. To greatest extent practicable, prune or top the vegetation instead of grubbing/uprooting. Protect all other trees and plants onsite and offsite.

1.5.3. Salvage all trees and plants to be removed in accordance with the Contract or as directed by the Departmental Representative.

1.5.4. Wrap salvaged trees in burlap, trees and shrubs adjacent to construction Work, storage areas and trucking lanes, and encase with protective wood framework from grade level to height of 2 m minimum.
1.5.5. Protect roots of designated trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
1.5.6. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed.
1.5.7. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.
1.5.8. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.
1.5.9. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

1.6. Archaeological

1.6.1. Attend archaeological awareness training provided by Departmental Representative.
1.6.2. Abide by Chance Find Procedures developed by Departmental Representative, as appropriate.

1.7. Species At Risk

1.7.1. Protect all Species At Risk, including meeting all federal, provincial, and municipal laws and regulations.
1.7.2. Modify Work procedures, including stopping Work, as instructed by Contractor's Qualified Professional or Departmental Representative to protect Species At Risk.

1.8. Non-Contaminated Quality Soil and Water Management

1.8.1. Solid waste
1.8.1.1. Remove all Non-Contaminated Quality Soil within Work areas in accordance with the Contract and as directed by the Departmental Representative.
1.8.1.2. Remove surplus materials and temporary facilities from Site.
1.8.1.3. Do not burn or bury any waste onsite.
1.8.1.4. Do not discharge wastes into streams or waterways.
1.8.1.5. Do not dispose of volatile or hazardous materials such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
1.8.1.6. Dispose of all Non-Contaminated Quality Soil at a Landfill Facility.

1.8.2. Sewage

1.8.2.1. Store Sewage from toilet facilities with wastewater from handbasins, and/or showers, for ultimate disposal.

1.8.2.2. Provide, operate, and maintain Sewage storage tanks to store Sewage.

1.8.2.3. Transport and dispose of Sewage at a Disposal Facility, or discharge to municipal sanitary sewer system in compliance with Municipal requirements, as accepted by Departmental Representative.

1.8.2.4. Discharges: comply with applicable discharge limitations and requirements; do not discharge Sewage to Site sewer systems that do not conform to or are in violation of such limitations or requirements; and obtain approval prior to discharge of Sewage.

1.8.3. Wastewater

1.8.3.1. Dewater various parts of Work including, excavations, structures, foundations, and Work areas, unless otherwise specified or directed by Departmental Representative.

1.8.3.2. Employ construction methods, plant procedures, and precautions that ensure Work is stable, free from disturbance, and dry.

1.8.3.3. Direct surface waters that have not contacted potentially Contaminated Material to surface drainage systems.

1.8.3.4. Control surface drainage including ensuring that gutters are kept open, wastewater is not allowed across or over pavements or sidewalks except through accepted pipes or properly constructed troughs, and runoff from unstabilized areas is intercepted and diverted to suitable outlet.

1.8.3.5. Dispose of Wastewater in manner not injurious to public health or safety, to the environment, to onsite or offsite property, or to any part of Work completed or under construction.

1.8.3.6. Control disposal or runoff of Wastewater containing suspended materials or other harmful substances in accordance with local authority requirements.

1.8.3.7. Ensure pumped Wastewater into waterways, sewer or drainage systems is free of suspended materials. Provide flocculation tanks, settling basins, or other treatment facilities to remove suspended solids or other materials before discharging to storm sewers, watercourses or drainage areas.

1.8.3.8. Obtain permits to discharge Wastewater to environment or municipal system (sewer, ditches).

1.8.3.9. Do not discharge water which may have come in contact with potentially Contaminated Soil or otherwise be Contaminated directly offsite to the environment or to municipal system.

1.9. Public Traffic Management

1.9.1. Where applicable, traffic to include pedestrian traffic.

1.9.2. Ensure pedestrians have safe and unencumbered access in public areas. Provide traffic control personnel wherever Contractor's activities (including vehicle crossings) impedes sidewalks, pathways, bike paths, roadways, or other public routes, or elsewhere as required or as directed by Departmental Representative.

1.9.3. Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
1.9.4. Comply with requirements of acts, regulations and bylaws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.
1.9.5. Comply with current version of WorkSafeBC Occupational Health and Safety Regulation *Part 18 Traffic Control* or Yukon Workers' Compensation Health and Safety Board Occupational Health and Safety Act and Regulations *Public Way 1.46 and 1.47*, as appropriate.
1.9.6. Comply with current version of BC Ministry of Transportation and Infrastructure *2015 Interim Traffic Management Manual for Work on Roadways*.
1.9.7. Obtain all necessary permits or other authorizations regarding traffic control, including access and road usage.
1.9.8. Provide and maintain road access and egress to property fronting Site and in other areas in accordance with the Contract, except where other means of road access exist that are accepted.
1.9.9. Prevent tracking or spilling of debris or material onto private and public roads.
1.9.10. Immediately sweep or scrape up debris or material on private and public roads.
1.9.11. Clean public roads within a minimum 200 m radius of the Site entrance or as required at least once per shift, or as directed by Departmental Representative.
1.9.12. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.10. Noise, Vibration, Vapours, and Dust Control

1.10.1. Maintain acceptable levels not injurious or objectionable to worker safety, public health, the environment, and equipment and infrastructure.
1.10.2. Comply with applicable municipal bylaws and other applicable requirements unless otherwise specified or directed by Departmental Representative; Contractor's Qualified Professional to may determine lower acceptable levels.
1.10.3. Maximum levels allowed at site boundaries to prevent nuisance, unless otherwise accepted by Departmental Representative:
1.10.3.1. Noise: 65 dBa.
1.10.3.2. Vibration: 0.315 m/s^2 (based on ISO 2631-1).
1.10.3.3. Dust PM_{10}: 50 $\mu g/m^3$.
1.10.4. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not

proceed with stopped Work until corrections accepted by Departmental Representative.

1.10.5. Specific procedures to prevent dust:

1.10.5.1. Cover or wet down relevant Work to prevent vapours and blowing dust and debris, including temporary roads, excavations, and stockpiles. In urban environments or if sensitive neighbouring properties (eg residences) provide full time coverage or wetting down.

1.10.5.2. Covers to be impermeable (eg minimum 5 mil polyethylene) and securely fashioned to prevent blowing off. Use fresh (non-saline) water for dust and particulate control.

1.10.5.3. Use appropriate covers on vehicles, including trucks, barges, and trains, hauling vapour-generating or fine or dusty material. Use watertight vehicles to haul wet materials.

1.11. Spill Control

1.11.1. Pollution includes spills or other releases from Contractor's activities that could potentially contaminate soil, sediment, water, and atmosphere from discharge of hazardous, deleterious or regulated substances, including from equipment and material handling.

1.11.2. Prevent spills or releases.

1.11.2.1. Maintain temporary erosion and pollution control features.

1.11.2.2. Do not store fuel onsite other than tanks forming part of the equipment.

1.11.2.3. Plan activities near water such that materials such as paint, primers, blasting abrasives, rust solvents, degreasers, grout, poured concrete or other chemicals do not enter the watercourse.

1.11.2.4. Control emissions from equipment and plant to meet applicable authorities' emission requirements.

1.11.2.5. Contractor to regularly inspect all machinery on the Site to ensure it is in good repair and free of leaks.

1.11.3. Be prepared to intercept, cleanup, and dispose of spills or other releases that can occur whether on land or water.

1.11.4. Spill kits and containment are to be maintained onsite and ready for deployment in the event of spills or other releases.

1.11.4.1. Spill kits are to include sufficient quantities of absorbent material, containers, booms, shovels and other tools, and personal protective equipment.

1.11.4.2. Spill response materials must be compatible with type of equipment being used or type of material being handled.

1.11.4.3. Spill kits are to be in close proximity to machinery.

1.11.4.4. During the Work there are to be trained and qualified personnel available that are ready to deploy spill kits when necessary.

1.11.5. Take immediate action using available resources to contain and mitigate effects on environment and persons from spill or release.

1.11.6. Promptly report spills and releases potentially causing damage to environment to:

1.11.6.1. Authority having jurisdiction or interest in spill or other release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
1.11.6.2. Contractor emergency response team including Superintendent.
1.11.6.3. Departmental Representative and other contractor(s) and individuals as directed by the Departmental Representative.
1.11.7. Departmental Representative can collect samples for chemical analyses prior to, during, and upon Final Completion of Work to monitor potential pollution caused by Contractor's activities. Assist Departmental Representative in collection of samples.
1.11.8. Remediation of soil, sediment or water contaminated by Contractor's activities.
1.11.8.1. Remediate all soil, sediment or water contaminated by Contractor's activities associated with the Work onsite and offsite.
1.11.8.2. Remediation includes excavation, pumping, testing, transport, treatment and disposal as appropriate for the type of contamination incurred, and at a minimum in accordance with the Contract.
1.11.8.3. Submit procedures for remediating soil, sediment or water contaminated by Contractor's activities.
1.11.8.4. Remediate as directed by the Departmental Representative.
1.11.8.5. Contractor is responsible for any additional investigation, testing, and assessments required as acceptable to the Departmental Representative.
1.11.9. Departmental Representative can stop relevant Work at any time when Contractor's Work procedures are inadequate, when reasonable use of neighbouring properties are impacted, or when monitoring indicates that levels equal or exceed regulated or levels in accordance with the Contract. Do not proceed with stopped Work until corrections accepted by Departmental Representative.

1.12. Work In or Adjacent to Waterways

1.12.1. Approvals and Practices:
1.12.1.1. As required, comply with Fisheries Act Approval and other relevant authorizations, permits and approvals and in accordance with the Contract. Obtain amendments as required by Contractor's methods, means, and sequences only if recommended by Contractor's Qualified Professional and accepted by Departmental Representative.
1.12.1.2. Restrict Work as described in, and follow requirements in, Contract including Environmental Effects Determination, Environmental Management Plan, Aquatic Effects Assessment, Environmental Mitigation Strategy, or similar documents. Variations allowed only if recommended by Contractor's Qualified Professional and accepted by Departmental Representative.
1.12.1.3. Follow practices described in *Land Development Guidelines for the Protection of Aquatic Habitat* (Fisheries and Oceans Canada/Ministry of Environment, Lands and Parks, 1993 September) and *Measures to avoid*

causing harm to fish and fish habitat including aquatic species at risk (Fisheries and Oceans Canada, 2018 December 14).

1.12.1.4. Follow practices described in *Standards and Best Practices for Instream Works* (BC Ministry of Environment, 2004 March).

1.12.2. Timing

1.12.2.1. Time work in water to respect timing windows to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.

1.12.2.2. Minimize duration of in-water work.

1.12.2.3. Conduct instream work during periods of low flow, or at low tide, to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows.

1.12.2.4. Schedule work to avoid wet, windy and rainy periods that may increase erosion and sedimentation.

1.12.3. Site Selection

1.12.3.1. Design and plan activities and works in wetland and waterbody such that loss or disturbance to aquatic habitat is minimized and sensitive spawning habitats are avoided.

1.12.3.2. Design and construct approaches to wetland and waterbody such that they are perpendicular to the watercourse to minimize loss or disturbance to riparian vegetation. Design a Site Access Plan detailing areas of access and egress to Waterways and including equipment types and methods to limit riparian vegetation clearing for approval by the Departmental Representative.

1.12.3.3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or the built structures.

1.12.3.4. Undertake all instream activities in isolation of open or flowing water to maintain the natural flow of water downstream and avoid introducing sediment into the watercourse.

1.12.4. Shoreline/bank Re-vegetation and Stabilization

1.12.4.1. Clearing of riparian vegetation should be kept to a minimum: use existing trails, roads or cut lines wherever possible to avoid disturbance to the riparian vegetation and prevent soil compaction. When practicable, prune or top the vegetation instead of grubbing/uprooting. Coordinate with Departmental Representative for fish and wildlife salvage prior to conducting Work within or Adjacent to waterbodies

1.12.4.2. Minimize the removal of natural woody debris, rocks, sand or other materials from the banks, the shoreline or the bed of the waterbody below the ordinary high water mark. If material is removed from the waterbody, set it aside and return it to the original location once construction activities are completed. Coordinate with Departmental Representative to conduct pre-clearing nesting bird surveys prior to vegetation clearing

1.12.4.3. Immediately stabilize shoreline or banks disturbed by any activity associated with the project to prevent erosion and/or sedimentation, preferably through re-vegetation with native species suitable for the site.

1.12.4.4. Restore bed and banks of the waterbody to their original contour and gradient; if the original gradient cannot be restored due to instability, a stable gradient that does not obstruct fish passage should be restored.

1.12.4.5. If replacement rock reinforcement/armouring is required to stabilize eroding or exposed areas, then ensure that appropriately-sized, clean rock is used; and that rock is installed at a similar slope to maintain a uniform bank/shoreline and natural stream/shoreline alignment.

1.12.4.6. Remove all construction materials from site upon project completion.

1.12.4.7. Do not remove riparian vegetation if the riparian area is identified as part of critical habitat of an aquatic listed Species At Risk.

1.12.5. Aquatic Life Protection

1.12.5.1. Ensure that all in-water activities, or associated in-water structures, do not interfere with aquatic life passage, constrict the channel width, or reduce flows, or result in the stranding or death of aquatic life.

1.12.5.2. Contractor's Qualified Professional to ensure applicable permits for relocating fish are obtained and to capture any fish trapped within an isolated/enclosed area at the work site and safely relocate them to an appropriate location in the same waters. Fish may need to be relocated again, should flooding occur on the site.

1.12.5.3. Any capture and relocation of an endangered or threatened aquatic Species At Risk will require approval from Department of Fisheries and Oceans.

1.12.6. Water Intake or Outlet Pipe Screening:

1.12.6.1. Screen any water intakes or outlet pipes to prevent entrainment or impingement of fish. Entrainment occurs when a fish is drawn into a water intake and cannot escape. Impingement occurs when an entrapped fish is held in contact with the intake screen and is unable to free itself.

1.12.6.2. Screens should be located in areas and depths of water with low concentrations of fish throughout the year.

1.12.6.3. Screens should be located away from natural or artificial structures that may attract fish that are migrating, spawning, or in rearing habitat.

1.12.6.4. The screen face should be oriented in the same direction as the flow.

1.12.6.5. Ensure openings in the guides and seals are less than the opening criteria to make "fish tight".

1.12.6.6. Screens should be located a minimum of 300 mm (12 in.) above the bottom of the watercourse to prevent entrainment of sediment and aquatic organisms associated with the bottom area.

1.12.6.7. Structural support should be provided to the screen panels to prevent sagging and collapse of the screen.

1.12.6.8. Large cylindrical and box-type screens should have a manifold installed in them to ensure even water velocity distribution across the screen surface. The ends of the structure should be made out of solid materials and the end of the manifold capped.

1.12.6.9. Heavier cages or trash racks can be fabricated out of bar or grating to protect the finer fish screen, especially where there is debris loading (woody

material, leaves, algae mats, etc.). A 150 mm (6 in.) spacing between bars is typical.

1.12.6.10. Provision should be made for the removal, inspection, and cleaning of screens.

1.12.6.11. Ensure regular maintenance and repair of cleaning apparatus, seals, and screens is carried out to prevent debris-fouling and impingement of fish.

1.12.6.12. Pumps should be shut down when fish screens are removed for inspection and cleaning.

1.12.7. Explosives:

1.12.7.1. Avoid using explosives in or near water. Use of explosives in or near water produces shock waves that can damage a fish swim bladder and rupture internal organs. Blasting vibrations may also kill or damage fish eggs or larvae.

1.12.7.2. Do not use explosives where SARA-listed aquatic species, their residences or critical habitat occur, without review by Department of Fisheries and Oceans.

1.12.8. Operation of Machinery

1.12.8.1. Ensure that machinery arrives on site in a clean condition and is maintained free of fluid leaks, invasive species and noxious weeds.

1.12.8.2. Whenever possible, operate machinery on land above the high water mark, on ice, or from a floating barge in a manner that minimizes disturbance to the banks and bed of the waterbody.

1.12.8.3. Limit machinery fording of the watercourse to a one-time event (ie over and back), and only if no alternative crossing method is available. If repeated crossings of the watercourse are required, construct a temporary crossing structure.

1.12.8.4. Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (eg dominated by organic materials and silts) banks and beds. For fording equipment without a temporary crossing structure, use stream bank and bed protection methods (eg swamp mats, pads) if minor rutting is likely to occur during fording.

1.12.8.5. Wash, refuel and service machinery and store fuel and other materials for the machinery in such a way as to prevent any deleterious substances from entering the water.

1.12.8.6. Do not ford, place crossing materials or operate machinery on the bed of a waterbody where SARA-listed shellfish occur, or critical habitat or residences of freshwater SARA-listed aquatic species occur.

2. PART 2 - PRODUCTS

2.1. Not Used

2.1.1. Not Used.

3. PART 3 - EXECUTION

3.1. Not Used

3.1.1. Not Used.

END OF SECTION

1. PART 1 - GENERAL

1.1. Reference

1.1.1. ASTM D6286 / D6286M – 20, Standard Guide for Selection of Drilling and Direct Push Methods for Geotechnical and Environmental Subsurface Site Characterization.
1.1.2. ASTM D5092/D5092M – 16, Standard Practice for Design and Installation of Groundwater Monitoring Wells.
1.1.3. Handbook of suggested practices for the design and installation of ground-water monitoring wells, EPA160014-891034 , US EPA, March 1991.

1.2. Measurement Procedures

1.2.1. Unit Price Table.

1.3. Definitions

1.3.1. See 01 11 55.

1.4. Action and Informational Submittals

1.4.1. Submittals sent as pdf document via email to Departmental Representative.
1.4.2. Materials: Submit manufacturers well materials specification documents to Departmental Representative for approval.
1.4.3. Submit disposal facility's acceptance to Departmental Representative prior to final waste soil and water disposal.
1.4.4. Submit waste manifest to Departmental Representative withing 30 days of disposal.

1.5. Work includes

1.5.1. Supply well materials.
1.5.2. Drilling and construction:
1.5.2.1. Boreholes.
1.5.2.2. Monitoring Wells.
1.5.2.3. Vapour Probes.
1.5.3. Supply barrels for soil and groundwater containment.
1.5.4. Disposal of soil and groundwater.

1.6. Drilling Methods

1.6.1. Solid Stem Auger.
1.6.2. Hollow Stem Auger.
1.6.3. Air Hammer.
1.6.4. Sonic.

1.7. Surface Completions

1.7.1. Sub-surface.
1.7.2. Flush-mount.

1.7.3. Stick-up.

2. PART 2 - PRODUCTS

2.1. Drilling Equipment

2.1.1. Drill Rigs and/or support truck have a pressure washer with not less than 300 L water tank capacity.

2.1.2. 4x4 Truck Mounted Rotary Drill Unit:
2.1.2.1. Capable of drilling and installing 50mm (2inch) wells up to 50m (165 ft) below ground surface at all required drilling sites.
2.1.2.2. Wheeled or truck mounted.
2.1.2.3. Capable of 4x4 operation.
2.1.2.4. Torque not less than 10.8 kN-m (8,000 ft-lbs).
2.1.2.5. Pull back force not less than 106.7 kN (24,000 lbs).
2.1.2.6. Tower not less that 9.1 m (30ft).
2.1.2.7. Rotary with air compressor not less than 82 L/s (175 cfm).
2.1.2.8. Hollow and Solid Stem Tooling.
2.1.2.8.1. Hollow stem boreholes not less that 200mm (8 inch) nominal diameter.
2.1.2.8.2. Solid stem boreholes not less that 150mm (6 inch) nominal diameter.
2.1.2.9. Air Hammer Tooling:
2.1.2.9.1. Boreholes with 95 mm (3.75 inch) nominal diameter.
2.1.2.9.2. Unit with air rotary casing not less than 95 mm (3.75 inch) nominal diameter.

2.1.3. Sonic Unit:
2.1.3.1. Capable of drilling and installing 50mm (2inch) wells up to 75m (250 ft) below ground surface at all required drilling sites.
2.1.3.2. Track mounted with roll over protective structure.
2.1.3.3. Sonic: Boreholes 150mm (6 inch) and 200 mm (8 inch) nominal diameter.
2.1.3.4. Sonic rig and support vehicles complete with all auger, air tooling and sample tooling for 75 m (250 feet) maximum depth.
2.1.3.5. Sonic Unit:
2.1.3.5.1. Drilling head drive motor not less than 150 kW.
2.1.3.5.2. Pull Back Force not less than 65 kN.
2.1.3.5.3. Down Force not less than 35 kN.
2.1.3.5.4. Output Force @ 75 Hz not less than 200 kN.

2.2. Monitoring Wells

2.2.1. Well materials manufactured and approved specifically for groundwater monitoring wells.
2.2.2. All materials pre approved by Departmental Representative.
2.2.3. Site specific materials list based on typical well drawings provided by Departmental Representative.

2.2.4. Nominal diameter 50mm (2 inch).
2.2.5. PVC Casing and PVC Screen:
2.2.5.1. PVC Schedule 40.
2.2.5.2. Threaded connections.
2.2.5.3. Rubber o-ring seals at joins.
2.2.5.4. Screen slot sizes:10 to 30 slot.
2.2.6. Bottom Well Points – PVC Schedule 40, Threaded Points compatible with other well materials.
2.2.7. J-Plugs – Lockable and compatible with other well materials.
2.2.8. Filter Sand
2.2.8.1. Compatible with slot size.
2.2.8.2. Supplied in 25 kg bags.
2.2.9. Backfill Sand.
2.2.9.1. Free from material larger than 6mm (1/4 inch).
2.2.9.2. Supplied in 25 kg bags.
2.2.10. Uncontaminated Soil Cuttings
2.2.10.1. As determined by Departmental Representative
2.2.10.2. Free from material larger than 12mm (1/2 inch)
2.2.11. Bentonite Grout
2.2.11.1. Bentonite Chips – Equivalent to Baroid® 3/8 Holeplug®.
2.2.11.2. Bentonite Granules – Equivalent to Baroid® Quik-Grout®.
2.2.11.3. Supplied in 25 kg bags

2.3. Vapour Probes
2.3.1. Well materials approved for vapour probes.
2.3.2. Departmental Representative provides Vapour Probe Screen and Tubing.
2.3.3. All materials pre-approved by Departmental Representative.
Filter pack compatible with 20 Slot Screen.

2.4. Concrete Stone Mix
2.4.1. Equivalent to Commercial Grade Quikrete® FastSet™ Concrete.
2.4.2. Supplied in 25 kg bags.

2.5. Well Protectors
2.5.1. Wells completed as sub-surface, flush-mount or stick-up.
2.5.2. Sub-surface Well Protector:
2.5.2.1. Steel Plate 6.35 mm (1/4 inch) thick.
2.5.2.1.1. 406 mm x 406 mm(16 inch x 16 inch).
2.5.2.1.2. Painted with rust paint primer.
2.5.2.2. Crib constructed as indicated
2.5.2.2.1. Material unpainted cedar 2x4.
2.5.2.2.2. Crib held together by rust resistant screws
2.5.3. Flush mount boxes:
2.5.3.1. Aluminum and/or steel.
2.5.3.2. Square or round.

2.5.3.3. Not less than 203mm (8 inch) nominal diameter or smallest square dimension.
2.5.4. Stick-up well protectors.
2.5.4.1. Steel, painted red.
2.5.4.2. Not less than 102mm x 102mm x 1219mm (4 inch x 4 inch x 48 inch).
2.5.4.3. Round or square steel.
2.5.4.4. Lockable hinged lid.

2.6. Soil Cuttings Bags
2.6.1. Capacity not less than 1 m^3.
2.6.2. Approved for containing hydrocarbon contaminated soil.
2.6.3. Approved for transporting hydrocarbon contaminated soil.

2.7. Soil and Groundwater Barrels
2.7.1. Approved for containing and transporting hydrocarbon contaminated materials.
2.7.2. Soil Cuttings Barrels – 200L steel with removable lid.
2.7.3. Purge Water Barrels – 200L Plastic with removable lid.

3. PART 3 - EXECUTION

3.1. Departmental Representative Responsibilities
3.1.1. Departmental Representative will provide information prior to deployment to permit contractor to prepare for drilling. Departmental Representative will provide as a minimum:
3.1.1.1. Site location and Site Plan showing drilling location(s) and significant site features.
3.1.1.2. Proposed start date.
3.1.1.3. Typical well design drawing(s).
3.1.1.4. Drilling method.
3.1.1.5. Wheeled or tracked drill rig.
3.1.1.6. Sampling method.
3.1.1.7. Sampling interval.
3.1.1.8. Drill Rig requirements.
3.1.1.9. Mobility issues.
3.1.1.10. Safety issues.
3.1.1.11. Potential Contaminant(s).
3.1.1.12. Locator's Schedule.
3.1.2. Departmental Representative is responsible for utility clearance and providing documentation to contractor prior to drilling.
3.1.3. Departmental Representative will provide access for drill rigs movement including:
3.1.3.1. Preparing the ground and route to drilling locations.
3.1.3.2. Permission and liaison with other consultants, site owners and operators.

3.2. Drill Rig Operation

3.2.1. Includes:

3.2.1.1. Drilling boreholes for Monitoring Wells, Vapor Probes and Soil Sampling.

3.2.1.2. Moving between boreholes on the same drilling site.

3.2.1.3. Loading and Unloading drill rigs onto flatbeds for transport between drilling sites.

3.3. On-site Vehicle Recovery

3.3.1. Contractor responsible for inspection of prepared route and drilling locations and may require improvements prior to entering the site or moving equipment to drilling locations.

3.3.2. Contractor responsible for recovery of contractor's vehicles and mobile equipment.

3.4. Utility Locates

3.4.1. Departmental Representative is responsible for utility clearance and providing documentation to contractor prior to drilling.

3.4.2. Contractor will not rely upon Drawings or other information provided with utility locations.

3.5. Drilling Equipment Decontamination

3.5.1. Drilling equipment in contact with borehole and well materials cleaned prior to mobilization and between drilling locations as directed by Departmental Representative.

3.6. Soil Cuttings

3.6.1. Place soil cuttings in drums as directed by Departmental Representative.

3.6.2. Place filled soil cutting barrels on site in location determined by Departmental Representative.

3.6.3. Soil cutting barrels free from drilling related waste.

3.7. Waste Disposal

3.7.1. Dispose of waste at an approved facility.

3.7.2. Waste includes all waste associated with drilling consumables.

3.8. Soil and Water Disposal

3.8.1. Departmental Representative designates location, in consultation with contractor, for soil and water barrels for future pickup and disposal by contractor.

3.8.2. Dispose soil and water at an approved facility acceptable to Departmental Representative.

3.8.3. Soil and water drums removed from site withing 30 days of completion of individual site drilling.

3.9. Borehole Drilling

3.9.1. Drill, construct and install wells as indicated and as directed by Departmental Representative.
3.9.2. Boreholes plumb and aligned.
3.9.3. Drill in locations determined by Departmental Representative.

3.10. Sampling

3.10.1. Collect samples when and as directed by Departmental Representative.
3.10.2. Provide table for examination of samples by Departmental Representative.
3.10.3. Collect blow counts as directed by Departmental Representative.
3.10.4. Decontaminate sampling equipment between samples.
3.10.5. Communicate sampling interval to Departmental Representative.

3.11. Installing Monitoring Wells

3.11.1. Install wells as indicated on typical well drawings and as directed by Departmental Representative.
3.11.2. Departmental Representative confirm well design details prior to construction at each borehole:
3.11.2.1. Slot size.
3.11.2.2. Screen length.
3.11.2.3. Sand pack.
3.11.2.4. Backfill.
3.11.2.5. Well seal.
3.11.2.6. Well protector.
3.11.3. Joins free from solvents and glues.
3.11.4. Use uncontaminated drill cuttings for backfill as directed by Departmental Representative.
3.11.5. Cut stick up to depth or height as directed by Departmental Representative.
3.11.6. Cut top square.
3.11.7. Well inside casing and screen free from fragments resulting from cutting.

3.12. Well Protector Completions

3.12.1. Complete as indicated and as directed by Departmental Representative:
3.12.1.1. Sub Surface Well Protector
3.12.1.2. Flush Mount Well Protector
3.12.1.3. Stick Up Well Protector

3.13. Installing Vapour Probes

3.13.1. Install probes as indicated on typical vapour probe drawings and as directed by Departmental Representative.
3.13.2. Install Vapour Probes with Monitoring Wells as indicated and as directed by Departmental Representative.

3.13.2.1. Secure Screens and Tubing to PVC Casing with zip ties provided by Departmental Representative.
3.13.3. Departmental Representative confirm probe design details prior to construction at each probe location:
3.13.3.1. Screen length.
3.13.3.2. Bentonite Granules.
3.13.3.3. Sand pack.
3.13.3.4. Backfill.
3.13.3.5. Well seal.
3.13.3.6. Well protector completion.
3.13.4. Joins free from solvents and glues.
3.13.5. Cut stick up to depth or height as directed by Departmental Representative.

END OF SECTION

Annex A
Borehole Logs

E14-E15

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: E14-MW10-01

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

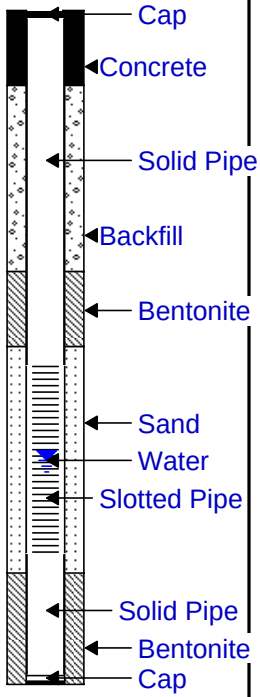
Client: PWGSC

Logged by: M. Gol

Site Location: E14

Checked By: CMC

SUBSURFACE PROFILE				SAMPLE		VOC Concentration	Well Completion Details
Depth (ft / m)	Symbol	Description	Depth/Elev.	Number	Type	%LEL: 25, 50, 75 / PPM: 100, 300, 500, 700, 900	
0 / 0		Ground Surface					
0–3 / 0–1		***SAND, Clayey, Gravelly, some Silt*** Light Brown, Moist, Loose to compact.		1	G	0	
3–10 / 1–3		***SAND, Clayey, some Gravel, Silt*** Dark Brown, Moist, Looseto Compact		2	G	15	
				3	G	0	
				4	G	0, Dup	
10–14 / 3–4		***SAND, Clayey, some Gravel, Silt*** Dark Brown, Wet, Loose to Compact		5	G	0	
				6	G	80	
14–18 / 4–5		***CLAY, Sandy, some Silt, Gravel (Possible Weathered Bedrock)*** Light Brown, Dry, Dense		7	G	0	
				8	G	0	
18 / 6		End of Borehole					



Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex / Split Spoon

Datum: NA

Drill Date: December 13, 2010

Sheet: 1 of 1

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: E14-MW10-02

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: CMC

Site Location: E14

Checked By:

SUBSURFACE PROFILE

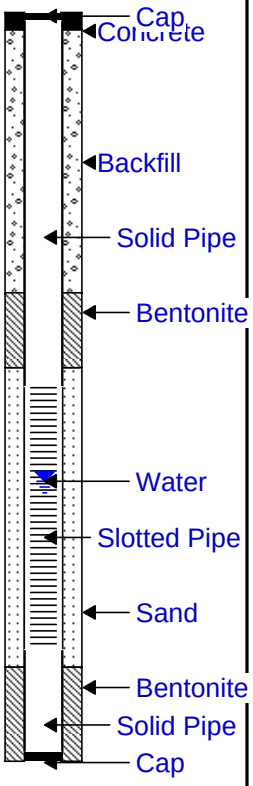
Depth (ft / m)	Symbol	Description	Depth/Elev.
0 / 0		Ground Surface	
0 – 3 / 0 – 1		***CLAY, Sandy with some Silt, trace Gravel*** Brown, Dry, Firm. Rootlets from 0-0.6m	
3 – 10 / 1 – 3		***SAND, Clayey with trace Gravel*** Brown, Moist, Compact	
10 – 18 / 3 – 5		***Weathered Sandstone and Mudstone SHALE interbeds*** Grey, Wet, Hard	
18 – 20 / 5 – 6		***Sandstone and Mudstone SHALE Bedrock*** Grey Blue, Wet, Hard	
20 / 6		End of Borehole	

SAMPLE

Number	Type	VOC Concentration (PPM)
1	G	45
2	G	0
3	G	5
4	G	5
5	G	0
6	G	0
7	G	0
8	G	430

VOC Concentration: %LEL (25, 50, 75); PPM (100, 300, 500, 700, 900)

Well Completion Details



Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex/ Split Spoon

Datum: NA

Drill Date: December 14, 2010

Sheet: 1 of 1

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: E14c-MW10-01

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: CMC

Site Location: E14c

Checked By: OC

SUBSURFACE PROFILE				SAMPLE		VOC Concentration	Well Completion Details
Depth (ft / m)	Symbol	Description	Depth/Elev.	Number	Type	%LEL (25, 50, 75) / PPM (100, 300, 500, 700, 900)	
0 / 0		Ground Surface					
0–10 / 0–3		***CLAY, Sandy with some Gravel*** Brown, Dry, Frozen.		1, 2, 3, 4, 5	G	0, 0, 10, 5, 20	Cap Concrete Backfill
10–22 / 3–7		***Weathered SHALE Bedrock,*** Brown Dry, Frozen		6, 7, 8, 9, 10	G	10, 10, 0, 0, 5	Solid Pipe
22–30 / 7–9		***SHALE Bedrock*** Grey Brown, Dry, Hard		11, 12, 13, 14, 15	G	0, 0, 0, 45	Bentonite Sand Slotted Pipe

Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex / Split Spoon

Datum: NA

Drill Date: December 8, 2010

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: E14c-MW10-01

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: CMC

Site Location: E14c

Checked By: OC

SUBSURFACE PROFILE				SAMPLE		VOC Concentration	
Depth	Symbol	Description	Depth/Elev.	Number	Type	%LEL (25, 50, 75) / PPM (100, 300, 500, 700, 900)	Well Completion Details
31				15	G	0	Water
32							Solid Pipe
33 10						0	Bentonite
34				16	G	30	Cap
35				17	G		
36 11		End of Borehole					
37							
38							
39 12							
40							
41							
42							
43 13							
44							
45							
46 14							
47							
48							
49 15							
50							
51							
52 16							
53							
54							
55							
56 17							
57							
58							
59 18							
60							

Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex / Split Spoon

Datum: NA

Drill Date: December 8, 2010

Sheet: 2 of 2

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: E14c-MW10-03

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: CMC

Site Location: E14c

Checked By: OC

SUBSURFACE PROFILE

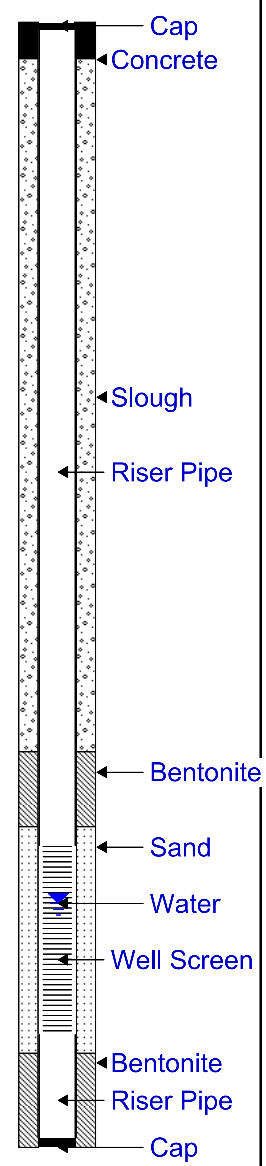
Depth (ft)	Depth (m)	Description
0	0	Ground Surface
0–2		***GRAVEL, Sandy with some Silt*** Brown, Dry, Compact
2–8	1–2	***CLAY, Sandy with some Silt, trace Gravel*** Brown, Dry, Hard
8–10	3	***SAND, Silty with trace Gravel*** Brown Dry, Comapct Minor Black Staining
10–18	3–5	***Weathered SHALE Bedrock*** Grey Brown, Dry, Hard
18–30	6–9	***Mudstone SHALE Bedrock*** Grey/Brown, Dry, Hard

SAMPLE

Number	Type	VOC Concentration (PPM)
1	G	0
2	G	0
3	G	0
4	G	0
5	G	0
6	G	0
7	G	0
8	G	0
9	G	0
10	G	10
11	G	0

VOC Concentration: %LEL 25, 50, 75; PPM 100, 300, 500, 700, 900

Well Completion Details



Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex / Split Spoon

Datum: NA

Drill Date: December 10, 2010

Sheet: 1 of 1

MONITORING WELL ID: E15-MW19-10

Well Type: Groundwater Monitoring Well
Project Location: E-15 Wonowon
Drilling Contractor: Ernco Environmental Drilling and Coring Inc
Drilling Equipment/Method: SSA/ODEX
Well Location: E-15 Wonowon

Project Name/No.: 14661-03
Client: PSPC
Engineer/Geologist: BK
Drill Date: January 24, 2019

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm (0 500 1000 1500 2000)	Well Construction	Remarks
21									
22					N	E15-MW19-10 (6.5)	1.0		
23 (7)		Becoming light abrown at 5.0 mbg							
24					N	E15-MW19-10 (7.5)	0.7		
25									
26		Becoming very hard at 7.8 mbg.			N	E15-MW19-10 (8.0)	0.8		
27									
28									
29				N/A	N	E15-MW19-10 (8.9) / Dup 18-A	1.0		
30 (9)									
31									
32									
33									
34 (10)									
35									
36				N/A	Y	E15-MW19-10 (11.1)	0.6		
37 (11)									
38									
39									
40 (12)									

Date of Water Level: January 27, 2019
Water Level (from TOC): 12.15 m

Well-Borehole Diameter: 0.20 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.25mm

Depth of Well (TOC): 14.50 m

MONITORING WELL ID: E15-MW19-10

Well Type: Groundwater Monitoring Well
Project Location: E-15 Wonowon
Drilling Contractor: Ernco Environmental Drilling and Coring Inc
Drilling Equipment/Method: SSA/ODEX
Well Location: E-15 Wonowon

Project Name/No.: 14661-03
Client: PSPC
Engineer/Geologist: BK
Drill Date: January 24, 2019

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Well Construction	Remarks
41									
42		Becoming moist at 12.8 mbg.		N/A	Y	E15-MW19-10 (12.6)	0.2		
13									
43									
44				N/A	N	E15-MW19-10 (13.3) / Dup 18-B	0.0		
45									
46									
14									
47		Becoming wet at 14.3 mbg.							
48		End of Hole							
49									
15									
50									
51									
52									
16									
53									
54									
55									
17									
56									
57									
58									
59									
18									
60									

Headspace (PID) ppm: 0 500 1000 1500 2000

Well Construction: 10/20 Silica sand; Well screen

Date of Water Level: January 27, 2019
Water Level (from TOC): 12.15 m

Well-Borehole Diameter: 0.20 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.25mm

Depth of Well (TOC): 14.50 m

MONITORING WELL ID: E15-MW19-11

Well Type: Groundwater Monitoring Well
Project Location: E-15 Wonowon
Drilling Contractor: Ernco Environmental Drilling and Coring Inc
Drilling Equipment/Method: ODEX/SSA
Well Location: E-15 Wonowon

Project Name/No.: 14661-03
Client: PSPC
Engineer/Geologist: BK
Drill Date: January 25, 2019

Depth (ft)	Depth (m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Well Construction	Remarks
0	0		Ground Surface							
0	0		***FILL*** Black to brown, clay with some fine to medium sand and trace fine grave (Fill). Medium stiff, dry, staining and or odours not observed.							
1					N/A	Y	E15-MW19-11 (0.3)	0.3		
2			***CLAY*** Black to brown, CLAY with some fine to medium sand and trace fine gravel. Medium stiff, dry, staining and or odours not observed.							
3	1				N/A	N	E15-MW19-11 (1.0)	0.1		
4										
5			Gravel decreasing with depth.		N/A	N	E15-MW19-11 (1.5)	0.2		
6	2									
7					N/A	N	E15-MW19-11 (2.0)	0.0		
8										
9					N/A	N	E15-MW19-11 (2.5)	0.9		
10	3				N/A	N	E15-MW19-11 (3.0)	1.3		
11						N	E15-MW19-11 (3.2)	12.7		
12										
13	4					N	E15-MW19-11 (4.0)	23.5		
14										
15						N	E15-MW19-11 (4.6)	54.7		
16										
17	5					Y	E15-MW19-11 (5.0)	249.3		
18						Y	E15-MW19-11 (5.6) / Dup19-D	59.4		
19										
20	6					N	E15-MW19-11 (6.0)	56.3		

Well Construction: Well cover; Bentonite; Nylon; Vapour probe; 50mm HDPE

Date of Water Level: January 28, 2019
Water Level (from TOC): 12.08 m

Well-Borehole Diameter: 0.20 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.25mm

Depth of Well (TOC): 13.44 m

MONITORING WELL ID: E15-MW19-11

Well Type: Groundwater Monitoring Well
Project Location: E-15 Wonowon
Drilling Contractor: Ernco Environmental Drilling and Coring Inc
Drilling Equipment/Method: ODEX/SSA
Well Location: E-15 Wonowon

Project Name/No.: 14661-03
Client: PSPC
Engineer/Geologist: BK
Drill Date: January 25, 2019

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Well Construction	Remarks
21		***SANDSTONE / SILTSTONE*** Interbedded weathered SANDSTONE / SILTSTONE (recovered as sand/silt) silt to very fine sand with trace fine to medium gravel. Hard, dry, moderate odours, staining not observed. Hardness increasing with depth.			Y	E15-MW19-11 (6.5)	354.5		
22									
23	7								
24		Becoming very hard with low odours at 7.5 mbg.			N	E15-MW19-11 (7.5)	54.5		
25									
26	8				N	E15-MW19-11 (8.0) / Dup19-C	25.9		
27									
28					N	E15-MW19-11 (8.5)	27.2		
29									
30	9	Becoming brown to grey at 9.0 mbg			Y	E15-MW19-11 (8.9)	27.2		
31									
32					N	E15-MW19-11 (9.5)	74.2		
33	10								
34					N	E15-MW19-11 (10.5)	67.5		
35									
36	11	Becoming moist at 11.0 mbg.			Y	E15-MW19-11 (11.1)	58.2		
37		Becoming moist to wet at 11.4 mbg.							
38									
39	12				N	E15-MW19-11 (12.0)	19.5		
40									

Date of Water Level: January 28, 2019
Water Level (from TOC): 12.08 m

Well-Borehole Diameter: 0.20 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.25mm

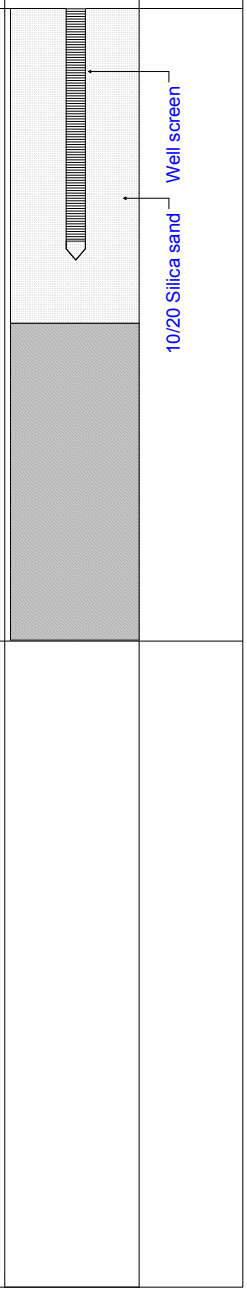
Depth of Well (TOC): 13.44 m

MONITORING WELL ID: E15-MW19-11

Well Type: Groundwater Monitoring Well
Project Location: E-15 Wonowon
Drilling Contractor: Ernco Environmental Drilling and Coring Inc
Drilling Equipment/Method: ODEX/SSA
Well Location: E-15 Wonowon

Project Name/No.: 14661-03
Client: PSPC
Engineer/Geologist: BK
Drill Date: January 25, 2019

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Well Construction	Remarks
41									
42					Y	E15-MW19-11 (12.6)	17.3		
13									
43									
44					N	E15-MW19-11 (13.3)	13.8		
45		***SAND*** Grey, fine to medium SAND. Dense, wet, staining and or odours not observed.			N	E15-MW19-11 (13.7)	1.3		
46									
14									
47					N	E15-MW19-11 (14.2)	3.5		
48									
49									
15					N	E15-MW19-11 (15.2)	4.3		
50		End of Hole							
51									
52									
16									
53									
54									
55									
17									
56									
57									
58									
59									
18									
60									



Date of Water Level: January 28, 2019
Water Level (from TOC): 12.08 m

Well-Borehole Diameter: 0.20 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.25mm

Depth of Well (TOC): 13.44 m

I-13B

Borehole Log: I13B-10BH-13

Project No: 1200-1003

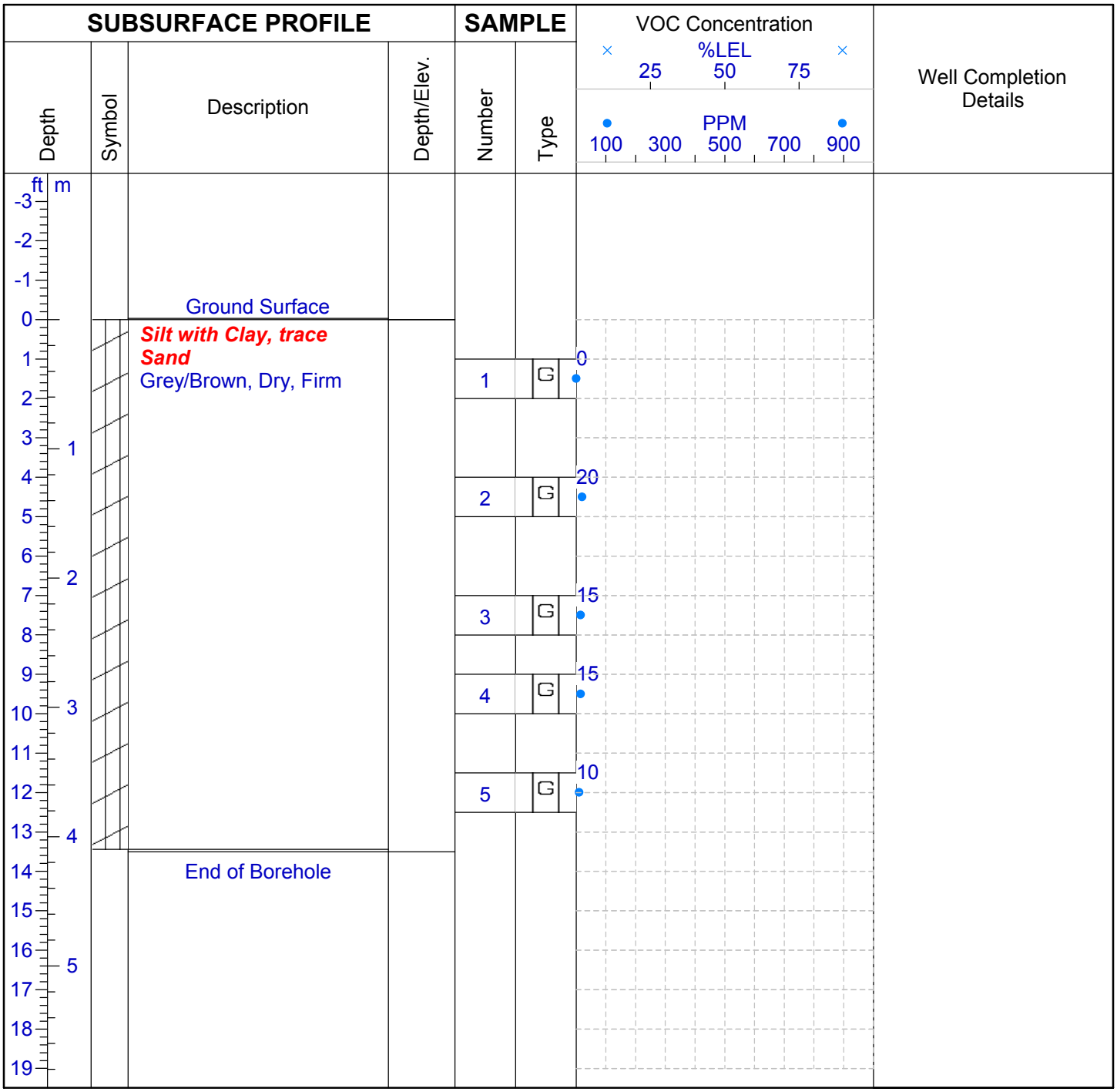
Project: Alaska Highway Former Alignment P1 Sites

Client: PWGSC

Logged by: E. Busch

Site Location: I13B

Checked By: OC



Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 11.43cm (4.5")

Drill Method: Direct Push

Datum: NA

Drill Date: September 25, 2010

Sheet: 1 of 1

ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC, V6B 2T4
Telephone: 604-632-9941
Fax: 604-632-9942

Borehole Log: I13B-MW16-14

CLIENT PWGSC
PROJECT NAME Alaska Highway former maintenance camp
PROJECT NUMBER 102054-002
PROJECT LOCATION I-13B
DRILLING CONTRACTOR Uniwide
HOLE DIAMETER 6 " **WELL DIAMETER** 2 "
DRILLING METHOD Solid Stem
GROUND ELEVATION 955.406 m
DRILL DATE 22/7/16
NORTHING 6342300.131 **EASTING** 517869.416
LOGGED BY EN/SD **CHECKED BY** IB
GROUND WATER LEVELS ▼ 10.83 m

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
	0.2–0.8		**SILT**, some clay, grey, Light brown streaks						Casing Type: Stick Up; Concrete
	0.91			954.50					
	1.0–11.2		**SILTY CLAY**, dark grey, stiff, dry	G	MW14-01			0 = ppm	
				G	MW14-02			20 = ppm	
5				G	MW14-03			15 = ppm	
10				G	MW14-04			0 = ppm	Bentonite
15				G	MW14-05			0 = ppm	
20				G	MW14-06			0 = ppm	
25				G	MW14-07			25 = ppm	Sand
30				G	MW14-08			5 = ppm	Well Screen
35									
	11.28			944.13					

Bottom of borehole at 11.28 meters

MONITORING WELL ID: MW17-23

Well Type: Groundwater and soil vapour monitoring wells
Project Location: Alaska Highway I-13B Yard, Sikanni Chief, BC
Drilling Contractor: Omega Environmental Drilling Ltd.
Drilling Equipment/Method: Sonic Core
Well Location: S portion of site

Project Name/No.: 13334
Client: PWGCS
Engineer/Geologist: JG
Drill Date: February 23, 2017 **Page:** 1 of 1

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Elevation (m)	Well Construction	Remarks
ft m							0 100 200 300 400 500			
-1		Ground Surface						0.000		
0		***CLAY*** Brown CLAY, some silt, some fine to coarse grained sand, some fine to coarse grained gravel. Stiff, moist, odours and/or staining were not observed.								
1				100	N	MW17-23(0.3)	0.5			
2				100	N	MW17-23(0.5)	0.4			
3 1										
4										
5		Trace sand and trace gravel at 1.5 m		100	N	MW17-23(1.5)	0.4			
6 2										
7										
8				100	N	MW17-23(2.5)	0.7			
9										
10 3										
11				100	N	MW17-23(3.4)	0.9			
12										
13 4				100	N	MW17-23(3.9)/MW17-B	1.0			
14										
15										
16 5				100	N	MW17-23(4.9)	1.3			
17										
18										
19				100	N	MW17-23(6.0)	0.7			
20 6								-6.096		
21		End of Hole								
22										
23 7										
24										
25										

Stickup and Concrete
Nylon Tubing
Soil Vapour Screen
PVC Casing
Bentonite
Slough
Well Screen and 10/20 Silica Sand

Co-ordinates: n/a
Date of Water Level: n/a
Water Level (from TOC): Dry well
Surveyed Water Elevation (m): n/a

Well-Borehole Diameter: 0.20 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.0025 m

Depth of Well (TOC): 5.50 m
Well Elevation (TOC): 955.957 m
Well Elevation (Ground): 955.010 m
Datum:

Log of Monitoring Well: 13B-MW18-06S/D

HEMMERA

Project Name/No: Delineation Drilling at I-13B / 376-250.02
Drilling Company: Geotech Drilling
Client: Public Works and Government Services Canada
Drilling Method: Solid Stem Auger
Date Drilled: February 24, 2018
Logged by: Andrei Novikov
Site Location: km 445 Alaska Highway
Sheet: 1 of 1

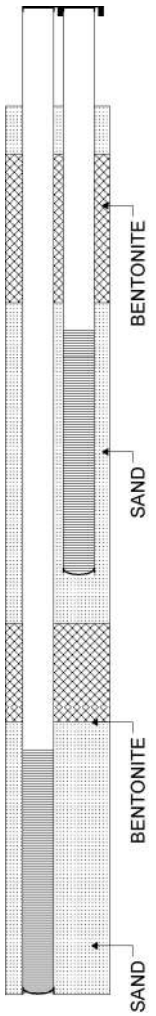
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev (m)
			Ground Surface	0.00
0			**SILT** Sandy, gravelly, dark brown, frozen	0.00
2			**SILT** Laminated / layered wirth black organic soil, wood, roots	-0.61 0.61
4	1		**ORGANIC SILT**	-1.22 1.22
6			**SILT** Trace coarse sand / fine gravel, dark brown, firm, blocky, layered, moist, trace sand lenses	-1.83 1.83
10	3		Soft to firm, sandstone below 3 m	
12			**CLAY** Dark brown, soft to firm, homogeneous, moist, trace sandstone	-3.66 3.66
18	5		End of Log	-5.49 5.49

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
3B-MW18-06-1	Y		100	
3B-MW18-06-2	N		110	
3B-MW18-06-3	Y		90	
3B-MW18-06-4	N		75	

Backfill details



Well location: North-east of MW16-15
Well casing diameter: 0.05 m
Depth of well (TOC): 6.39 m and 3.87 m
Depth to water level (TOC): dry
Well casing material: P C
Well Elevation (TOC): not surveyed
Date of water level: n/a
Well screen slot size: 10 slot
Ground Elevation: not surveyed
Borehole diameter: 0.13 m
Well screen interval (bgs): 3.96 - 5.46 m and 1.44 - 2.94 m

Log of Borehole: 13B-BH18-07

HEMMERA

Project Name/No: Delineation Drilling at I-13B / 376-250.02

Client: Public Works and Govenment Services Canada

Date Drilled: February 24, 2018

Site Location: km 445 Alaska Highway

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Geotech Drilling

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
		Ground Surface	0.00						
		SILT Sandy, some gravel, dark brown, blocky, frozen, moist, rootlets	0.00						
			-0.91						
		SILT Trace sand stone, trace sand lenses, dark brown, firm, moist	0.91	13B-BH18-07-1	Y		115		
			-1.83						
		CLAY Dark brown, firm, blocky, moist	1.83	13B-BH18-07-2	N		110		
		Some coarse sand / fine gravel below 2.9 m		13B-BH18-07-3	N		90		
				13B-BH18-07-4	N		110		
		End of Log	-3.96 3.96						

Backfill details: SAND; BENTONITE

Borehole location: North-east of MW16-15

Borehole ground elevation: not surveyed

Borehole diameter: 0.13 m

Borehole depth: 4 m

Log of Monitoring Well: 13B-MW18-08S/D

HEMMERA

Project Name/No: Delineation Drilling at I-13B / 376-250.02
Drilling Company: Geotech Drilling
Client: Public Works and Government Services Canada
Drilling Method: Solid Stem Auger
Date Drilled: February 24, 2018
Logged by: Andrei Novikov
Site Location: km 445 Alaska Highway
Sheet: 1 of 1

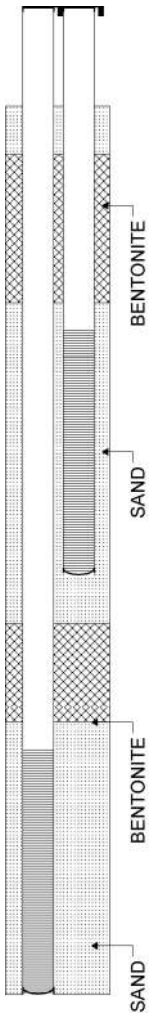
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	0.00 / 0.00
0 / 0		**SILT** Sandy, trace to some fine gravel, dark brown, firm, frozen, blocky, moist, sand lenses, roots and rootlets Orange reci itation at 0.6 m	
5 / 1		Piece of metal at 1.5 m	-1.52 / 1.52
5 / 1		**CLAY** Silty, dark brown, firm, blocky, moist, sandstone, sand lenses yellow fine grained sand	
10 / 3		Some fine gravel / coarse sand, layered below 3 m	
13 / 4		Trace sandstone, no gravel / sand below 4.4 m	
18 / 5.5		End of Log	-5.49 / 5.49

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
3B-MW18-08-1	Y		115	
3B-MW18-08-2	N		130	
3B-MW18-08-3	N		95	
3B-MW18-08-4	Y		95	

Backfill details



Well location: North of MW16-15
Well casing diameter: 0.05 m
Depth of well (TOC): 6.39 m and 3.87 m
Depth to water level (TOC): dry
Well casing material: P C
Well Elevation (TOC): not surveyed
Date of water level: n/a
Well screen slot size: 10 slot
Ground Elevation: not surveyed
Borehole diameter: 0.13 m
Well screen interval (bgs): 3.96 - 5.46 m and 1.44 - 2.94 m

I-22

LOCATION ID: BH17-01

Keystone Environmental

Project Location: Alaska Highway I20 Yard, Sikanni Chief, BC
Project Name/No.: 13334
Drilling Contractor: Uniwide Drilling Co. Ltd.
Client: PWGSC
Drilling Equipment/Method: Solid Stem Augers
Engineer/Geologist: JG
Location Type: Borehole
Drill Date: February 19, 2017
Page: 1 of 1

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed (Y,N)	Sample ID	Headspace (PID) ppm	Elevation (m)	Remarks
ft / m		Ground Surface						0.00	
0 / 0		***SAND and GRAVEL*** Brown fine to coarse grained SAND and GRAVEL, trace silt. Loose, dry, odours and/or staining were not observed.		100	N	BH17-01(0.3)	0.0		
2				100	N	BH17-01(0.5)	0.0		
3 / 1								-1.22	
4		***SILT*** Brown SILT, some clay, trace sand, trace gravel. Stiff, miost, odours and/or staining were not observed.		100	N	BH17-01(1.5)	0.0		
6 / 2									
8								-2.44	
8		***CLAY*** Brown CLAY, some silt, trace fine grained sand, trace fine grained gravel. Stiff, miost, odours and/or staining were not observed.		100	N	BH17-01(2.5)	0.0		
10 / 3									
11				100	N	BH17-01(3.5)	0.0		
13 / 4									
14				100	Y	BH17-01(4.5)	0.0		
16				100	Y	BH17-01(5.0)	1.6		
16 / 5									
18		Very stiff at 5.8 m							
19				100	Y	BH17-01(6.0)	0.7		
20 / 6								-6.10	
20		End of Hole							
21									
22									

Location of Borehole: South side of Site

Borehole Diameter: 0.15 m
Depth of Borehole: 6.1 m

Borehole Elevation: 897.623 m
Co-ordinates: n/a
Datum: Local

MONITORING WELL ID: MW/SV17-02

Well Type: Groundwater and soil vapour monitoring wells
Project Location: Alaska Highway I20 Yard, Sikanni Chief, BC
Project Name/No.: 13334
Drilling Contractor: Uniwide Drilling Co. Ltd.
Client: PWGSC
Drilling Equipment/Method: Solid Stem Augers
Engineer/Geologist: JG
Well Location: South side of Site
Drill Date: February 19, 2017

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Elevation (m)	Well Construction	Remarks
ft / m		Ground Surface						0.000		
0 / 0		***SAND*** Brown fine to coarse grained SAND, some fine to coarse grained gravel, some silt. Loose, dry, odours and/or staining were not observed.		100	N	MW17-2(0.3)	0.0			
				100	N	MW17-2(0.5)	0.0			
1 / 1										
2										
3										
4								-1.372		
5 / 2		***CLAY*** Brown CLAY, some silt, trace sand, trace fine grained gravel. Stiff, dry, odours and/or staining were not observed.		100	N	MW17-2(1.5)	0.0			
6										
7										
8				100	N	MW17-2(2.5)/MW17-A	0.4			
9 / 3										
10										
11		Gravel not observed below 3.5 m, moist at 3.5 m		100	N	MW17-2(3.5)	0.4			
12										
13 / 4										
14				100	N	MW17-2(4.5)	0.2			
15										
16										
17 / 5		Low hydrocarbon-like odours were observed 5.5 to 7.6 m								
18				100	Y	MW17-2(5.5)	55.3			
19										
20 / 6										
21										

Nylon Tubing
Flushmount and Concrete
Soil Vapour Screen
Bentonite

Co-ordinates: n/a
Date of Water Level:
Water Level (from TOC): Dry
Surveyed Water Elevation (m): n/a

Well-Borehole Diameter: 0.15 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.0025 m

Depth of Well (TOC): 12.21 m
Well Elevation (TOC): 896.532 m
Well Elevation (Ground): 895.894 m
Datum: Local

MONITORING WELL ID: MW/SV17-02

Well Type: Groundwater and soil vapour monitoring wells
Project Location: Alaska Highway I20 Yard, Sikanni Chief, BC
Drilling Contractor: Uniwide Drilling Co. Ltd.
Drilling Equipment/Method: Solid Stem Augers
Well Location: South side of Site

Project Name/No.: 13334
Client: PWGSC
Engineer/Geologist: JG
Drill Date: February 19, 2017

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed	Sample ID	Headspace (PID) ppm	Elevation (m)	Well Construction	Remarks
22							151.4			
23 (7)				100	Y	MW17-2(6.5)				PVC Casing
24										
25				100	Y	MW17-2(7.5)	3.1			
26 (8)										
27				100	N	MW17-2(8.5)	1.4			
28										
29 (9)										
30				100	N	MW17-12(9.5)	0.7			
31										
32										
33 (10)										
34				100	N	MW17-2(10.5)	1.6			
35										
36 (11)										
37				100	N	MW17-2(11.5)	0.6			
38										
39 (12)				100	N	MW17-2(12.0)	1.1			
40		End of Hole						-12.192		Well Screen and 10/20 Silica Sand
41										
42										

Headspace (PID) ppm: 0 100 200 300 400 500

Co-ordinates: n/a
Date of Water Level:
Water Level (from TOC): Dry
Surveyed Water Elevation (m): n/a

Well-Borehole Diameter: 0.15 m
Well Casing Diameter: 0.05 m
Well Casing Material: Schedule 40 PVC
Well Screen Slot Size: 0.0025 m

Depth of Well (TOC): 12.21 m
Well Elevation (TOC): 896.532 m
Well Elevation (Ground): 895.894 m
Datum: Local

LOCATION ID: BH17-07

Keystone Environmental

Project Location: Alaska Highway I20 Yard, Sikanni Chief, BC
Project Name/No.: 13334
Drilling Contractor: Uniwide Drilling Co. Ltd.
Client: PWGSC
Drilling Equipment/Method: Solid Stem Augers
Engineer/Geologist: JG
Location Type: Borehole
Drill Date: February 20, 2017

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed (Y,N)	Sample ID	Headspace (PID) ppm	Elevation (m)	Remarks
ft / m		Ground Surface						0.00	
0 / 0		***SAND and GRAVEL*** Brown fine to coarse grained SAND and GRAVEL, some silt. Loose, dry, odours and/or staining were not observed. Dense at 0.3 m		100	N	BH17-07(0.3)	0.3		
2				100	N	BH17-07(0.5)	1.7		
4 / 1								-1.37	
5		***CLAY*** Brown CLAY, some silt, some fine to coarse grained sand, some fine to coarse grained gravel. Moderately stiff, moist, odours and/or staining were not observed. Cobbles and moderate hydrocarbon-like odours were observed at 2.0 m		100	Y	BH17-07(1.5)	3.5		
8 / 2				100	Y	BH17-07(2.4)	236.0		
11 / 3		Trace sand and gravel were observed below 3.5 m and low hydrocarbon-like odours were observed from 3.5 to 6.5 m		100	N	BH17-07(3.5)	220.0		
13 / 4				100	Y	BH17-07(4.2)	27.4		
19 / 6				100	N	BH17-07(5.8)	6.9		
22				100	N	BH17-07(6.5)	2.4		

Location of Borehole: Southwest corner of Site

Borehole Diameter: 0.15 m
Depth of Borehole: 7.6 m

Borehole Elevation: 896.837 m
Co-ordinates: n/a
Datum: Local

LOCATION ID: BH17-07

Keystone Environmental

Project Location: Alaska Highway I20 Yard, Sikanni Chief, BC
Project Name/No.: 13334
Drilling Contractor: Uniwide Drilling Co. Ltd.
Client: PWGSC
Drilling Equipment/Method: Solid Stem Augers
Engineer/Geologist: JG
Location Type: Borehole
Drill Date: February 20, 2017

Depth (ft/m)	Symbol	Soil / Sediment Description	Sample Type	% Recovery	Sample Analyzed (Y,N)	Sample ID	Headspace (PID) ppm 0 500 1000 1500 2000	Elevation (m)	Remarks
23									
24				100	Y	BH17-07(7.5)	3.0	-7.62	
25		End of Hole							
26	8								
27									
28									
29									
30	9								
31									
32									
33	10								
34									
35									
36	11								
37									
38									
39	12								
40									
41									
42									
43	13								
44									

Location of Borehole: Southwest corner of Site

Borehole Diameter: 0.15 m
Depth of Borehole: 7.6 m

Borehole Elevation: 896.837 m
Co-ordinates: n/a
Datum: Local

I24

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: I24-MW10-01

Project No: 1200-1011

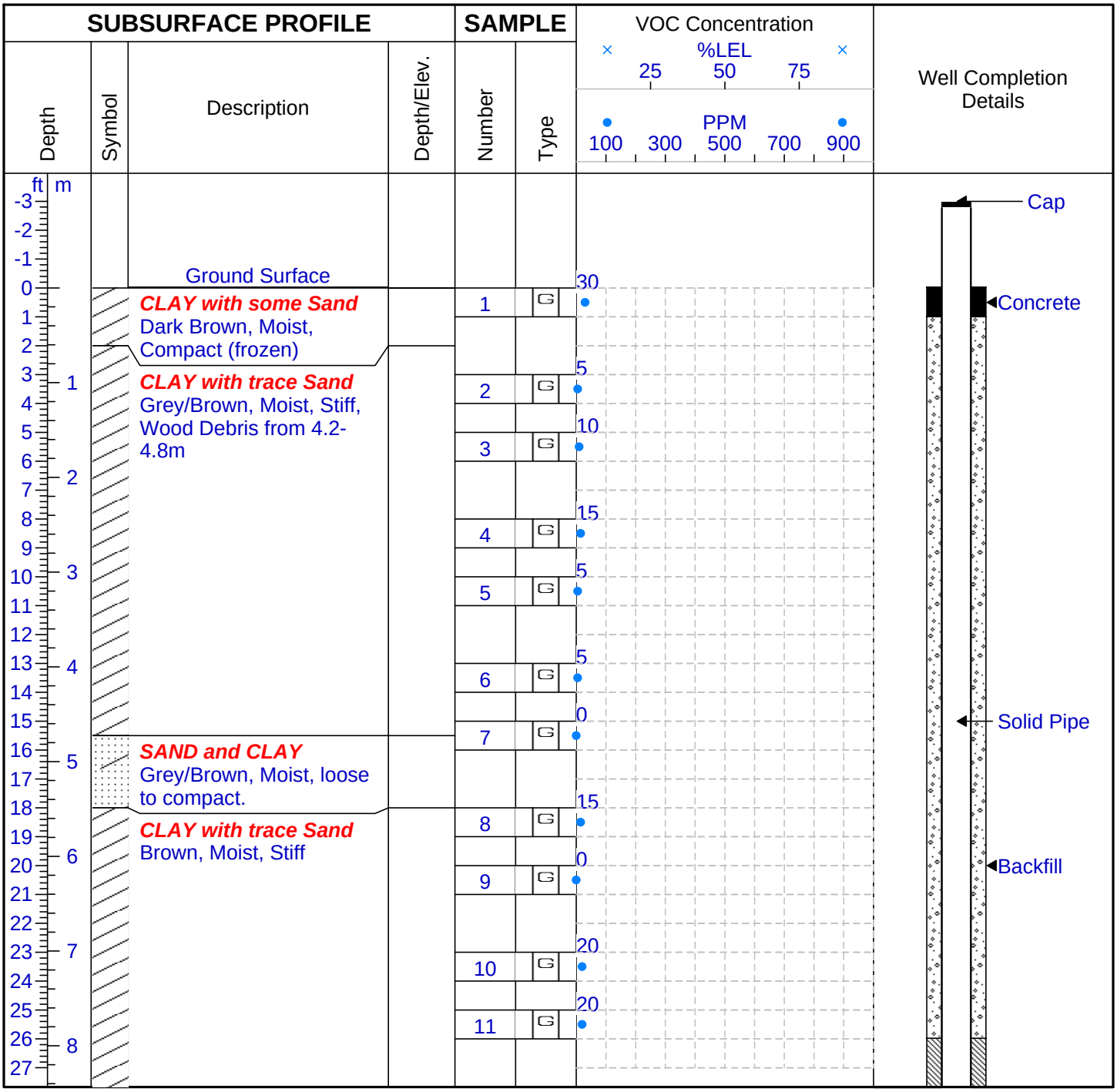
Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: C.Dupuis

Site Location: I24

Checked By: CMC



Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex / Split Spoon

Datum: NA

Drill Date: December 15, 2010

Sheet: 1 of 2

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: I24-MW10-01

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: C.Dupuis

Site Location: I24

Checked By: CMC

SUBSURFACE PROFILE				SAMPLE		VOC Concentration	Well Completion Details
Depth	Symbol	Description	Depth/Elev.	Number	Type	%LEL: 25, 50, 75; PPM: 100, 300, 500, 700, 900	
28–57	9, 10, 11, 12, 13, 14, 15, 16, 17	***Mudstone Bedrock recovered as CLAY, with trace Gravel*** Dark Grey, Moist, Stiff		12	G	30	Sand
				13	G	15	Slotted Pipe
				14	G	15	Cap
		End of Borehole					

Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Odex / Split Spoon

Datum: NA

Drill Date: December 15, 2010

Sheet: 2 of 2

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: I24-BH10-02

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: C.Dupuis

Site Location: I24

Checked By: CMC

SUBSURFACE PROFILE				SAMPLE		VOC Concentration	Well Completion Details
Depth	Symbol	Description	Depth/Elev.	Number	Type	%LEL: 25, 50, 75 / PPM: 100, 300, 500, 700, 900	
ft / m		Ground Surface					
0 / 0		***CLAY, Sandy with trace Gravel*** Brown, Moist, Soft					
1 / 1		Wood Debris from 1.8-2.2m		1	G	40	
2 / 2		Also Wood Debris from 4.9-5.2m		2	G	80	
3 / 3				3	G	50	
4 / 4				4	G	120	
5 / 5				5	G	110	
6 / 6				6	G	190	
7 / 7		End of Borehole		7	G	260	Backfill
8 / 8				8	G	200	
9 / 9							Bentonite

Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Solid Stem Auger

Datum: NA

Drill Date: December 16, 2010

Sheet: 1 of 1

FRANZ ENVIRONMENTAL INC.

CONSULTING ♦ ENGINEERING ♦ TECHNOLOGIES ♦

Borehole Log: I24-MW10-03

Project No: 1200-1011

Project: Alaska Highway Historical Gas Stations

Client: PWGSC

Logged by: C.Dupuis

Site Location: I24

Checked By: CMC

SUBSURFACE PROFILE

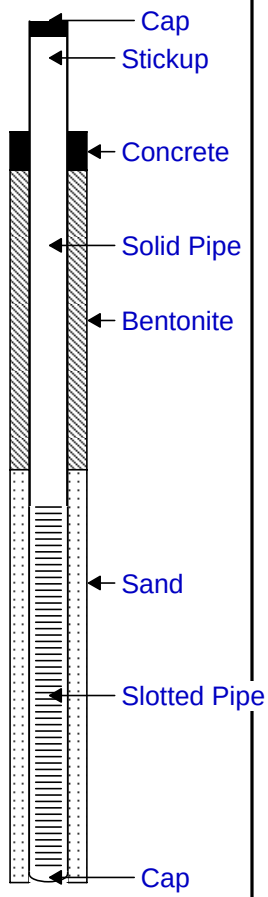
Depth (ft / m)	Symbol	Description	Depth/Elev.
0 / 0		Ground Surface	
0 – 3 / 0 – 1		***CLAY, Sandy with trace Gravel*** Brown, Moist, Soft	
3 – 10 / 1 – 3		***CLAY, Sandy with some Gravel*** Dark Brown, Moist, Soft	
20 / 6		End of Borehole	

SAMPLE

Number	Type	VOC Concentration (PPM)
1	G	15
2	G	10
3	G	0
4	G	0
5	G	0
6	G	70
7	G	0
8	G	0

VOC Concentration: %LEL (25, 50, 75); PPM (100, 300, 500, 700, 900)

Well Completion Details



Drilled By: Geotech

Well Diameter: 5.08cm (2")

Hole Diameter: 10.16cm (4")

Drill Method: Solid Stem Auger

Datum: NA

Drill Date: December 16, 2010

Sheet: 1 of 1

ARCADIS Canada Inc.
308-1080 Mainland Street
Vancouver, BC, V6B 2T4
Telephone: 604-632-9941
Fax: 604-632-9942

Borehole Log: I24-MW16-13

CLIENT PWGSC
PROJECT NAME Alaska Highway former maintenance camp
PROJECT NUMBER 102054-004
PROJECT LOCATION I-24
DRILLING CONTRACTOR Uniwide
HOLE DIAMETER 6 " **WELL DIAMETER** 2 "
DRILLING METHOD Solid Stem
GROUND ELEVATION 1056.377 m
DRILL DATE 21/7/16
NORTHING 6341090.68 **EASTING** 517074.542
LOGGED BY EN/SD **CHECKED BY** IB
GROUND WATER LEVELS ▼ 4.64 m

DEPTH (ft)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	SAMPLE NUMBER	RECOVERY %	BLOW COUNTS	RKI READINGS	WELL DIAGRAM
	0.2–3.2		**SILT**, trace sand, light brown, dry,	G	MW13-01			0 = ppm	Casing Type: Stick Up; Concrete
			Some clay, trace sand, dark grey, stiff, dry below 0.76m.	G	MW13-02			40 = ppm	
5				G	MW13-03			55 = ppm	Bentonite
10	3.35		1053.03						
	3.4–10.2		**SILTY CLAY**, dark grey, moist,	G	MW13-04			0 = ppm	▼
				G	MW13-05			0 = ppm	
15				G	MW13-06			0 = ppm	Sand
			Trace gravel, soft, moist below 5.49m.	G	MW13-07			40 = ppm	
20				G	MW13-08			0 = ppm	Well Screen
			No gravel below 6.7m						
				G	MW13-09			55 = ppm	
25			Dense, dry below 7.6m.						
				G	MW13-10			0 = ppm	
30									
				G	MW13-11			0 = ppm	Bentonite
	10.36		1046.02						
35	10.4–12.0		**SILT**, some sand and gravel, light brown, dry,						
			Trace sand and gravel, dark grey, dry below 10.7m.	G	MW13-12			0 = ppm	
40	12.19		1044.19						

Bottom of borehole at 12.19 meters

MONITORING WELL TEMPLATE 1 102054-004 SITE I24 BH LOGS.GPJ GINT STD CANADA LAB.GDT 12/10/16

Log of Monitoring Well: 24-MW18-09

HEMMERA

Project Name/No: Delineation Drilling at I-24 / 376-250.02

Client: Public Works and Government Services Canada

Date Drilled: February 26, 2018

Site Location: km 445 Alaska Highway

Drilling Company: Geotech Drilling

Drilling Method: Solid Stem Auger

Logged by: Andrei Novikov

Sheet: 1 of 1

Depth (ft / m)	Description	Depth/Elev (m)	Sample ID	Analysed Y,N	Sample Type	Vapour ppm	LEL %
	Ground Surface	0.00					
0	**TOP SOIL**	0.00 / -0.30					
1	**SILT, SAND AND GRAVEL** Dark brown, firm, frozen, blocky, moist	0.30					
1	**SAND** Fine to medium grained, some gravel, brown, dense, homogeneous, moist,	-1.07 / 1.07	24-MW18-09-1	N		120	
2	**CLAY** Some fine gravel, dark brown, firm, blocky, layered, moist		24-MW18-09-2	N		135	
3	**ORGANIC SOIL**	-3.35 / 3.35					
4	**CLAY** Gravelly, dark brown, firm, blocky, layered, moist, sandstone, sand lenses		24-MW18-09-3	N		190	
5		-5.64 / 5.64					
6	**ORGANIC SOIL** Wood, twigs		24-MW18-09-4	N			9
6	**CLAY** Some gravel, some silt, grey, soft to firm, laminated, moist Water on auger below 6 m						
7	Trace fine gravel, no sand, stiff below7.3 m	-7.62 / 7.62	24-MW18-09-5	N			3
8	**CLAY** Dark brown, firm to stiff, laminated, layered, wet, trace sandstone, small 1cm sand lenses						
9			24-MW18-09-6	N		115	
	End of Log	-9.75 / 9.75					

Backfill details: SAND / BENTONITE / SAND / SLOUGH

Well location: North of MW16-07

Depth to water level (TOC): 6.32 m

Date of water level: March 1, 2018

Borehole diameter: 0.13 m

Well casing diameter: 0.05 m

Well casing material: P C

Well screen slot size: 10 slot

Well screen interval (bgs): 6.8 - 8.3 m

Depth of well (TOC): 9.17 m

Well Elevation (TOC): not surveyed

Ground Elevation: not surveyed

J06

WELL RECORD

WELL NO: **MW17-01**

CLIENT: PWGSC

PROJECT: Site J06, Alaska Highway, BC

PGL PROJECT NO: **125-95.01**
TOP OF PIPE (TOP) ELEVATION: **1141.499 m**
SURFACE ELEVATION: **1140.634 m**

DEPTH (m)	SOIL TYPE	SOIL DESCRIPTION	SAMPLE TYPE	LABORATORY ANALYSES	VAPOUR READING (ppmv)	WATER LEVEL	WELL COMPLETION	COMPLETION NOTES	ELEVATION (m)
0.2		**SILT**						Stick Up.	1140.4
0.4		very hard, trace fine sand, trace clay, trace gravel,						J-Plug	1140.2
0.6		brown, dry to moist						Concrete	1140.0
0.8				J06-MW17-01-01	ND			Silica Sand	1139.8
1.0									1139.6
1.2									1139.4
1.4									1139.2
1.6				J06-MW17-01-02	ND				1139.0
1.8									1138.8
2.0									1138.6
2.2									1138.4
2.4									1138.2
2.6		no gravel, some clay, hard , moist, below 2.5m		J06-MW17-01-03 / Z01	ND				1138.0
2.8									1137.8
3.0									1137.6
3.2								Bentonite	1137.4
3.4		**SAND**							1137.2
3.6		fine grained, compact, trace silt, brown, dry		J06-MW17-01-04	35				1137.0
3.8									1136.8
4.0									1136.6
4.2									1136.4
4.4									1136.2
4.6		some silt, trace gravel, dry to moist, below 4.6m		J06-MW17-01-05	ND				1136.0
4.8									1135.8
5.0									1135.6
5.2									1135.4
5.4									1135.2
5.6				J06-MW17-01-06	ND				1135.0
5.8								Silica Sand	1134.8
6.0									1134.6
6.2									1134.4
6.4									1134.2
6.6				J06-MW17-01-07	ND				1134.0
6.8									1133.8
7.0									1133.6
7.2									1133.4
7.4								50mm 010	1133.2
7.6		moist below 7.5m						Slot PVC	1133.0
7.8									1132.8
8.0									1132.6
8.2		hard drilling, poor recovery from 7.5 to 9.0m		J06-MW17-01-08	25				1132.4
8.4									1132.2
8.6									1132.0
8.8						▼			1131.8
9.0									1131.6
9.2								Silica Sand	1131.4
9.4									1131.2
9.6				J06-MW17-01-09	20				1131.0
9.8								Bentonite	1130.8
10.0		hard drilling, poor recovery from 9.0 to 10.5m							1130.6
10.2									1130.4
10.4								Slough	1130.2

End of borehole at 10.50 m

Screened interval from 6 m to 9 m below surface.
GW 8.82 mbgs
(2/26/2017)

INVESTIG. METHOD: Solid Stem Auger
INVESTIG. DATE: February 22, 2017
LOGGED BY: SLB HOLE DIAM (mm): 152

Sample Notes ▭ Auger

THIS LOG IS FOR ENVIRONMENTAL PURPOSES ONLY.

Smith River

FRANZ ENVIRONMENTAL INC.
CONSULTING • ENGINEERING • TECHNOLOGIES

Borehole Log: SRA-MW11-01

Project No: 2043-1001

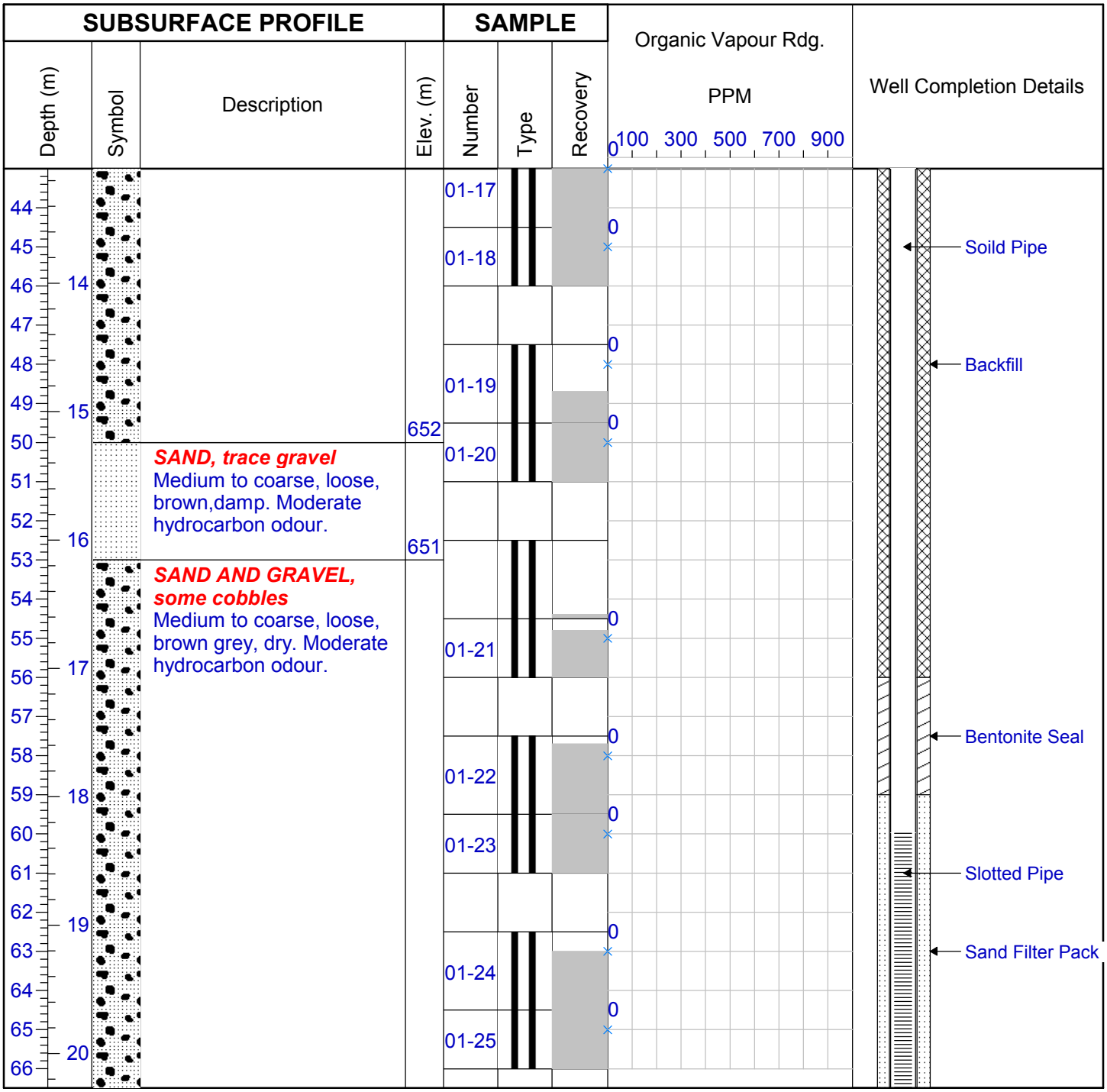
Project: Smith River Airport

Client: PWGSC

Logged By: M.Gol

Location: Smith River Airport

Checked By: C.McDonald



Drilled By: Geotech Drilling

Hole Dia: 4'

Well Dia: 2'

Drill Method: Odex and Split Spoons

Grnd Elev: 667.29

TOC Elev: 668.12

Drill Date: 11th to 12th Feb 2011

Sheet: 3 of 4

FRANZ ENVIRONMENTAL INC.
CONSULTING • ENGINEERING • TECHNOLOGIES

Borehole Log: SRA-MW11-01

Project No: 2043-1001

Project: Smith River Airport

Client: PWGSC

Logged By: M.Gol

Location: Smith River Airport

Checked By: C.McDonald

SUBSURFACE PROFILE				SAMPLE			Organic Vapour Rdg. PPM	Well Completion Details
Depth (m)	Symbol	Description	Elev. (m)	Number	Type	Recovery	100 300 500 700 900	
67			646					
68								
69	21	***SAND, some silt, some gravel , some silt*** Fine to coarse, loose, brown, damp. Moderate Hydrocarbon odour.		01-26			0	Slotted Pipe
70								Sand Filter Pack
71								
72	22							
73								
74								
75	23			01-27			0	End Cap
76								
77								Backfill
78								
79	24							
80				01-28			0	
81			643					
82	25	End of Borehole						
83								
84								
85	26							
86								
87								
88								
89	27							

Drilled By: Geotech Drilling

Hole Dia: 4'

Well Dia: 2'

Drill Method: Odex and Split Spoons

Grnd Elev: 667.29

TOC Elev: 668.12

Drill Date: 11th to 12th Feb 2011

FRANZ ENVIRONMENTAL INC.
CONSULTING • ENGINEERING • TECHNOLOGIES

Borehole Log: SRA-MW11-02

Project No: 2043-1001

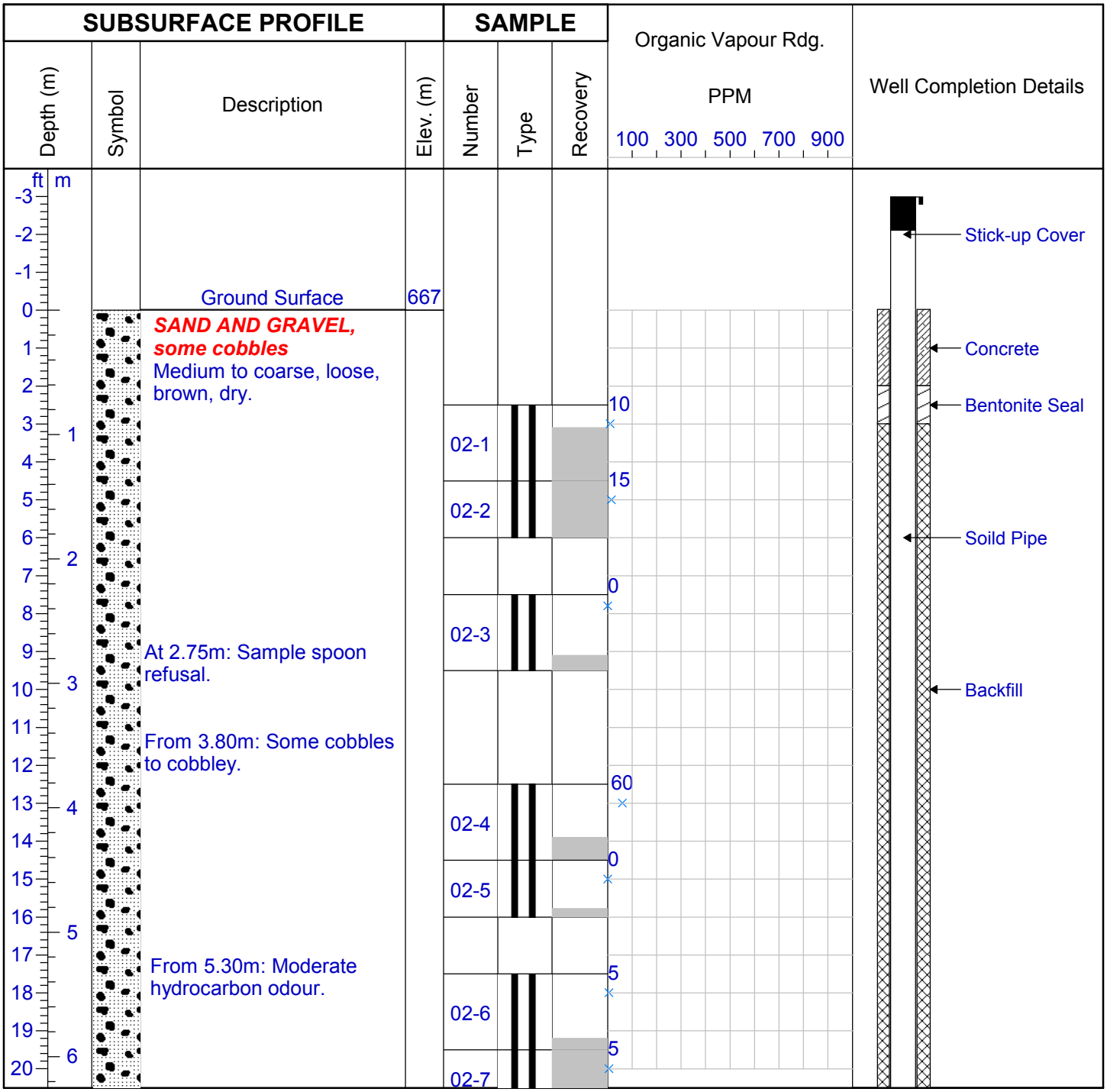
Project: Smith River Airport

Client: PWGSC

Logged By: M.Gol

Location: Smith River Airport

Checked By: C.McDonald



Drilled By: Geotech Drilling

Hole Dia: 4'

Well Dia: 2'

Drill Method: Odex and Split Spoons

Grnd Elev: 667.17

TOC Elev: 667.93

Drill Date: 12th to 13th Feb 2011

FRANZ ENVIRONMENTAL INC.
CONSULTING • ENGINEERING • TECHNOLOGIES

Borehole Log: SRA-MW11-02

Project No: 2043-1001

Project: Smith River Airport

Client: PWGSC

Logged By: M.Gol

Location: Smith River Airport

Checked By: C.McDonald

SUBSURFACE PROFILE				SAMPLE			Organic Vapour Rdg. PPM	Well Completion Details
Depth (m)	Symbol	Description	Elev. (m)	Number	Type	Recovery	100 300 500 700 900	
21				02-7			5	
22								
23	7	From 7.30m: No odour.		02-8			5	Backfill
24								
25				02-9			0	Soild Pipe
26	8							
27								
28				02-10			0	Bentonite Seal
29								
30	9			02-11			0	
31								
32								
33	10			02-12			0	Sand Filter Pack
34								
35				02-13			5	Slotted Pipe
36	11							
37								
38								
39								
40	12			02-14			5	End Cap
41			655					Backfill
42		End of Borehole						
43	13							

Drilled By: Geotech Drilling

Hole Dia: 4'

Well Dia: 2'

Drill Method: Odex and Split Spoons

Grnd Elev: 667.17

TOC Elev: 667.93

Drill Date: 12th to 13th Feb 2011

Sheet: 2 of 2

PROJECT No.: 1665286

RECORD OF BOREHOLE: BH17-01

SHEET 1 OF 4

CLIENT: Public Works and Government Services Canada
PROJECT: Smith River Airport Phase II Environmental Site Assessment
LOCATION: AEC 1
N: 6641066.65 E: 643448.42 UTM NAD83 Zone: 9V

DRILLING DATE: 03/10,11,12/2017

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
			Ground Surface		673.61										
0	Mobile B-80	Odex Downhole Hammer	**(SW)** SAND, fine to medium, some gravel; brown, no odour, no staining; non-cohesive, dry, loose.		0.00										
1			- hydrocarbon odour from 1.2m to 1.4m			1	SS	REF	1	10			12.4		
2						2	SS	REF	2	21					
3						3	SS	64	3	88					
4						DUP A									
5															
					667.82										
6			**(GW)** SAND and GRAVEL; brown-greyish colour, no odour, no staining; non-cohesive, dry, loose.		5.79	4	SS	69	4	100					
7					666.29										
			(SW) SAND, fine to medium, some gravel; brown, no odour, no staining; non-cohesive, dry, loose.		7.32	5	SS	REF	5	75					
8															
9						6	SS	REF	6	50					
10			*CONTINUED NEXT PAGE*												

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AGH
CHECKED: AGH

Golder Associates

PROJECT No.: 1665286

RECORD OF BOREHOLE: BH17-01

SHEET 2 OF 4

CLIENT: Public Works and Government Services Canada
PROJECT: Smith River Airport Phase II Environmental Site Assessment
LOCATION: AEC 1
N: 6641066.65 E: 643448.42 UTM NAD83 Zone: 9V

DRILLING DATE: 03/10,11,12/2017

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (2 4 6 8)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	WATER CONTENT PERCENT (Wp W Wl; NP - Non-Plastic) (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
10	Mobile B-80	Odex Downhole Hammer	**(SW)** SAND, fine to medium, some gravel; brown, no odour, no staining; non-cohesive, dry, loose. *(continued)*			7	SS	REF	7	42					
11															
12						8	SS	REF	8	21					
13															
14						9	SS	REF	9	21					
15						10	SS	REF	10	8					
16															
17															
18					655.63										
			(GW) sandy GRAVEL; brown-greyish, no odour, no staining; non-cohesive, dry, loose.		17.98	11	SS	REF	11	46					
19															
20			*CONTINUED NEXT PAGE*												

DEPTH SCALE
1 : 50

Golder Associates

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AGH
CHECKED: AGH

PROJECT No.: 1665286

RECORD OF BOREHOLE: BH17-01

SHEET 3 OF 4

CLIENT: Public Works and Government Services Canada
PROJECT: Smith River Airport Phase II Environmental Site Assessment
LOCATION: AEC 1
N: 6641066.65 E: 643448.42 UTM NAD83 Zone: 9V

DRILLING DATE: 03/10,11,12/2017

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
20	Mobile B-80	Odex Downhole Hammer	**(GW)** sandy GRAVEL; brown-greyish, no odour, no staining; non-cohesive, dry, loose. *(continued)*												
21					652.58										
			(SW) SAND, medium to coarse, some gravel; brown, no odour, no staining; non-cohesive, dry, loose.		21.03	12	SS	REF	12	25	⊕				
22															
23															
24						13	SS	REF	13	42	⊕				
25															
					648.01										
			(SP) SAND, fine to medium, trace gravel; brown, no odour, no staining; non-cohesive, moist, loose.		25.60										
26															
27						14	SS	REF	14	46	⊕				
28															
29															
30			*CONTINUED NEXT PAGE*												

PID ppm: 2, 4, 6, 8

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

WATER CONTENT PERCENT: Wp, W, Wl; NP - Non-Plastic; 10, 20, 30, 40

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AGH
CHECKED: AGH

Golder Associates

PROJECT No.: 1665286

RECORD OF BOREHOLE: BH17-01

SHEET 4 OF 4

CLIENT: Public Works and Government Services Canada
PROJECT: Smith River Airport Phase II Environmental Site Assessment
LOCATION: AEC 1
N: 6641066.65 E: 643448.42 UTM NAD83 Zone: 9V

DRILLING DATE: 03/10,11,12/2017

DATUM: Ground Surface

DEPTH SCALE METRES	DRILLING RIG	DRILLING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
30			**(SP)** SAND, fine to medium, trace gravel; brown, no odour, no staining; non-cohesive, moist, loose. *(continued)*			15	SS	96	15	100	⊕				
						DUP B									
31															
32															
33	Mobile B-80	Odex Downhole Hammer			640.39										
			(SW-GW) SAND and GRAVEL; brown, no odour, no staining; non-cohesive, dry, loose.		33.22	16	SS	REF	16	42	⊕				
34															
35															
36															
						17	SS	71	17	100	⊕				
37					636.73										
			End of Borehole.		36.88										
38															
39															
40															

PID ppm: 2, 4, 6, 8

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

WATER CONTENT PERCENT: Wp, W, Wl; NP - Non-Plastic; 10, 20, 30, 40

DEPTH SCALE
1 : 50

SOIL CLASSIFICATION SYSTEM: GACS
LOGGED: AGH
CHECKED: AGH

Golder Associates

National IM Server:GINT_GAL_NATIONALIM Unique Project ID: Output Form:BC_BOREHOLE (ENVIRO) RY James 9/6/17

R01

PROJECT No.: 10-1436-0085

LOCATION: R-01 Alaska Highway

RECORD OF MONITORING WELL: R-01-MW10-01

SHEET 1 OF 1

DATUM: N/A

DRILLING DATE: September 29, 2010

DRILLING CONTRACTOR: Geotech Drilling Services Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface													Stickup =
0	Fraste Mito DR225 Air Rotary	Dense, moist, dark brown, silty SAND, some organics, some gravel, contains cobbles. - no odour or staining.		0.00	1	AS			⊕						Concrete
1		Dense, moist, dark brown, silty fine SAND, trace organics, trace fine gravel. - no odour or staining.		0.81	2	AS			⊕						
		Dense, moist, grey-brown, fine to medium SAND. - no odour or staining. - wet from 1.83m - 2.29m depth.		1.07	3	AS			⊕						Bentonite Seal
2					4	AS			⊕						Filter Sand
		Dense, moist to wet, grey-brown, medium SAND, trace silt. - no odour or staining.		2.74	5	AS			⊕						
3		Dense, moist to damp, coarse cobbly SAND, some gravel, trace silt. - no odour or staining. - wet at 3.35m depth.		3.05	6	AS			⊕						Slotted PVC Pipe
4		No recovery.		4.57											
5															
6		End of Monitoring Well.		5.79											
7															
8															
9															
10															

DEPTH SCALE

1 : 50

LOGGED: EvK

CHECKED: NJ

PROJECT No.: 10-1436-0085

LOCATION: R-01 Alaska Highway

RECORD OF MONITORING WELL: R-01-MW10-02

SHEET 1 OF 1

DATUM: N/A

DRILLING DATE: September 29, 2010

DRILLING CONTRACTOR: Geotech Drilling Services Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20) / PID ppm (50 100 150 200)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface											Stickup =
0	Fraste Mito DR225 Air Rotary	Firm, moist, grey, gravelly SILT and SAND, contains cobbles, some clay. - no odour or staining. - trace charcoal and organics from 1.22m - 2.29m depth.		0.00	1	AS			⊕				Concrete
1													Bentonite Seal
2					2	AS			⊕				
		Dense, moist, brown to grey-brown, fine silty SAND. - no odour or staining. - grades to fine to medium sand at 2.90m depth.		2.29	3	AS			⊕				Filter Sand
3					4	AS			⊕				
					5	AS			⊕				
4		Loose to dense, dry to moist, grey-brown, medium to coarse SAND and GRAVEL, contains cobbles. - no odour or staining. - wet at 4.88m depth.		3.96	6	AS			⊕				Slotted PVC Pipe
5					7	AS			⊕				
6		End of Monitoring Well.		5.79									
7													
8													
9													
10													

DEPTH SCALE

1 : 50

LOGGED: EvK

CHECKED: NJ

File:N:\BUR-GRAPHICS\PROJECTS\2010\1436\10-1436-0085\DRAFTING\GINTR-01 (MW)\10-1436-0085 (R-01) MW.GPJ Output Form:BC_BOREHOLE (ENVIRO) Template:BC REGION TEMPLATE BETA 1.GDT Library:BC REGION LIBRARY.GLB bdrozdiak 03/21/12

PROJECT No.: 10-1436-0085

LOCATION: R-01 Alaska Highway

RECORD OF MONITORING WELL: R-01-MW10-03

SHEET 1 OF 1

DATUM: N/A

DRILLING DATE: September 29, 2010

DRILLING CONTRACTOR: Geotech Drilling Services Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
0		Ground Surface											Stickup =
	Fraste Mito DR225 Air Rotary	Dense, moist, dark brown, silty, organic SAND, some gravel. - trace hydrocarbon-like odour.		0.00	1	AS							
		Firm, moist, dark brown, sandy SILT, some gravel, some clay with organics. - no odour or staining.		0.15	2	AS							
1		Firm to dense, moist, dark brown, sandy SILT, trace gravel. - no odour or staining.		1.07	3	AS							Bentonite Seal
2		Dense, moist, grey-brown, fine to medium SAND, trace silt. - no odour or staining.		1.98	4	AS							
		Dense, moist, grey-brown, fine silty SAND. - no odour or staining.		2.44	5	AS							Filter Sand
3		Stiff, damp, grey SAND and SILT, trace clay with dark organics. - no odour.		2.90	6	AS							
		Loose to dense, wet, grey-brown, medium to coarse SAND, trace to some silt.		3.35	7	AS							Slotted PVC Pipe
4													
		End of Monitoring Well.		4.57									
5													
6													
7													
8													
9													
10													

PID ppm: 5, 10, 15, 20 / 50, 100, 150, 200

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m: 20, 40, 60, 80

WATER CONTENT PERCENT: Wp — W — Wl; 10, 20, 30, 40

DEPTH SCALE

1 : 50

LOGGED: EvK

CHECKED: NJ

PROJECT No.: 10-1436-0085

LOCATION: R-01 Alaska Highway

RECORD OF MONITORING WELL: R-01-MW10-04

SHEET 1 OF 1

DATUM: N/A

DRILLING DATE: September 29, 2010

DRILLING CONTRACTOR: Geotech Drilling Services Ltd.

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.3m	CORE No.	CORE RECOVERY %	PID ppm (5 10 15 20)	PID ppm (50 100 150 200)	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	WATER CONTENT PERCENT Wp W Wl (10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER, STANDPIPE OR THERMISTOR INSTALLATION
		Ground Surface													Stickup =
0	Fraste Mito DR225 Air Rotary	Loose to dense, moist, dark brown, organic SAND and GRAVEL, with leaves and wood fragments.		0.00	1	AS									
		Firm, moist, grey-brown, silty CLAY, some sand, trace gravel. - no odour or staining.		0.15	2	AS									
1		Dense, moist, brown, organic, fine silty SAND. - no odour or staining.		0.91	3	AS									Bentonite Seal
2		Dense, moist to dry, brown, fine to medium SAND. - fragment of rotting wood at 2.74m depth.		1.83	4	AS									Filter Sand
3		Dense, wet, grey-brown, coarse SAND and GRAVEL, contains cobbles. - wet at 3.45m depth.		3.35	5	AS									Slotted PVC Pipe
4		End of Monitoring Well.		4.57											
5															
6															
7															
8															
9															
10															

DEPTH SCALE

1 : 50

LOGGED: EvK

CHECKED: NJ

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location R01, Alaska Highway, BC

Borehole No. : R01-BH16-05

PAGE 1 OF 1

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 26	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	377.331	Borehole Logged By:	CMH/MLC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	378.165	Date Drilled:	2016 08 18
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6521067.803	Easting: 470550.327	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: R01-MW16-05

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND and GRAVEL, fine grained sand, fine and coarse gravel, subrounded, silty, dark brown, loose, dry, rootlets. Between 0.2 m and 0.5 m - hydrocarbon-like odour.			**05-01**		80	55
1	SILT, some sand, fine grained, trace gravel, dark brown, soft, dry. Below 0.9 m - trace sand, no gravel, dark grey/brown, firm, damp, organics (wood chips, rootlets, peat-like material).			05-02		80	0
2	SAND, fine to medium grained, trace silt, brown, loose, damp. Below 2.1 m - moist.			**05-03** **05-04***			15
3	SILT, trace sand, fine grained, grey, brown striations, soft, medium plasticity, wet. Below 2.4 m - sandy. SAND, fine to medium grained, brown, loose, wet. No recovery.					40	
4							30
5	Hard conglomerate, black, hydrocarbon-like odour (possible asphalt). SAND, fine to medium grained, trace silt, brown, loose, wet. Below 5.5 m - silty, dark grey.			05-05			
6	Below 5.8 m - medium to coarse grained sand, no silt, brown. Bottom of hole at 6.1 m.			05-06			650
7							
8							
9							
10							

10^1 10^2 10^3 10^4

CONCRETE
SAND
BENTONITE
R01-MW16-05
SAND
BENTONITE

NOTES
Bolded sample denotes sample analyzed.
*denotes blind field duplicate.
*05-04 is a blind field duplicate of 05-03.

QA AT 2016 11 21 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location R01, Alaska Highway, BC

Borehole No. : R01-BH16-06

PAGE 1 OF 1

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	n/a	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	377.633	Borehole Logged By:	CMH/MLC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	377.713	Date Drilled:	2016 08 19
Pipe/Slotted Pipe Dia. (m)	0.01/0.01	Northing: 6521180.258	Easting: 470437.666	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

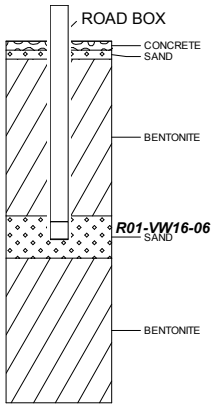
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: R01-VW16-06

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SILT and GRAVEL, fine and coarse gravel, subrounded to subangular, some cobbles, dark brown, stiff, no plasticity, dry, rootlets.			06-01		50	5
1				06-02			200
	SAND, fine grained, some gravel, fine and coarse, subrounded to subangular, some silt, light brown, loose, dry.			06-03			75
2	No recovery.						
3	Bottom of hole at 3.1 m.						
4							
5							
6							
7							
8							
9							
10							



NOTES
Bolded sample denotes sample analyzed.

QA AT 2016 11 21 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location R01, Alaska Highway, BC

Borehole No. : R01-BH16-08

PAGE 1 OF 2

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 26	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	383.935	Borehole Logged By:	CMH/MLC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	384.962	Date Drilled:	2016 08 19
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6521279.965	Easting: 470553.278	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: R01-MW16-08

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SILT, dark brown, very stiff, medium plasticity, damp, rootlets.					100	
1				08-01			5
	Below 1.5 m - dark grey.						
2	Between 1.8 m and 2.4 m - wood debris, dark grey/black, odour.			08-02			390
	Below 2.4 m - trace gravel, fine and coarse, subrounded to subangular.						
3	Below 3.0 m - brown, stiff, moist.					70	
	Below 3.4 m - some gravel, subrounded, cobbles, dark brown, damp.						
4							
	GRAVEL, fine and coarse, subrounded, sandy, fine grained, some silt, cobbles, light brown, loose, dry.			08-03			60
5	SILT, trace gravel, fine and coarse, subrounded to subangular, dark brown, very stiff, medium plasticity, damp.						
6	Below 6.1 m - dark grey.					100	
	Between 6.7 m and 7.3 m - stiff, organics (rootlets/sticks), black, spongy, peat-like inclusions.						
7				08-04			25
	Below 7.3 m - dark brown.						
	Below 7.6 m - trace to some sand, fine grained, grey/brown, stiff, damp to moist.						
8							
9	Below 9.1 m - trace sand, brown, very soft, high plasticity, wet.					100	
10							

CONCRETE
SAND
BENTONITE
R01-MW16-08
SAND

NOTES
Bolded sample denotes sample analyzed.

QA AT 2016 11 21 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location R01, Alaska Highway, BC

Borehole No. : R01-BH16-08

PAGE 2 OF 2

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 26	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	383.935	Borehole Logged By:	CMH/MLC
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	384.962	Date Drilled:	2016 08 19
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6521279.965	Easting: 470553.278	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

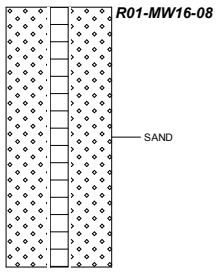
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: R01-MW16-08

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SILT, trace gravel, fine and coarse, subrounded to subangular, dark brown, very stiff, medium plasticity, damp. *(continued)*						
11							
	SAND, fine to medium grained, brown, loose, wet.						
12	Below 11.9 m - medium to coarse grained sand.			08-05			175
	Bottom of hole at 12.2 m.						
13							
14							
15							
16							
17							
18							
19							
20							



NOTES
Bolded sample denotes sample analyzed.

QA AT 2016 11 21 Print Date:2016-12-23

U27

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-06

PAGE 1 OF 2

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 27	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	936.417	Borehole Logged By:	MAG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	937.219	Date Drilled:	2016 08 27
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6508437.790	Easting: 390044.241	Log Typed By:	NDS

Drilling Legend: Sample Interval; Vibrasonic

Water/NAPL Levels: Water Level 1; Water Level 2; NAPL; NAPL

Reading within indicated scale; Reading outside indicated scale

Solid PVC; Slotted PVC

Well Name 1: U27-MW16-06

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND, fine to medium grained, trace coarse grained sand, trace gravel, fine and coarse, trace silt, brown, medium dense, some rootlets, some organics.					60	
1	SAND and GRAVEL, fine to medium grained sand, silty, cobbles, dark grey, dense, damp. Below 0.9 m - grey. Below 1.2 m - no cobbles. Between 1.5 m and 1.7 m - crushed rock / gravel, white.			06-01 06-02*			0
2							
3	Between 2.7 m and 3.0 m - silt layer, some sand, some gravel. Between 3.0 m and 3.8 m - cobbles.			06-03		80	10
4							
5	Between 4.4 m and 4.6 m - cobbles. Below 4.6 m - some silt, moist.			06-04			0
6	Below 5.3 m - some medium to coarse grained sand, fine gravel, trace silt, moist to wet. Between 6.1 m and 6.7 m - no recovery.					60	
7	Below 6.7 m - some silt.						
8	Below 7.9 m - silty.						
9	Below 8.8 m - grey, moist to wet.			06-05		30	40
10	Below 9.1 m - cobbles.						

Soil Vapour (ppm) scale: 10^1 10^2 10^3 10^4

CONCRETE
SAND
BENTONITE
SLOUGH
BENTONITE
U27-MW16-06
SAND

NOTES
Bolded sample denotes sample analyzed.
*denotes blind field duplicate.
*06-02 is a blind field duplicate of 06-01.

QA MAG 2016 10 26 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-06

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 27	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	936.417	Borehole Logged By:	MAG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	937.219	Date Drilled:	2016 08 27
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6508437.790	Easting: 390044.241	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

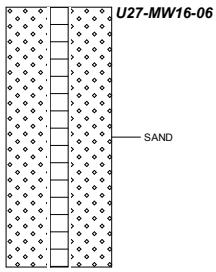
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: U27-MW16-06

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SAND and GRAVEL, fine to medium grained sand, silty, cobbles, dark grey, dense, damp. *(continued)* Below 10.1 m - trace silt, some cobbles, brown, wet.						
11				06-06			0
	SAND, medium grained, trace gravel, fine, trace silt, brown, medium dense, wet.			06-07			0
12	Bottom of hole at 12.2 m.						
13							
14							
15							
16							
17							
18							
19							
20							



NOTES
Bolded sample denotes sample analyzed.
*denotes blind field duplicate.
*06-02 is a blind field duplicate of 06-01.

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-07

PAGE 1 OF 1

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 27	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	933.282	Borehole Logged By:	MAG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	934.079	Date Drilled:	2016 08 27
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6508480.454	Easting: 389996.912	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: U27-MW16-07

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND, GRAVEL and ORGANICS, wet.			07-01		92	300
	GRAVEL, trace silt, brown.						
1	SAND and GRAVEL, fine to medium grained sand, fine and coarse gravel, some cobbles, trace silt, grey, moist. Below 0.8 m - silty, damp.						
	Between 1.4 m and 1.5 m - crushed rock, white.					80	
2				07-02			0
3	Between 3.0 m and 3.4 m - gravelly.					85	
	Between 3.4 m and 3.7 m - dark grey, wet.						
4							
5	At 4.9 m - crushed rock, boulders, dry.						
	At 5.5 m - some coarse grained sand, trace silt, olive grey, wet.						70
6				07-05			
	Between 6.1 m and 6.7 m - cobbles/gravels.						
7							
	At 7.6 m - coarse grained sand, fine gravel, trace silt, olive grey, wet.			07-03			220
8	Below 7.9 m - some silt.						
9				07-04			170
	Bottom of hole at 9.1 m.						
10							

CONCRETE
SAND
BENTONITE
SLOUGH
BENTONITE
U27-MW16-07
SAND

NOTES
Bolded sample denotes sample analyzed.

QA MAG 2016 10 26 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-08

PAGE 1 OF 1

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	2016 08 27	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	927.571	Borehole Logged By:	MAG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	928.351	Date Drilled:	2016 08 27
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6508718.994	Easting: 389895.028	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: U27-MW16-08

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	No recovery.					50	0
1	SAND and GRAVEL, fine to medium grained sand, fine and coarse gravel, silty, some cobbles, medium dense, moist.			08-01			
2	At 1.8 m - crushed rock, white.						
3	Below 3.0 m - trace silt.					40	
4	Between 4.6 m and 4.9 m - silty, wet.						
5	Between 4.9 m and 5.5 m - coarse grained sand seam, fine gravel.			08-02			35
6	Between 6.1 m and 7.3 m - cobbles.					40	
7							
8							
9	SAND, medium grained, trace gravel, trace silt, wet.						
	Bottom of hole at 9.1 m.						
10							

Soil Vapour (ppm): 10^1 10^2 10^3 10^4

CONCRETE
SAND
BENTONITE
U27-MW16-08
SAND
BENTONITE

NOTES
Bolded sample denotes sample analyzed.

QA MAG 2016 10 26 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-09

PAGE 1 OF 1

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	n/a	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	932.644	Borehole Logged By:	MAG
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	932.693	Date Drilled:	2016 08 27
Pipe/Slotted Pipe Dia. (m)	0.01/0.01	Northing: 6508517.746	Easting: 390008.103	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: U27-VW16-09

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
0	SAND, fine to medium grained, silty, dark brown, medium dense, moist, organics.			09-01 09-02*			0
1	Below 0.2 m - some silt, brown.						
	Below 1.4 m - silty.			09-03			0
	Bottom of hole at 1.5 m.						
2							
3							
4							
5							
6							
7							
8							
9							
10							

CONCRETE
SAND
BENTONITE
SAND
U27-VW16-09

NOTES
Bolded sample denotes sample analyzed.
*denotes blind field duplicate.
*09-02 is a blind field duplicate of 09-01.

QA MAG 2016 10 26 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-10

PAGE 1 OF 2

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	n/a	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	942.493	Borehole Logged By:	SJWM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	943.389	Date Drilled:	2016 09 09
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6508831.096	Easting: 390248.109	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: U27-MW16-10

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm)
0	SAND, fine grained, brown, damp to moist, organics, roots.					100	
1	SAND and GRAVEL, fine to coarse grained sand, fine and coarse gravel, subangular to rounded, some cobbles, dark grey, loose, damp to moist. Between 0.9 m and 1.1 m - fine grained sand, dense, trace roots.			**10-01**			0
2	Below 1.8 m - damp.						
3	Between 2.4 m and 3.0 m - dry.					100	
4	At 3.7 m - boulder.						
5							
6	Below 5.5 m - fine grained sand, some silt, dense.					100	
7							
8							
9						100	
10							

10^1 10^2 10^3 10^4

CONCRETE
SAND
BENTONITE
SLOUGH
BENTONITE
U27-MW16-10
SAND

NOTES
Bolded sample denotes sample analyzed.

QA MAG 2016 10 26 Print Date:2016-12-23

SNC·LAVALIN

Client
Public Works & Government Services Canada

Location
Location U27, KM 615, Alaska Highway, BC

Borehole No. : U27-BH16-10

Drilling Contractor	Geotech Drilling Services Ltd.	Date Monitored	n/a	Project Number:	640098
Drilling Method	Vibratory Sonic	Ground Surface Elev. (m)	942.493	Borehole Logged By:	SJWM
Borehole Dia. (m)	0.15	Top of Casing Elev. (m)	943.389	Date Drilled:	2016 09 09
Pipe/Slotted Pipe Dia. (m)	0.05/0.05	Northing: 6508831.096	Easting: 390248.109	Log Typed By:	NDS

Drilling Legend
- Sample Interval
- Vibrasonic

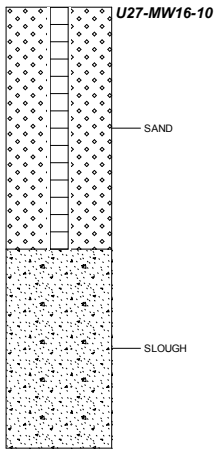
Water/NAPL Levels
- Water Level 1
- Water Level 2
- NAPL
- NAPL

Reading within indicated scale
Reading outside indicated scale

Solid PVC
Slotted PVC

Well Name 1: U27-MW16-10

Depth in Metres	Soil Description	Stratigraphy Plot	Sample Interval Core Run	Sample Number	Blow Count	% Recovery	Soil Vapour (ppm) 10^1 10^2 10^3 10^4
10	SAND and GRAVEL, fine to coarse grained sand, fine and coarse gravel, subangular to rounded, some cobbles, dark grey, loose, damp to moist. *(continued)*					100	
11							
12				10-02			0
13							
14	Bottom of hole at 13.7 m.						
15							
16							
17							
18							
19							
20							



NOTES
Bolded sample denotes sample analyzed.