Public Works and Government Services Canada

Requisition No. EZ897-170083/A

SPECIFICATIONS
for

Sikanni Building Move and Remediation

Sikanni Maintenance Camp, Kilometre 254 Alaska Highway, BC

Project No. R.018391.002

APPROVED BY:

Regional Manager ES Date

Construction Safety Coordinator Date

TENDER:

Project Manager Date

Real Property Services Branch, Professional and Technical Services, Pacific Region
#641 – 800 Burrard Street, Vancouver, B.C. V6Z 2V8

Part 1 General

1.1 Introduction

This specification is for relocation of the existing maintenance building, three above ground storage tanks (ASTs), two propane tanks, hydro poles and above ground power line, remedial excavation of petroleum-hydrocarbon (PHC) soil, screening of excavated soil, placement of PHC-contaminated soil in the onsite Biocell and backfilling at the Sikanni Maintenance Camp (the site) owned by Public Works and Government Services Canada (PWGSC) (the Site Owner).

The Sikanni Maintenance Camp (SMC) is located at kilometre (km) 254 of the Alaska Highway, British Columbia (BC).

Prior to remediation, the maintenance garage, generator shed, ASTs, propane tanks, power poles and power line will be permanently relocated to the new operations area approximately 150 m north-west of the current maintenance garage location. The new operations area will require backfilling, compaction, and grading to include a 10m buffer around it to the north. Remediation will consist of the excavation, screening and placement of the PHC-contaminated soil in the onsite Biocell and backfilling the excavation. All work is to be completed before September 15, 2016.

1.2 Background

The SMC is located in northeastern BC at km 254 of the Alaska Highway on the south side of the Sikanni River, approximately 185 km north of Fort St. John and 200 km south of Fort Nelson. The site location is shown on Drawing 1 in Appendix A.

The original SMC was constructed on the north side of the Sikanni River in 1942 and was jointly operated by the American and Canadian Armed Forces. On April 1, 1964, responsibility for the SMC was transferred to PWGSC. The SMC was moved to its current location in the 1980s when the Alaska Highway was re-routed.

The SMC is approximately 26 hectares in size and is bordered by the Alaska Highway to the north, east, and south, by the Sikanni River to the northwest, and by forest to the southwest. A site plan is included as Drawing 2 in Appendix A. Site photographs are included in Appendix B.

The topography of the site consists of four main benches. The upper bench, located in the southern portion of the site, is occupied by residential trailers and water system shed. Moving north, the second bench is occupied by the maintenance garage, a new generator shed (for on-site power generation), an old generator shed, a sign shed, three ASTs, a fuel dispensing pump, and two propane tanks (for heating the maintenance garage). The third bench is occupied by the salt shed and salt/sand stockpiles. The lowest bench, located in the northern portion of the site, is used to store old vehicles, equipment, metal debris, concrete debris, old batteries, old drums and a relocated AST. The Biocell is located on the forth bench. The land to the north of the fourth (lowest) bench slopes steeply down toward the Sikanni River.

The SMC is currently being maintained by Emcon Services Inc. (Emcon, the Site User). Emcon runs highway maintenance activities (i.e. sand and salt loading, road repair) and equipment maintenance year-round in the area of the site.

The Site User will remove surface debris and equipment in the excavation area (as shown on Photograph 6), the sign shed, and the old diesel generator shed prior to the start of remediation.

Employees of Emcon live at the SMC year-round. A water well is located onsite. On-site power and water are not provided to the remediation Contractor.

Several Environmental Site Assessments (ESAs) have been conducted at the SMC site from 2002 to 2013 by SLR Consulting (Canada) Ltd. (previously operated as SEACOR Environmental Inc.), Pottinger Gaherty Environmental Consultants Ltd., Hemmera and PWGSC. The SMC was found to contain PHC, polycyclic aromatic hydrocarbon (PAH), metals, and salt-impacted soil and groundwater resulting from site activities.

In 2013, SLR conducted a Supplemental Site Investigation to further investigate the extent of PHC contamination in soil and groundwater, which was used as a basis for estimating volumes of PHC contamination in soil.

PAH, metals, and salt-impacted soil will be assessed through a risk assessment. Remediation of site PAH, metals, and salt-impacted soil is outside the scope of this remediation.

1.3 Work Covered By Contract Documents

Work under this Contract includes the following:

.1 The following is a general summary of the Work included in this Project with respect to building and building services relocation as shown on the drawings and as described in the specifications. The Work includes but is not limited to the following:

.2 Health and Safety Plan. Submit site-specific project Health and Safety Plan and emergency procedures to PWGSC within 5 working days of award. Provide work area delineation plans to comply with Work Safe BC Prime Contractor requirements.

.3 Locate and protect all known and unknown buried services on and adjacent to the site.

.4 Grading and any necessary maintenance of the gravel access road from km 258 to the Man and Beast Pit prior to start of Work, after completion of Work, and any other times necessary to maintain the road is useable condition.

.5 Backfill, compaction, and grading the infrastructure and AST relocation area and 10m buffer around it (as shown on Drawing 3) and soil compaction testing by a geotechnical engineer prior to building relocation.

.6 Proposed Fuel Storage and Transfer Containment Slab - In accordance with current environmental protection practices, a new exterior reinforced concrete storage and refueling slab is to be built to provide protection to the site from the Aboveground Storage Tanks (AST's) to be relocated with the building and refueling and maintenance activities.

.7 See the drawings that accompany the specification documents for the approximate location and size of the proposed containment slab. The containment slab is to be drained by drainage system including an oil water separator. The intent of the containment slab is to reduce the risk of contaminating the ground or natural water courses together with appropriate operation and maintenance procedures. It is not the intention that it provides secondary containment to the AST's.

.8 Above-ground Storage Tanks (AST's) - An existing 35,000 L Diesel AST, 55,000 L Bitumen AST, and a 2,500 L Waste Oil AST are to be relocated on a proposed containment slab adjacent to the related maintenance building. Relocation work is to also include the installation of services serving these tanks such as monitoring and leak detection systems in accordance with Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Above Ground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products PN 1326 and other relevant standards.

.9 Propane Tanks - Relocate two existing 1,900 L above ground propane tanks, associated services and protective concrete jersey barriers. Propane tanks are to be reconnected to heating services in the maintenance building.

.10 Relocate the existing power poles, above ground power line, and associated structures to the new location at the site as shown on Drawing 3 in Appendix A to similar specifications (as a minimum height, spacing, etc) as currently exists.

.11 Maintenance Building Relocation - The existing maintenance building at the Sikanni Highway Maintenance Camp is to be relocated to allow ground remediation works to take place at the camp site. The new location at the site as shown on Drawing 3 in Appendix A. The existing maintenance building structure, and other building elements, are described in Scouten Engineering drawings 1027-02 G-101, C-101 to C103, and S-101 to S-103. The maintenance building is a pre-engineered steel framed type structure with exterior profiled metal cladding. The building appears to be founded on reinforced concrete foundations. The project requires the existing maintenance building to relocated, and therefore the construction of new building foundations and an interior partitioned office space, mezzanine floor, mezzanine floor access stairs and associated non-structural partitions, doors and windows to approximately match the existing interior of the maintenance building. The new floor slab for the building is to be designed to allow water and snow collected on vehicles to drain to the new oil-water separator (see the description of the proposed Fuel Storage and Transfer Containment Slab below). Following the maintenance building relocation, the existing foundations are to be demolished and removed from site.

.12 Generator and Seacan Enclosure Relocation - The existing generator together with its Seacan enclosure is to be relocated and related services re-routed. The generator and enclosure is to be placed on a new reinforced concrete slab-on-grade foundation in its proposed new location.

.13 Commissioning (hook up) of the existing power system to the onsite facilities after the power lines are re-routed to the new structure locations.

.14 Construct a new mezzanine inside the Maintenance Garage after relocation.

.15 Excavate and transport to the onsite Biocell approximately 6,920 m^3 of hydrocarbon-contaminated soil as detailed in Section 1.4, below. The maximum depth of excavation is approximately 6 m. Approximately 1,385 m^3 of the sand

and gravel soil, excavated from surface to between approximately 1.0 and 2.0 m depth, will be screened with a 19 mm (¾") screener prior to transport to the Biocell. An additional approximately 25 m^3 of PHC-contaminated soil with concentrations exceeding the BC Hazardous Waste Regulation (HWR) will be transported offsite for disposal.

.16 Construction of dewatering system and wastewater storage and treatment system for contaminated waters generated during soil remediation work, including separation, recovery and elimination of free-phase hydrocarbons, if encountered. The treatment system must consist of a minimum of two water storage tanks and capable of treating liquid/solid mixtures while not causing delay to dewatering operations. A minimum storage capacity of approximately 30,000 L for each tank is required.

.17 Water from the Water Treatment Facility will be transferred to the storage tanks prior to discharge for sampling and characterization. It is the responsibility of the Contractor to sample water in the storage tanks for hydrocarbons prior to discharge and have that samples analyzed by a CALA certified laboratory. The laboratory results of the water stored in the tanks must be provided to the Departmental Representative and accepted prior to discharge. For the laboratory results to be valid, no additional water can be added to the storage tank between the time of sampling and the time of discharge. The discharge location must be accepted by the Departmental Representative.

.18 Tilling / turning of the material in the Biocell as described in Section 02 61 00 01. This will include the addition of soil amendments and water as necessary.

.19 Excavation and/or Biocell dewatering, collection, and treatment of hydrocarbon-impacted water. Treated water infiltration onto the site will be completed once treatment of water to applicable standards / guidelines has been confirmed by laboratory analytical results and as directed by the Departmental Representative.

.20 Placement and compaction of backfill to geotechnical specifications. Backfill will consist of geotechnically suitable screened 19 mm (¾") overs, imported backfill provided by the Contractor, and backfill from two locations provided by PWGSC 1) the Man and Beast Pit, located down a road to the east of km 258 of the Alaska Highway (a distance of approximately 17 km from the site); and 2) from the site, within 500m of the excavation. The location of the Man and Beast Pit and route from the SMC site is shown on Drawing 7. The Contractor will be responsible for screening with a 38 mm screen and loading the backfill at the pit and within the site, transporting the backfill from the pit and within the site to the backfill area, and placement and compaction of the backfill onsite.

.21 Repair and re-instate to their original condition any utilities, structures if damaged, tanks or other infrastructure.

.22 The general Electrical Scope of Work consists of the relocation of the existing maintenance building, generator building and the extension of electrical services required as a result of the relocation. Electrical requirements for the relocation are located in the NRS Engineering Ltd. Division 16 Section 16010 General Provision in Appendix D.

.23 The intent of the project scope of work is to design and build new construction in accordance with current Building Codes and Guidelines. Because of the nature of this project it is not the intent that all aspects of the relocated, existing building and other work included in this scope will be upgraded to meet current Building

Codes and Guidelines unless they represent a risk to life safety. An example of the above project limitations would the thermal insulation of the relocated building. It is beyond the scope of this project to upgrade the building insulation to meet the current energy efficiency requirements of the British Columbia Building Code.

.24 Final Site inspection after completion of work covered under the contract.

1.4 Estimated Excavation Volumes

A total of approximately 6,920 m^3 of PHC-contaminated soil will be excavated and placed in the Biocell. Approximately 1,385 m^3 of the PHC-contaminated soil will be excavated, temporarily stockpiled onsite, and screened with a 19 mm (¾") screener. The screened soil will then be placed in the Biocell. The screened 19 mm (¾") overs will be temporarily stockpiled onsite and used as backfill after excavation is complete.

An additional approximately 25 m^3 of PHC-contaminated soil with concentrations exceeding the BC Hazardous Waste Regulation (HWR) will be transported offsite for disposal.

The following table summarizes the excavated soil volumes at the SMC by soil destination:

Sikanni Maintenance Camp Summary of Excavated Soil Volumes and Soil Destinations

Soil Type	Screened? (Y/N)	Soil Destination	Pre-screened In-Situ Volume (m^3)
Hydrocarbon-impacted soil to Biocell	Yes	Biocell	1,385
Hydrocarbon-impacted soil to Biocell	No	Biocell	5,535
Hydrocarbon-impacted soil > BC HWR for offsite disposal	No	Offsite disposal	25
		Total	6,945

The current and new maintenance garage locations are shown on Drawing 3 in Appendix A.

A drawing showing the estimated remedial zone and two subsurface cross-sections are presented in the Drawings 4 through 6 in Appendix A.

1.5 Work Done Under Separate Contract

.1 The following Work is the responsibility of the Site User, and will be completed under separate contract.

.1 The decommissioning and disposal of the sign shed and the old diesel generator shed.

.2 Movement of Site User (Emcon) tools and equipment from the existing Maintenance Garage location into a temporary secured container and, after the building is relocated, movement of the tools and equipment into the new Maintenance garage location.

1.6 Work By Others

.1 Co-operate with the Site Owner, Owner Representative, Site User, and other Contractors in carrying out their respective works and carry out instructions from the Departmental Representative.

.2 Co-ordinate work with that of Site User and other Contractor and Consultants. If any part of work under this Contract depends for its proper execution or result upon work of another Contractor, report promptly to Departmental Representative, in writing, any defects which may interfere with proper execution of the Work.

1.7 Work Sequence

.1 Construct Work in stages to accommodate Owner's and User's continued use of premises during Work.

.2 Co-ordinate Progress Schedule and co-ordinate with Owner and User during construction.

.3 Construct Work in stages to provide for continuous Maintenance Camp usage. Do not close off User's access to facilities until use of one stage of Work will provide alternate usage.

.4 Maintain fire access/control.

1.8 Contractor Use of Premises

.1 Moderate restricted use of site as it is an active Alaska Highway Maintenance Camp. Owner and User will occupy the SMC premises during entire Work period for execution of normal operations.

.2 Limit use of premises for storage to allow:

.1 User occupancy (residential trailers).

.2 Work by other Contractors.

.3 Co-ordinate use of premises under direction of Departmental Representative.

.4 Provide work area delineation plans and fencing to comply with Work Safe BC Prime Contractor requirements.

.5 Repair or replace portions of existing Work, which have been altered during construction operations to match existing or adjoining Work, as directed by Departmental Representative.

.6 At completion of operations condition of existing Work: equal to or better than that which existed before new Work started.

1.9 Owner and User Occupancy

.1 Owner and User will occupy the SMC premises during entire Work period for execution of normal operations.

.2 Co-operate with Owner and User in scheduling operations to minimize conflict and to facilitate Owner's and User's usage.

1.10 Furnished Items

.1 Site User Responsibilities:

.1 Removal of equipment and debris in proposed work areas, providing available utility location information to the Contractor, safety requirements, and any site-specific work policies.

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review utility information, Maintenance Shop, cross-sections, and Drawings. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Inspect deliveries; record shortages, and damaged or defective items.

.5 Handle products at site, including uncrating and storage.

.6 Protect products from damage.

.7 Provide installation inspections required by public authorities.

.8 Repair or replace items damaged by Contractor or subcontractor onsite (under their control).

1.11 Alterations, Additions or Repairs to Existing Building

.1 Comply with requirements Section 01 35 29.14 [Health and Safety for Contaminated Sites] regarding the results of the building materials survey in Appendix G.

.2 The wooden mezzanine inside the existing Maintenance Building will be deconstructed and materials disposed of off-site.

.3 A new foundation and fuelling containment pad, and oil water separator will be constructed for the maintenance building as described in Section A1010 [Standard Foundations], A1030 [Slab on Grade], B1010 [Floor Construction] and D2030 [Sanitary Waste].

.4 The existing Maintenance Building will be relocated to another location at the site, as shown on Drawing 3 and described in Section G1020 [Site Demolition and Relocations].

.5 A new wooden mezzanine will be constructed inside the Maintenance Building at the new location as described in Section G1020 [Site Demolition and Relocations] and C2012 [Interior Stairways].

.6 Execute Work with least possible interference or disturbance to Owners, Users, and normal use of premises. Arrange with Departmental Representative to facilitate execution of Work.

1.12 Above Ground Power Line Rerouting

.1 The existing above ground power line be rerouted to the new location of the Maintenance Building and to any other required onsite locations, as described in Section G1020 [Site Demolition and Relocations] and the NRS Engineering Ltd. Division 16 Section 16010 General Provision in Appendix D. Pole spacing and power line height to be at minimum similar specifications as currently exists.

1.13 Existing Services

.1 Notify Departmental Representative, Users, and utility companies of intended interruption of services and obtain required permission.

.2 Where Work involves breaking into or connecting to existing services, provide Departmental Representative and User 48 hours notice for necessary interruption of mechanical or electrical service throughout course of Work. Minimize duration of interruptions.

.3 Provide alternative routes for personnel and vehicular traffic.

.4 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.

.5 Submit schedule to and obtain approval from Departmental Representative for any shut-down or closure of active service or facility including power and communications services. Adhere to accepted schedule and provide notice to affected parties.

.6 Provide temporary services to maintain critical systems.

.7 Provide adequate bridging over trenches to permit normal traffic.

.8 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.

.9 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner accepted by authorities having jurisdiction.

.10 Record locations of maintained, re-routed and abandoned service lines.

.11 Construct barriers in accordance with Section 01 56 00 [Temporary Barriers and Enclosures].

1.14 Documents Required

.1 Maintain onsite, one copy each document as follows:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Meeting Addenda and Minutes.
- .4 Change Orders.
- .5 Other Modifications to Contract.

.6 Field Test / Inspection Reports.

.7 Copy of Accepted Work Schedule.

.8 Health and Safety Plan and Other Safety Related Documents.

.9 Other documents as specified.

END OF SECTION

Part 1 General

1.1 Access and Egress

.1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.

1.2 Use of Site and Facilities

.1 Owner and/or Site User will occupy the SMC premises during entire Work period for execution of normal operations. Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Where security is reduced by Work, provide temporary means to maintain security.

.3 Closures: protect work temporarily until permanent enclosures are completed.

1.3 Alterations, Additions or Repairs to Existing Building

.1 Comply with requirements Section 01 35 29.14 [Health and Safety for Contaminated Sites] regarding the results of the building materials survey in Appendix G.

.2 The wooden mezzanine inside the existing Maintenance Building will be deconstructed and materials disposed of off-site.

.3 A new foundation and fuelling containment pad, and oil water separator will be constructed for the maintenance building as described in Section A1010 [Standard Foundations], A1030 [Slab on Grade], B1010 [Floor Construction] and D2030 [Sanitary Waste].

.4 The existing Maintenance Building will be relocated to another location at the site, as shown on Drawing 3 and described in Section G1020 [Site Demolition and Relocations].

.5 A new mezzanine will be constructed inside the Maintenance Building at the new location as described in Section G1020 [Site Demolition and Relocations] and C2012 [Interior Stairways].

.6 Execute Work with least possible interference or disturbance to Owners, Users, and normal use of premises. Arrange with Departmental Representative to facilitate execution of Work.

.7 All building relocation work will be conducted in accordance with the recommendations of the SNC-Lavalin Regulated Building Material Survey, included in Appendix G.

1.4 Special Requirements

.1 Submit schedule in accordance with Section 01 32 16.07 [Construction Progress Schedules - Bar Chart].

.2 Keep within limits of work and avenues of ingress and egress as defined by the Contractor and Departmental Representative.

.3 Work shall be conducted between the hours of 07:00 and 19:00. Work outside those hours must be accepted in advance by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 Administrative

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

.2 Contractor will prepare agenda for meetings.

.3 Distribute written notice of each meeting 5 days in advance of meeting date to Departmental Representative.

.4 Contractor will provide physical space, make arrangements for meetings onsite, and preside at meetings.

.5 Contractor will record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.6 Contractor will reproduce and distribute copies of the minutes within 24 hours after meetings and transmit to meeting participants, PWGSC, Departmental Representative and affected parties not in attendance.

.7 Representative of Contractor, Subcontractors, and suppliers attending meetings will be qualified and authorized to act on behalf of the party each represents.

1.2 Preconstruction Meeting

.1 Within 3 working days after award of Contract, request a conference call meeting of parties in Contract to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of PWGSC, Departmental Representative, Contractor, major Subcontractors, and field inspectors will be in attendance.

.3 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.4 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16.07 [Construction Progress Schedules - Bar Chart].

.3 Site preparation work to be completed prior to building relocation.

.4 Schedule of submission of shop drawings and samples. Submit submittals in accordance with Section 01 33 00 [Submittal Procedures].

.5 Requirements for temporary facilities, site signage, offices, storage sheds, utilities, fences, water supply, in accordance with Section 01 52 00 [Construction Facilities].

.6 Delivery schedule of specified equipment.

.7 Site security in accordance with Section 01 56 00 [Temporary Barriers and Enclosures].

.8 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.9 Owner provided products.

.10 Record drawings in accordance with Section 01 33 00 [Submittal Procedures].

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

.13 Insurances, transcript of policies.

1.3 Progress Meetings

.1 During course of Work schedule progress meetings weekly.

.2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.

.3 Notify parties minimum 5 days prior to meetings.

.4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 24 hours after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems which impede construction schedule.

.5 Review of offsite fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules, expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for affect on construction schedule and on completion date.

.12 Other business.

1.4 Final Site Inspection

.1 Upon completion of work, schedule final onsite inspection. Contractor and Departmental Representative are to be in attendance during final inspection.

END OF SECTION

Part 1 General

1.1 Definitions

.1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.

.2 Bar Chart: graphic display of schedule-related information. In typical bar charts, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally, bar charts should be derived from commercially available computerized project management system.

.3 Baseline: original accepted plan (for Project, work package, or activity), plus or minus accepted scope changes.

.4 Construction Work Week: Monday to Sunday, inclusive, will provide seven day work week and define schedule calendar working days as part of Bar Chart submission.

.5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as work days or work weeks.

.6 Master Plan: summary-level schedule that identifies major activities and key milestones.

.7 Milestone: significant event in project, usually completion of major deliverable.

.8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.

1.2 Requirements

.1 Ensure Master Plan and Project Schedule are practical and remain within specified Contract duration.

.2 Plan to complete Work in accordance with prescribed milestones and time frame.

.3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.

.4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 Submittals

.1 Provide submittals in accordance with Section 01 33 00 [Submittal Procedures].

.2 Submit to Departmental Representative within 14 days of Contract award Bar Chart as Master Plan for planning, monitoring and reporting of project progress.

.3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 Project Milestones

.1 Project milestones form interim targets for Project Schedule. Contractor to identify key milestones on Bar Chart.

1.5 Master Plan

.1 Structure schedule to allow orderly planning, organizing and execution of Work as in the Bar Chart.

.2 Departmental Representative will review and return revised schedules within 5 working days.

.3 Revise schedule and resubmit within 5 working days.

.4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.6 Project Schedule

.1 Downtime imposed on the Site Users use of the maintenance garage must be minimized, and total downtime must be less than 14 consecutive days.

.2 All work is to be completed before September 15, 2016.

.3 Develop detailed Project Schedule derived from Master Plan.

.4 Ensure detailed Project Schedule includes, as minimum, milestones and activity types as follows:

.1 Award.

.2 Submission of analytical results for any proposed backfill not supplied by PWGSC.

.3 Permits.

.4 Mobilization.

.5 Site preparation at the new Maintenance Garage building location prior to relocating the ASTs.

.6 Relocation of ASTs and propane tanks.

.7 Power pole and above ground power line re-routing.

.8 Relocation of Maintenance Garage building and associated structures to the new location at the site.

.9 Construction of new mezzanine at the new Maintenance Garage location.

.10 Excavation, screening, and transport of hydrocarbon-contaminated soil to the Biocell.

.11 Tilling / turning of the material in the Biocell, including addition of soil amendments.

.12 Transport of hydrocarbon-contaminated soil exceeding the BC Hazardous Waste Regulation offsite for disposal.

.13 Backfill, compaction and inspection.

.14 Final site inspection and de-mobilization.

1.7 Project Schedule Reporting

.1 Update Project Schedule on weekly basis reflecting activity changes and completions, as well as activities in progress.

.2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

1.8 Project Meetings

.1 Discuss Project Schedule at weekly site meetings as specified in Section 01 31 19 [Project Meetings]. Identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current accepted dates shown on Project Schedule.

END OF SECTION

Part 1 Part 1 General

1.1 Administrative

.1 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 not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal until review is complete.

.3 Present shop drawings, product data, samples and mock-ups in SI Metric units.

.4 Where items or information is not produced in SI Metric units converted values are acceptable.

.5 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 co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific Project will be returned without being examined and considered rejected.

.6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents and stating reasons for deviations.

.7 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.

.8 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.

.9 Keep one reviewed copy of each submission onsite.

1.2 Manifests

.1 A copy of all manifests and/or truck weigh scale documents and/or truck counts for material brought onto, transported on to, or removed from the site are to be provided to the Departmental Representative.

.2 Manifest and/or weigh scale documents are to be completed in accordance with applicable federal and provincial regulations.

1.3 Project Technical Submittal List - Prior to Project Initiation

#	Contractor's Submission	Submitted to PWGSC	Submitted when
1	Health & Safety Plan (Sections 01 11 00, 01 35 29.14, A1030, B1010 and G1020)	Departmental Representative	Within 5 days of Contract Award
2	WorkSafe BC Notice of Project (Section 01 35 29.14)	Departmental Representative	Prior to commencing construction
3	Proof of Good Standing with WorkSafe BC (Section 31 23 33.01)	Departmental Representative	Within 14 days of Contract Award

#	Contractor's Submission	Submitted to PWGSC	Submitted when
4	Progress Meeting Material (01 35 13.43)	Departmental Representative	24 hours prior to scheduled meetings
5	Bar Chart as Master Plan (Section 01 32 16.07)	Departmental Representative	Within 14 days of Contract Award
6	Project Schedule (Section 01 32 16.07)	Departmental Representative	Master Plan acceptance plus 5 days
7	Site Layout Drawings (Section 01 35 13.43)	Departmental Representative	Within 14 days of Contract Award
8	Refueling Containment Pad Design (Section A1010)	Departmental Representative	Within 14 days of Contract Award
9	Equipment Decontamination Pad Design (Section 01 35 13.43)	Departmental Representative	Prior to commencing work
10	Documentation Verifying Hazardous Materials Employees are Trained / Certified (Section 01 35 13.43)	Departmental Representative	Within 14 days of Contract Award
11	Environmental Protection Plan (Section 01 35 43)	Departmental Representative	Within 14 days of Contract Award
12	Construction Facility Site Plan (Section 01 52 00)	Departmental Representative	Within 14 days of Contract Award
13	Proposed water treatment system design (Section 02 61 00 01 and 31 23 33 01)	Departmental Representative	Prior to commencing construction
14	Water laboratory results for treated water (Section 02 61 00 01 and 31 23 33 01)	Departmental Representative	Prior to discharge
15	Proposed Disposal Facilities and Hazardous Waste Permit (Section 02 61 00 01)	Departmental Representative	Within 14 days of Contract Award
16	Proposed Non-PWGSC Backfill Source and Analytical Results (Section 31 23 33.01)	Departmental Representative	Within 14 days of Contract Award
17	Quality Assurance and Quality Control (Section 02 61 00.01, A1030, B1010 and C2012)	Departmental Representative	Within 14 days of Contract Award
18	Excavation Designs (Section 02 61 00.01 and 31 23 33.01)	Departmental Representative	Within 14 days of Contract Award
19	Structural Engineering Drawings (Section A1010, B1010 and C2012)	Departmental Representative	Within 14 days of Contract Award
20	Shop Drawings (Section 01 31 19, A1010, B1010 and G1020)	Departmental Representative	Within 14 days of Contract Award
21	Demolition and Building Relocation Procedures and Plans (Section G1020)	Departmental Representative	Within 14 days of Contract Award and a minimum of two (2) weeks before it is planned to commence any demolition and relocation work (including any preparatory work) on site
22	Concrete Mix Design and Batching Method (Section A1010)	Departmental Representative	Within 14 days of Contract Award
23	Drain System Engineering Drawings (Section D2030)	Departmental Representative	Within 14 days of Contract Award
24	Demolition and Building Relocations Engineering Plans (Section G1020)	Departmental Representative	Within 14 days of Contract Award

#	Contractor's Submission	Submitted to PWGSC	Submitted when
25	Power Relocation Engineering Plans (Section G1020 and NRS Engineering Ltd. Division 16 Section 16010 General Provision in Appendix D)	Departmental Representative	Within 14 days of Contract Award

1.4 Project Technical Submittal List - Closeout Submittals

#	Contractor's Submission	Submitted to PWGSC	Submitted when
1	As-Built Record – Building and Facilities (surveying to be completed by BC Land Surveyor, drawings in AutoCAD 14 format) (Section 01 78 00)	Departmental Representative	At completion of work
2	As-Built Record – Utilities (surveying to be completed by BC Land Surveyor, drawings in AutoCAD 14 format) (Section 01 78 00)	Departmental Representative	At completion of work
3	Record drawing of foundations (Section A1010)	Departmental Representative	At completion of work
4	Schedule B Assurance of Professional Design and Commitment for Field Review (Section A1010)	Departmental Representative	At completion of work
5	Structural Engineer Of Record (SEOR) field review records (Section A1010)	Departmental Representative	At completion of work
6	Schedule C-B Assurance of Professional Field Review and Compliance (Section A1010)	Departmental Representative	At completion of work
7	As-Built Record – Biocell Configuration (surveying to be completed by BC Land Surveyor, drawings in AutoCAD 14 format) (Section 01 78 00)	Departmental Representative	At completion of work
8	Copies of all landfill acceptance certificates (certificates of disposal), manifests and/or truck weigh scale documents and/or truck counts for material brought onto, transported on to, or removed from the site. (Section 01 78 00)	Departmental Representative	At completion of work

END OF SECTION

Part 1 General

1.1 References (latest Edition)

.1 Canada Labour Code: Part 11-Occupational Health and Safety.

.2 Canada Occupation Health and Safety Regulations.

.3 Canadian Environmental Protection Act, S.C.

.4 Controlled Products Regulations.

.5 Inter-provincial Movement of Hazardous Waste Regulations.

.6 National Fire Code of Canada.

.7 Transportation and Dangerous Goods Act.

.8 Canadian Council of Ministers of the Environment (CCME) Documentation.

.9 Canadian Council of Ministers of the Environment. Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil.

.10 British Columbia Environmental Management Act

.11 British Columbia Contaminated Sites Regulation.

.12 British Columbia Hazardous Waste Regulation.

.13 British Columbia Water Act.

.14 British Columbia Groundwater Protection Regulation.

.15 British Columbia Workers Compensation Act.

.16 British Columbia Occupational Health and Safety Regulation.

.17 Land Development Guidelines for the Protection of Aquatic Habitat (Department of Fisheries and Oceans).

1.2 Submittals

.1 Submittals: in accordance with Section 01 33 00 [Submittal Procedures].

.2 Submittals for Progress Meetings: make submittals at least 24 hours prior to scheduled progress meetings as follows:

.1 Updated progress schedule detailing activities. Include review of progress with respect to previously established dates for starting and stopping various stages of Work, major problems and action taken, injury reports, equipment breakdown, and material removal.

.2 Copies of transport manifests, trip tickets, and disposal receipts for waste materials removed from work area.

.3 Weekly copies of site entry and work area logbooks with information on worker and visitor access.

.4 Other information required by Departmental Representative for progress meetings.

.3 Site Layout: within 14 days after Contract award and prior to mobilization to site, submit site layout drawings showing existing conditions and facilities, construction facilities and temporary controls provided by Contractor including following:

.1 Equipment and personnel decontamination areas.

.2 Means of ingress, egress and temporary traffic control facilities. Refer to Section 01 56 00 [Temporary Barriers and Enclosures for traffic control].

.3 Equipment and material staging areas, including Biocell.

.4 Overburden soil stockpile areas.

.5 Haul road from the excavation areas to the Biocell.

.6 Exclusion Zones, Contaminant Reduction Zones, and other zones specified in Contractor's site-specific Health and Safety Plan.

.7 Backfill, compaction, and grading, including contours, required to grade the new Maintenance Building and AST area.

.8 Water storage tanks and water treatment facility.

.4 Equipment Decontamination Pad: submit equipment decontamination pad design to Departmental Representative for review prior to commencing construction.

.5 Submit documentation verifying that any hazardous materials abatement personnel have been trained, tested, and certified to safely and effectively carry out their assigned duties in accordance with Section 01 35 29.14 [Health and Safety for Contaminated Sites].

1.3 Regulatory Requirements

.1 Related Section 01 41 00 [Regulatory Requirements]

.2 Provide erosion and sediment control in accordance with Section 01 35 43 [Environmental Procedures].

.3 Comply with federal, provincial, and local anti-pollution laws, ordinances, codes, and regulations when disposing of waste materials, debris, and rubbish.

.4 Work to meet or exceed minimum requirements established by federal, provincial, and local laws and regulations which are applicable.

.1 Contractor: responsible for complying with amendments as they become effective.

.5 In event that compliance exceeds scope of work or conflicts with specific requirements of contract notify Departmental Representative immediately.

1.4 Sequencing and Scheduling

.1 Do not commence Work involving contact with potentially contaminated materials until decontamination facilities are operational and accepted by Departmental Representative.

.2 Downtime imposed on the Site Users use of the maintenance garage must be minimized, and total downtime must be less than 14 consecutive days.

.3 All work is to be completed before September 15, 2016.

1.5 Equipment Decontamination Facility

.1 Prior to commencing work involving equipment contact with potentially contaminated materials, construct equipment decontamination facility.

.2 Provide, operate, and maintain necessary equipment, pumps, piping, and treatment facility required to collect, contain, and treat equipment decontamination wastewater and sediment and transfer materials to accepted storage facilities.

1.6 Biocell Facilities

.1 The Biocell must be de-watered and prepared by the Contractor prior to receiving soils as per Section 02 61 00.01 [Soil Remediation].

.2 The Biocell currently has a sump at the northwest corner. The sump must be maintained in the Biocell in order to drain saturated soils placed in the Biocell or to collect excess precipitation during rainfall events.

.3 Soil contaminated with petroleum hydrocarbons will be transported to the onsite Biocell.

.4 Once contaminated soil has been placed in the Biocell, any ponded water in the Biocell or water collected in a sump, must be pumped to the water treatment system for treatment and characterization.

1.7 Temporary Stockpile Facilities

.1 For excavated soil requiring screening, provide, maintain, and operate temporary storage/stockpiling facilities as required. Locate temporary stockpile areas as to minimize handling and maximize efficiency.

.2 All stockpiles onsite will be kept to a manageable size as confirmed by the Departmental Representative so that they may be safely covered by a tarp or 6-mil polyethylene liner to protect from wind and rain.

.3 Equip temporary stockpile facilities with tarps or 6-mil polyethylene liners below proposed stockpile locations to prevent contact between stockpile material and ground.

.4 Equip temporary stockpile facility with tarps or 6-mil polyethylene liner capable of covering stockpiled material to protect from wind and rain.

.5 All temporary stockpile facilities are to remain covered until Departmental Representative advises Contractor to screen, place it in the Biocell, dispose of the material offsite, or use it as excavation backfill.

.6 Contractor will ensure that stockpiled material not being actively added to is covered with tarps or 6-mil polyethylene liner and these are secured so they do not blow off. Any stockpiles not fully covered by tarps or 6-mil polyethylene liner must be fixed immediately.

1.8 Water Treatment System Design Requirements

.1 Water Treatment Facilities:

.1 Design and Operating Criteria: design water treatment plant capable of treating water generated from dewatering excavations and work areas (e.g. Biocell) to meet the guidelines listed in Section 1.8.4, below. Capable of removing oil, suspended solids, particulates, LNAPL (light non-aqueous phase liquids), and dissolved phase petroleum hydrocarbons prior to discharge.

.2 Discharge from the water treatment plant will be into an onsite infiltration pond lined with coarse rock capable of infiltrating the necessary volume of water, at a location and at a flow rate as designated by the Departmental Representative.

.3 Ensure that discharged treated water from site is in compliance with applicable guidelines listed in Section 1.8.4, below. Any LNAPL will be collected and drummed (205 L closed-lid drum) for offsite disposal.

.4 Design water treatment operations consisting of a minimum of two water storage tanks (volume approximately 30,000 L each) that is capable of treating liquid/solid mixtures while not causing delay to dewatering operations.

.5 The Contractor will be responsible for ensuring that the water treatment facility, infiltration pond and any piping are kept from freezing or damage and can operate on 24-hour basis if necessary.

.2 Piping: suitable material type, of sufficient diameter, length and structural thickness for purpose intended.

.3 Installation:

.1 Provide labour, materials, and equipment and do work required for setup and construction of water treatment plant.

.2 Following installation of system, implement initial operation test, in accordance with procedures developed by Contractor and submitted to Departmental Representative for review.

.3 Install piping in accordance with manufacturer's instructions and test for leakage prior to commencing dewatering, treating and filtering operations.

.4 Initial Testing: analytical results of treated water will initially be compared to the following standards by Departmental Representative as follows, prior to discharge:

.1 Canadian Drinking Water Quality guidelines (CDWG) for hydrocarbons;

.2 Federal Interim Groundwater Quality Guidelines (Tier 2) for hydrocarbons; and

.3 Total Suspended Solids are less than 100 mg/L.

.5 Operation:

.1 On basis of analytical results obtained by Departmental Representative, make system modifications required for treated water to satisfy discharge criteria, or continue with normal dewatering operations as directed by Departmental Representative.

.2 Operate water treatment plant by experienced, qualified personnel in accordance with manufacturer's instructions and procedures submitted by Contractor and accepted by Departmental Representative.

.3 Operation of the system must continue in inclement weather and be kept from freezing.

.6 Decommissioning/Dismantling:

.1 Decontaminate and remove salvageable components of water treatment plant including water filtering system, pumps, piping, and electrical equipment.

.2 Dispose of non-salvageable equipment and materials at accepted offsite disposal facility as directed by Departmental Representative. Decontaminate salvageable equipment within facility area as required prior to removal from site.

1.9 Wastewater Storage Tanks

.1 Provide, operate, and maintain a minimum of two wastewater storage tanks to store wastewaters. These must be kept from freezing or being damaged.

.2 Wastewater includes water, without the presence of NAPL, collected from excavation and Biocell dewatering operations and water collected from Equipment Decontamination Facility.

.3 Discharges: comply with applicable discharge limitations and requirements; do not discharge wastewaters to site sewer systems that do not conform to or are in violation of such limitations or requirements; and obtain Departmental Representative's approval prior to discharge of wastewater.

.4 Provide pumps and piping to convey collected wastewaters to designated wastewater storage tanks and treatment systems such that treated water quality can be analyzed and treated water quality accepted by Departmental Representative prior to discharge. All pumps and piping must be kept from freezing or being damaged.

.5 Install wastewater storage tanks in locations as directed by Departmental Representative.

.6 Connect pumps, piping, valves, miscellaneous items, and necessary utilities as required for operation of facilities; and protect tanks, valves, pumps, piping, and miscellaneous items from freezing or being damaged.

.7 Do not operate wastewater storage tanks until inspected and accepted by Departmental Representative.

.8 Once the initial treated water results indicate that the treated water meets applicable standards/guidelines as outlined in Section 1.8.4, above, treated water may discharged. Follow-up sampling to confirm treated water quality will be required at the discretion of the Departmental Representative. The Departmental Representative will conduct water quality testing prior to discharge to ensure compliance with applicable regulations. The Contractor should provide contingency for up to 11 days minimum water storage capacity to allow for testing, laboratory analysis, and communication of results.

.9 Do not discharge additional liquids to the filled treated water tank following sampling by Departmental Representative.

.10 Departmental Representative will determine appropriate disposition of wastewaters based on sample analysis.

1.10 Drums

.1 Storage of LNAPL: 200 L steel drums meeting Transportation and Dangerous Goods Act, closable lids, complete with labels for marking contents and date filled.

1.11 Vehicular Access and Parking

.1 Maintenance and Use:

.1 Prevent contamination of access roads or other areas of the site not within the work area as defined by the Contractor and Departmental Representative.

.2 Contractor will not load trucks in a manner that causes spillage onto the loading area.

.3 Contractor will not load trucks with soil such that spillage occurs onto the loading area during transport.

.4 Immediately scrape up debris or material on access roads which is suspected to be contaminated as determined Departmental Representative; transport and place into designated area accepted by Departmental Representative. Clean access roads at least once per shift.

.5 Departmental Representative may collect soil samples for chemical analyses from traveling surfaces of constructed and existing access routes prior to, during, and upon completion of Work. Excavate and dispose of clean soil contaminated by Contractor's activities at no additional cost to PWGSC.

1.12 Dust and Particulate Control

.1 Execute Work by methods to minimize raising dust from Work operations.

.2 Implement and maintain dust and particulate control measures immediately during Work and in accordance with British Columbia requirements.

.3 Provide positive means to prevent airborne dust from dispersing into atmosphere. Use water for dust and particulate control.

.4 Use chemical means for water misting system for dust and particulate control only with Departmental Representative’s prior written approval.

.5 As minimum, use appropriate covers on trucks hauling fine or dusty material. Use watertight vehicles to haul wet materials.

.6 Prevent dust from spreading to adjacent properties.

.7 Departmental Representative will stop work at any time when Contractor's control of dusts and particulates is inadequate for wind conditions present at site, or when air quality monitoring indicates that release of fugitive dusts and particulates into atmosphere equals or exceeds specified levels.

.8 If Contractor's dust and particulate control is not sufficient for controlling dusts and particulates into atmosphere, stop work. Contractor must discuss procedures with Departmental Representative that Contractor proposes to resolve problem. Make necessary changes to operations prior to resuming excavation, handling, processing, or other work that may cause release of dusts or particulates.

1.13 Pollution Control

.1 Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by Work.

.2 Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible onsite.

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

.1 Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.

.2 Owner of pollutant, if known.

.3 Person having control over pollutant, if known.

.4 Departmental Representative.

.4 Contact manufacturer of pollutant if known and ascertain hazards involved, precautions required, and measures used in cleanup or mitigating action.

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

.6 Provide spill response materials including, containers, adsorbent, shovels, and personal protective equipment. Make spill response materials available at all times in which hazardous materials or wastes are being handled or transported. Spill response materials: compatible with type of material being handled.

1.14 Equipment Decontamination

.1 Commence work involving equipment contact with potentially contaminated material only after Equipment Decontamination Facility is operational.

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

.3 Perform equipment decontamination on all vehicles and equipment that contact impacted soil.

.4 Collect all equipment washwater for treatment. Do not allow decontamination water to freeze.

.5 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. Use high-pressure, low-volume, hot water or steam supplemented by detergents or solvents as appropriate and as accepted by Departmental Representative. 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 Zone before removing from site or travelling on clean areas. Perform assessment as directed by Departmental Representative to determine effectiveness of decontamination.

.6 Maintain inspection record onsite which includes: equipment descriptions with identification numbers; time and date of decontamination; and name of inspector with comment stating that decontamination was performed and completed.

.7 Departmental Representative will inspect each piece of equipment after decontamination and prior to removal from site and/or travel on clean areas. Departmental Representative will have right to require additional decontamination to be completed if deemed necessary.

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

.9 Collect decontamination wastewaters and sediments which accumulate on equipment decontamination area. Transfer wastewaters to designated wastewater storage tank and sediments to the Biocell.

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

.11 Have on hand sufficient pumping equipment, of adequate pumping capacity and associated machinery and piping in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment. Maintain piping and connections in good condition and leak-free.

1.15 Water Control

.1 Maintain excavations free of water and snow.

.2 Protect site from standing or running water. Grade site to drain, if required.

.3 Prevent surface water runoff from leaving Work areas.

.4 Do not discharge decontaminated water, surface water runoff, or groundwater which may have come in contact with potentially contaminated material. All wastewater must be directed to the storage tanks and water treatment system.

.5 Prevent precipitation from infiltrating or from directly running off stockpiled materials. Cover stockpiled materials with an 6-mil polyethylene impermeable liner during periods of work stoppage including at end of each working day and as directed by Departmental Representative.

.6 Provide, operate, and maintain necessary equipment appropriately sized to keep excavations, staging pads, and other work areas free from water or snow.

.7 Once material is placed in the Biocell, contain any water that accumulates in the Biocell Sump and transfer to the wastewater storage tanks for treatment and discharge.

.8 Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for operation of pumping equipment.

1.16 Dewatering

.1 Dewater various parts of Work including, without limitation, excavations, structures, foundations, and work areas.

.2 Employ construction methods and precautions that ensure Work, including excavations, is stable, free from disturbance, and free of ponding water.

.3 Provide sufficient and appropriate labour, plant, and equipment necessary to keep Work area free of water including standby equipment necessary to ensure continuous operation of dewatering system.

.4 Departmental Representative will collect samples of treated water as required to confirm treated water meets applicable guidelines/standards prior to discharge.

1.17 Erosion and Sediment Control

.1 Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas, from stockpiles, staging areas, and other work areas. Prevent erosion and sedimentation.

.2 Minimize amount of bare soil exposed at one time. Stabilize disturbed soils as quickly as practical. Strip vegetation, re-grade, or otherwise develop to minimize erosion. Remove accumulated sediment resulting from construction activity from adjoining surfaces, drainage systems, and water courses, and repair damage caused by soil erosion and sedimentation as directed by Departmental Representative.

.3 Provide and maintain temporary measures which may include, silt fences, hay or straw bales, ditches, geotextiles, drains, berms, terracing, riprap, temporary drainage piping, sedimentation basins, vegetative cover, dikes, and other construction required to prevent erosion and migration of silt, mud, sediment, and other debris off site or to other areas of site where damage might result, or that might otherwise be required by Laws and Regulations. Make sediment control measures available during construction. Place silt fences and/or hay or straw bales in ditches to prevent sediments from escaping from ditch terminations.

.4 Hay or Straw Bale: wire bound or string tied; securely anchored by at least 2 stakes or rebar’s driven through bale 300 mm to 450 mm into ground; chinked (filled by wedging) with hay or straw to prevent water from escaping between bales; and entrenched minimum of 100 mm into ground.

.5 Silt Fence: assembled, ready to install unit consisting of geotextile attached to driveable posts. Geotextile: uniform in texture and appearance, having no defects, flaws, or tears that would affect its physical properties; and contain sufficient ultraviolet ray inhibitor and stabilizers to provide minimum 2-year service life from outdoor exposure. Installation must as directed in the DFO document “Land Development Guidelines for the Protection of Aquatic Habitat”.

.6 Net Backing: industrial polypropylene mesh joined to geotextile at both top and bottom with double stitching of heavy-duty cord, with minimum width of 750 mm.

.7 Posts: sharpened wood, approximately 50 mm square, protruding below bottom of geotextile to allow minimum 450 mm embedment; post spacing 2.4 m maximum. Securely fasten each post to geotextile and net backing using suitable staples.

.8 Plan construction procedures to avoid damage to work or equipment encroachment onto water bodies or drainage ditch banks. In event of damage, promptly take action to mitigate effects. Restore affected bank or water body to existing condition.

.9 Installation:

.1 Construct temporary erosion control items as indicated. Actual alignment and/or location of various items as directed by Departmental Representative.

.2 Do not construct bale barriers and silt fence in flowing streams or in swales.

.3 Check erosion and sediment control measures weekly after each rainfall; during prolonged rainfall check daily.

.4 Whenever sedimentation is caused by stripping vegetation, regrading, or other development, remove it from adjoining surfaces, drainage systems, and watercourses, and repair damage as quickly as possible.

.5 Prior to or during Work, Departmental Representative may require installation or construction of improvements to prevent or correct temporary conditions onsite. Improvements may include berms, mulching, sediment traps, detention and retention basins, grading, planting, retaining walls, culverts, pipes, guardrails, temporary roads, and other measures appropriate to specific condition. Temporary improvements must remain in place and in operation as necessary or until otherwise directed by Departmental Representative.

.6 Repair damaged bales, end runs, and undercutting beneath bales.

.7 Unless directed by Departmental Representative, remove temporary erosion and sediment control devices upon completion of Work. Spread accumulated sediments to form a suitable surface for seeding or dispose of, and shape area to permit natural drainage to satisfaction of Departmental Representative. Materials once removed become property of Contractor.

.10 Do not disturb existing embankments or embankment protection, if present.

.11 Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

.12 If soil and debris from site accumulate in low areas, storm sewers, roadways, gutters, ditches, or other areas where in the Departmental Representative's determination it is undesirable, remove accumulation and restore area to original condition.

1.18 Progress Cleaning

.1 Maintain cleanliness of Work and surrounding site to comply with federal, provincial, and local fire and safety laws, ordinances, codes, and regulations.

.2 Co-ordinate cleaning operations with disposal operations to prevent accumulation of dust, dirt, debris, rubbish, and waste materials.

1.19 Final Decontamination

.1 Perform final decontamination of construction facilities, equipment, and materials which may have come in contact with potentially contaminated materials prior to removal from site.

.2 Perform decontamination as specified to satisfaction of Departmental Representative. Departmental Representative will direct Contractor to perform additional decontamination if required.

1.20 Removal and Disposal

.1 Remove surplus materials and temporary facilities from site.

.2 Dispose of non-contaminated waste materials, litter, debris, and rubbish offsite.

.3 Do not burn or bury rubbish and waste materials onsite.

.4 Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner on to the property.

.5 Do not discharge wastes into streams or waterways.

.6 Dispose of following materials at appropriate offsite facility identified by Contractor and accepted by Departmental Representative:

.1 Debris including excess construction material.
.2 Non-contaminated litter and rubbish.
.3 Disposable PPE worn during final cleaning.
.4 Lumber from decontamination pads etc., if necessary.

.7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.

.8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:

.1 Hazardous wastes recycled in manner constituting disposal;
.2 Hazardous waste burned for energy recovery; and
.3 Lead-acid battery recycling.

1.21 Hazardous Waste Disposal

.1 Contaminated Waste Disposal: dispose Contaminated Waste at Disposal Facility identified by Contractor and accepted by the Departmental Representative.

.2 Disposal Facility must:

.1 Be designed, constructed and operated to prevent any pollution from being caused by the facility outside the area of the facility from waste placed in or on land within the facility.

.2 Hold a valid and subsisting permit, certificate, approval, or any other form of authorization issued by a province or territory for the disposal of soil or other material that is Waste Quality.

.3 Comply with applicable municipal zoning, bylaws, and requirements

.3 Dispose material as soon as practical and within 100 Working Days of leaving Site unless otherwise accepted by Departmental Representative.

.4 Material sent to a Disposal Facility must be permanently stored at that facility.

.5 If proposed Disposal Facility is not acceptable to Departmental Representative, identify an alternate Disposal Facility that is acceptable.

.6 Submit Certificates of Disposal for all material disposed offsite.

1.22 Hazardous Waste Transport

.1 Assume ownership of, and be responsible for, Contaminated Waste once it is loaded on a vehicle, barge, or other vessel for transport offsite.

.2 Transport material offsite as soon as practical. Do not unreasonably stockpile material onsite.

.3 Cover material while being transported to prevent release of airborne dust, vapours, or odours, and to prevent saturation and leachate generation from material.

.4 Excess water in soil or sediment must not be allowed to flow out of vehicle or vessel during transport.

.5 Stabilize soil and sediment as necessary.

.6 All vehicles, vessels and operators must be appropriately licensed and equipped to transport Hazardous Waste (HW) soil and sediment.

.7 Barges must be inspected by an independent Marine Surveyor and Submit a copy of the Certificate of Seaworthiness to Departmental Representative.

.8 Manifest and correlate weights of all material transported from Site documenting weight at removal from Site, movement, transfer stations, interim storage and treatment, and weight of material at final Disposal Facility. Submit all manifests, as instructed by the Departmental Representative.

.9 Material transported with discrepancies in manifests must be resolved as required by regulations and as acceptable to the Departmental Representative. Discrepancies include:

.1 No manifest or an incomplete manifest.

.2 The material transported does not match the description in the manifest.

.3 The amount transported differs by more than 5% in the manifest.

.4 The material transported is in a hazardous condition.

1.23 Record Keeping

.1 Maintain bills of ladings for minimum of 375 days from date of shipment or longer period required by applicable law or regulation.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

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. Submit the following:
1.3.3.1. Health and Safety Plan.
1.3.3.2. Copies of reports or directions issued by federal and provincial health and safety inspectors.
1.3.3.3. Copies of incident and accident reports.
1.3.3.4. Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
1.3.3.5. Emergency Procedures.
1.3.3.6. Notice of Project.
1.3.4. The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 Working Days after receipt of the plan.
1.3.5. If changes are required, revise the plan as appropriate and resubmit to Departmental Representative within 5 Working Days.
1.3.6. Submittal of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It will not:
1.3.6.1. Be construed to imply approval by the Departmental Representative.
1.3.6.2. Be interpreted as a warranty of being complete, accurate and legislatively compliant.
1.3.6.3. Relieve the Contractor of his legal obligations for the provision of health and safety on the 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. Canadian Standards Association (CSA) as amended:
1.4.3.1. CSA Z797-2009 Code of Practice for Access Scaffold.
1.4.3.2. CSA S269.1-1975 (R2003) Falsework for Construction Purposes.

1.4.3.3. CSA S350-M1980 (R2003) Code of Practice for Safety in Demolition of Structures.
1.4.3.4. CSA Z462- Workplace Electrical Safety Standard
1.4.4. National Fire Code of Canada 2010 (as amended):
1.4.4.1. Part 5 – Hazardous Processes and Operations and Division B as applicable and required.
1.4.4.2. FCC No. 302, Standard for Welding and Cutting.
1.4.5. American National Standards Institute (ANSI):
1.4.5.1. ANSI A10.3, Operations – Safety Requirements for Powder-Actuated Fastening Systems.
1.4.6. Province of British Columbia:
1.4.6.1. Workers Compensation Act Part 3-Occupational Health and Safety.
1.4.6.2. Occupational Health and Safety Regulation.

1.5. Regulatory Requirements

1.5.1. Comply with codes, acts, bylaws, standards and regulations applicable to the performance of the Work in accordance with the Contract to ensure safe operations at Site.
1.5.2. 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 instruct on the course of action to be followed.

1.6. Worker's Compensation Board Coverage

1.6.1. Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the Final Completion of the Work.
1.6.2. Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.7. Compliance with Regulations

1.7.1. PSPC may terminate the Contract without liability to PSPC where the Contractor, in the opinion of PSPC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
1.7.2. It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the Work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

1.8. Responsibility

1.8.1. Assume responsibility as the Prime Contractor for Work under this Contract.
1.8.2. Be responsible for health and safety of persons onsite, safety of property onsite and for protection of persons adjacent to Site and environment to extent that they may be affected by conduct of Work.

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

1.9. Health and Safety Coordinator

1.9.1. The Health and Safety Coordinator must:

1.9.1.1. Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the Site to perform Work.

1.9.1.2. Be responsible for implementing, daily enforcing, and monitoring the site-specific Health and Safety Plan.

1.9.1.3. Be on Site during execution of Work.

1.10. General Conditions

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

1.10.2. Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the Site:

1.10.2.1. Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.

1.11. Project/Site Conditions

1.11.1. Work at Site will involve contact with:

1.11.2. Contaminants identified in Specifications and environmental reports.

1.11.3. Multi-employer work site.

1.11.4. Federal employees and general public.

1.11.5. See Pre-construction Hazard Assessment

1.12. Work Permits

1.12.1. Obtain specialty permit[s] related to project before start of Work.

1.13. Filing of Notice

1.13.1. The Prime Contractor is to complete and submit a Notice of Project as required by Provincial or Territorial authorities.

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

1.14. Health and Safety Plan

1.14.1. Conduct a site-specific hazard assessment based on review of Contract, required Work, and project Site. Identify any known and potential health risks and safety hazards.

1.14.2. Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:

1.14.2.1. Primary requirements:
1.14.2.1.1. Contractor's safety policy.
1.14.2.1.2. Identification of applicable compliance obligations.
1.14.2.1.3. Definition of responsibilities for project safety/organization chart for project.
1.14.2.1.4. General safety rules for project.
1.14.2.1.5. Job-specific safe work, procedures.
1.14.2.1.6. Inspection policy and procedures.
1.14.2.1.7. Incident reporting and investigation policy and procedures.
1.14.2.1.8. Occupational Health and Safety Committee/Representative procedures.
1.14.2.1.9. Occupational Health and Safety meetings.
1.14.2.1.10. Occupational Health and Safety communications and record keeping procedures.
1.14.2.2. 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 Work.
1.14.2.3. List hazardous materials to be brought onsite as required by Work.
1.14.2.4. Indicate engineering and administrative control measures to be implemented at the Site for managing identified risks and hazards.
1.14.2.5. Identify personal protective equipment (PPE) to be used by workers.
1.14.2.6. Identify personnel and alternates responsible for site safety and health.
1.14.2.7. Identify personnel training requirements and training plan, including site orientation for new workers.
1.14.3. 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.
1.14.4. Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.
1.14.5. Departmental Representative's review: the review of Health and Safety Plan by Public Service and Procurement Canada (PSPC) will not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract.

1.15. Emergency Procedures

1.15.1. List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (ie names/telephone numbers) of:
1.15.1.1. Designated personnel from own company.
1.15.1.2. Regulatory agencies applicable to Work and as per legislated regulations.
1.15.1.3. Local emergency resources.
1.15.1.4. Departmental Representative and site staff.
1.15.2. Include the following provisions in the emergency procedures:
1.15.2.1. Notify workers and the first-aid attendant, of the nature and location of the emergency.

1.15.2.2. Evacuate all workers safely.
1.15.2.3. Check and confirm the safe evacuation of all workers.
1.15.2.4. Notify the fire department or other emergency responders.
1.15.2.5. Notify adjacent workplaces or residences which may be affected if the risk extends beyond the workplace.
1.15.2.6. Notify Departmental Representative and Site staff.
1.15.3. Provide written rescue/evacuation procedures as required for, but not limited to:
1.15.3.1. Work at high angles.
1.15.3.2. Work in confined spaces or where there is a risk of entrapment.
1.15.3.3. Work with hazardous substances.
1.15.3.4. Underground work.
1.15.3.5. Work on, over, under and adjacent to water.
1.15.3.6. Workplaces where there are persons who require physical assistance to be moved.
1.15.4. Design and mark emergency exit routes to provide quick and unimpeded exit.
1.15.5. Revise and update emergency procedures as required, and re-submit to the Departmental Representative.

1.16. Hazardous Products

1.16.1. 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 Representative and in accordance with the Canada Labour Code.
1.16.2. Where use of hazardous and toxic products cannot be avoided:
1.16.2.1. Notify Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents as required.
1.16.2.2. In conjunction with Departmental Representative, schedule to carry out Work during "off hours" when tenants have left the building.
1.16.2.3. Provide adequate means of ventilation as required.
1.16.2.4. The contractor shall ensure that the product is applied as per manufacturers recommendations.
1.16.2.5. The contractor shall ensure that only pre-approved products are brought onto the work site in an adequate quantity to complete the work.

1.17. Hazardous Building Materials

1.17.1. Regulated building materials are present in the maintenance garage, new generator shed, old generator shed, and sign shed as detailed in the SNC-Lavalin regulated building materials report included in Appendix G.
1.17.2. The Contractor is responsible for addressing hazardous building materials concerns, in accordance with WorkSafe BC requirements, during all phases of building preparation, relocation, and reinstatement
1.17.3. The Contractor will comply with all recommendations of the SNC-Lavalin regulated building materials report including:

1.17.3.1. Have a qualified person inspect the site to inspect any asbestos-containing materials that may be handled, disturbed, or removed during the Contractor's planned building relocation approach.
1.17.3.2. Have the inspection results available on-site at all times.
1.17.3.3. Ensure that asbestos-containing materials are safely contained or removed.
1.17.3.4. Development and implementation of a lead-based paint control plan and safe work procedures if work includes removal of lead-based paint.
1.17.3.5. Any light fixtures removed should be inspected for PCBs and managed accordingly.
1.17.4. The Contractor must submit the following documentation to verify that regulated building materials were handled in accordance with applicable regulations:
1.17.4.1. Notice of project for work involving asbestos to be filed with WorkSafe BC.
1.17.4.2. Notice of project to be filed with WorkSafe BC prior to lead abatement.
1.17.4.3. Site-specific work procedures for materials of concern.
1.17.4.4. Letter stating that PCB disposal work was completed.
1.17.4.5. Relevant waste disposal manifests.
1.17.5. Air testing is required after completion of maintenance garage relocation and reinstatement activities to confirm that there are no asbestos fibers present in indoor air.

1.18. Asbestos Hazard

1.18.1. Carry out any activities involving asbestos in accordance with applicable Provincial regulations.

1.19. PCB Removals

1.19.1. Mercury-containing fluorescent tubes and ballasts which contain PCBs are classified as hazardous waste.
1.19.2. Remove, handle, transport and dispose of in accordance with applicable regulations.

1.20. Removal of Lead-Containing Paints

1.20.1. All paints containing TCLP lead concentrations above 5 ppm are classified as hazardous.
1.20.2. Carry out demolition activities involving lead-containing paints in accordance with applicable Provincial regulations.

1.21. Electrical Safety Requirements

1.21.1. Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
1.21.1.1. Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.

1.21.1.2. 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.

1.22. Electrical Lockout

1.22.1. 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.

1.22.2. 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 available for review upon request by the Departmental Representative.

1.22.3. Keep the documents and lockout tags at the site and list in a log book for the full duration of the Contract. Upon request, make such data available for viewing by Departmental Representative or by any authorized safety representative

1.23. Overloading

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

1.24. Falsework

1.24.1. Design and construct falsework in accordance with CSA S269.1- 1975 (R2003).

1.25. Power-Actuated Devise

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

1.26. Fire Safety and Hot Work

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

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

1.27. Fire Protection and Alarm System

1.27.1. Fire protection and alarm systems shall not be:

1.27.1.1. Obstructed.

1.27.1.2. Shut off.

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

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

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

1.28. Unforeseen Hazards

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

1.29. Posted Documents

1.29.1. Post legible versions of the following documents onsite:

1.29.1.1. Health and Safety Plan.

1.29.1.2. Sequence of Work.

1.29.1.3. Emergency procedures.

1.29.1.4. Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.

1.29.1.5. Notice of Project.

1.29.1.6. Floor plans or Site plans.

1.29.1.7. Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the Site for review by employees and workers.

1.29.1.8. Workplace Hazardous Materials Information System (WHMIS) documents.

1.29.1.9. Material Safety Data Sheets (MSDS).

1.29.1.10. List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

1.29.2. Post all Material Safety Data Sheets (MSDS) onsite, 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.

1.29.3. 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 accepted by the Departmental Representative.

1.30. Meetings

1.30.1. Attend health and safety preconstruction meeting and all subsequent meetings called by the Departmental Representative.

1.30.2. Ensure all site personnel attend a health and safety toolbox meeting at the beginning of each shift, which must include:

1.30.2.1. Sign-in of all attendees.

1.30.2.2. Planned Work activities and environmental considerations for that shift.

1.30.2.3. Hazards associated with these Work activities, including environmental hazards (eg potential for hypothermia, heat exhaustion, heat stroke).

1.30.2.4. Appropriate job-specific safe work procedures.

1.30.2.5. Required personal protective equipment (PPE).

1.30.2.6. Appropriate emergency procedures.

1.30.2.7. Review recent accidents on Site, including near misses.

1.30.3. 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.

1.31. Correction of Non-Compliance

1.31.1. Immediately address health and safety non-compliance issues identified by the Departmental Representative.

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

1.31.3. The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time.

1.31.4. Correct non-compliance.

1.32. Hazardous Occurrence Investigation and Reporting

1.32.1. Hazard includes:

1.32.1.1. 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.

1.32.2. Hazardous Occurrence includes:

1.32.2.1. An event occurring at a PSPC 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.

1.32.3. Hazardous Occurrence Investigation and Reporting Procedures:

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

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

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

1.32.3.4. Requires the appointment of a qualified investigator.

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

1.32.4. Fatal or Serious Accidents Procedures:

1.32.4.1. Call 911 to advise the police organization having jurisdiction to secure the scene and investigate the matter.

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

1.32.4.3. No investigation will be conducted at the scene until the police service having jurisdiction has released the scene.
1.32.4.4. No person shall, unless authorized to do so, 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.

1.33. Utility Clearance

1.33.1. The Contractor is solely responsible for utility clearance.
1.33.2. The Contractor will not rely upon Drawings or other information provided with utility locations.

1.34. Personal Protective Equipment Program

1.34.1. Submit Personal Protective Equipment (PPE) program to the Departmental Representative addressing:
1.34.1.1. Donning and doffing procedures.
1.34.1.2. PPE selection based upon Site hazards.
1.34.1.3. PPE use and limitations of equipment.
1.34.1.4. Work mission duration, PPE maintenance and storage.
1.34.1.5. PPE decontamination and disposal.
1.34.1.6. PPE inspection procedures prior to, during, and after use.
1.34.1.7. Evaluation of effectiveness of PPE program, and limitations during temperature extremes, and other appropriate medical considerations.
1.34.1.8. Medical surveillance requirements for personnel assigned to work at Site.
1.34.1.9. 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.
1.34.1.10. 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.
1.34.1.11. Decontamination procedures for both personnel and equipment.
1.34.1.12. 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.
1.34.1.13. Written respiratory protection program for project activities.

1.34.1.14. Procedures dealing with heat and/or cold stress.
1.34.1.15. Spill containment program if waste material is generated, excavated, stored, or managed onsite.

1.35. Offsite Contingency and Emergency Response Plan

1.35.1. Prior to commencing Work involving handling of hazardous materials, develop offsite Contingency and Emergency Response Plan.
1.35.2. 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.

1.36. Personnel Health, Safety, and Hygiene

1.36.1. Training: ensure personnel entering Site are trained in accordance with specified personnel training requirements. Training session must be completed by Health and Safety Officer.
1.36.2. Levels of Protection: establish levels of protection for each Work area based on planned activity and location of activity.
1.36.3. Personal Protective Equipment:
1.36.3.1. Furnish site personnel with appropriate PPE as specified above. Ensure that safety equipment and protective clothing is kept clean and maintained.
1.36.4. Develop protective equipment usage procedures and ensure that procedures are strictly followed by site personnel; include following procedures as minimum:
1.36.4.1. Ensure prescription eyeglasses worn are safety glasses and do not permit contact lenses onsite within work zones.
1.36.4.2. Ensure footwear is steel-toed safety shoes or boots and is covered by rubber overshoes when entering or working in potentially contaminated work areas.
1.36.4.3. Dispose of or decontaminate PPE worn onsite at end of each workday.
1.36.4.4. Decontaminate reusable PPE before reissuing.
1.36.4.5. Ensure site personnel have passed respirator fit test prior to entering potentially contaminated work areas.
1.36.4.6. Ensure facial hair does not interfere with proper respirator fit.
1.36.5. Respiratory Protection:
1.36.5.1. 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.
1.36.5.2. Develop, implement, and maintain respirator program.
1.36.5.3. Monitor, evaluate, and provide respiratory protection for site personnel.
1.36.5.4. Ensure levels of protection as listed have been chosen consistent with site-specific potential airborne hazards associated with major contaminants identified onsite.
1.36.5.5. In absence of additional air monitoring information or substance identification, retain an industrial hygiene specialist to determine minimum levels of respiratory protection required.

1.36.5.6. Immediately notify Departmental Representative when level of respiratory protection required increases.
1.36.5.7. 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.
1.36.6. Heat Stress/Cold Stress: implement heat stress or cold stress monitoring program as applicable and include in site-specific Health and Safety Plan.
1.36.7. Personnel Hygiene and Personnel Decontamination Procedures. Provide minimum as follows:
1.36.7.1. Suitable containers for storage and disposal of used disposable PPE.
1.36.7.2. Potable water and suitable sanitation facility.
1.36.8. Emergency and First-Aid Equipment:
1.36.8.1. 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.
1.36.9. Site Communications:
1.36.9.1. Post emergency numbers near site telephones.
1.36.9.2. Ensure personnel use of "buddy" system and develop hand signal system appropriate for site activities.
1.36.9.3. Provide employee alarm system to notify employees of site emergency situations or to stop Work activities if necessary.
1.36.9.4. Furnish selected personnel with 2-way radios.
1.36.9.5. 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

Part 1 General

1.1 Definitions

.1 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.

.2 Environmental Protection: prevention/control of pollution and habitat or environment 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; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 Submittals

.1 Submittals: in accordance with Section 01 33 00 [Submittal Procedures].

.2 Prior to commencing construction activities or delivery of materials to the site, submit within 14 days of Contract award an Environmental Protection Plan for review and acceptance by Departmental Representative. The Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which must be addressed during Work.

.3 Address topics at level of detail commensurate with environmental issue and required work tasks.

.4 Environmental Protection Plan should include:

- .1 Comprehensive overview of known or potential environmental issues to be addressed during Work
- .2 Names of person or persons responsible for ensuring adherence to Environmental Protection Plan.
- .3 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
- .4 Names and qualifications of persons responsible for training site personnel.
- .5 Descriptions of environmental protection personnel training program.
- .6 Erosion and Sediment Control Plan which identifies type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .7 Drawings showing locations of proposed temporary excavation, embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, Biocell, and stockpiles of overburden materials including methods to control runoff and to contain materials on-site.
- .8 Traffic Control Plan, including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plans include measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.

.9 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.

.10 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.11 Communications Plan 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 instructed by the Departmental Representative; and federal, provincial, and municipal emergency contacts.

.12 Non-Hazardous Solid Waste Disposal Plan identifying methods and locations for solid waste disposal including clearing debris.

.13 Air Pollution Control Plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off the project site.

.14 Contaminant Prevention Plan that:

.1 Identifies potentially hazardous substances to be used on job site;

.2 Identifies intended actions to prevent introduction of such materials into air, water, or ground; and

.3 Details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.15 Wastewater Management Plan that identifies methods and procedures for management and/or discharge of wastewaters which are directly derived from building relocation, the Biocell, the excavation, and construction activities, such as concrete curing water, clean-up water, dewatering of groundwater in the excavation or precipitation in the biocell, disinfection water, hydrostatic test water, and water used in flushing of lines.

.16 Historical, Archaeological, Cultural Resources, Biological Resources, and Wetlands Plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

1.3 Fires

.1 Fires and burning of rubbish on-site is not permitted.

1.4 Disposal of Wastes

.1 Do not bury rubbish and waste materials on-site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways.

1.5 Drainage

.1 Provide an Erosion and Sediment Control Plan (ESCP), as part of the Environmental Protection Plan, that identifies type and location of erosion and sediment controls to be provided. ESCP to include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan and Federal, Provincial, and Municipal laws and regulations.

.2 Provide temporary drainage and pumping as necessary to keep excavations, biocell and site free from water as outlined in Section 01 35 13.43 [Special Project Procedures for Contaminated Sites].

.3 Do not pump water containing suspended materials into waterways, sewers, or drainage systems.

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

1.6 Site Clearing and Plant Protection

.1 Protect trees and plants on-site and adjacent properties where indicated.

.2 As directed by Departmental Representative, protect roots of trees to dripline during excavation and site grading to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.

1.7 Work Adjacent To Waterways

.1 Do not dump excavated fill, waste material or debris in waterways.

1.8 Pollution Control

.1 Maintain temporary erosion and pollution control features installed under this contract.

.2 Control emissions from equipment and plant to local authorities' emission requirements.

.3 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.9 Historical / Archaeological Control

.1 See General Conditions

1.10 Notification

.1 Departmental Representative will notify Contractor in writing of observed non-compliance with Federal, Provincial, or Municipal environmental laws or regulations, permits, the contract specification, and other elements of Contractor's Environmental Protection Plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action accepted by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

1.11 Spills or Release of Deleterious Substances

.1 Measures to be implemented to prevent, control or mitigate spills or release of deleterious substances:

.1 Contractor shall take due care to ensure no deleterious materials enter any surface drainage pathways located in the project area. The recommendations in the Land Development Guidelines for the Protection of Aquatic Habitat (Chillibeck et al. 1993) regarding erosion and sediment control shall be implemented. Silt-laden runoff water from the site shall not be allowed to enter nearby surface water. Engineering controls, such as silt fences shall be implemented, as required, to ensure proper isolation of soil from groundwater and surface water.

.2 Emergency response procedure for spills of deleterious substances must be in place. In the event of a spill, the Contractor will immediately implement their Spill Response Protocol.

.3 Response equipment to be on site at all times (i.e. spill kits) and workers trained in their location and use. The resources on hand must be sufficient to respond effectively and expediently to any spill that could occur on site.

.4 All equipment brought onto the site will be clean and properly maintained.

.5 Any equipment maintenance must occur in a designated area and must be conducted away from any surface water drains or collection points.

.6 Any equipment remaining on site overnight shall have appropriately placed drip pans.

.7 Waste generated will be prevented from entering the environment.

.8 Prevent discharges containing asphalt, grout, concrete or other waste materials from reaching storm drains or the aquatic environment. This includes, but is not limited to:

.1 Cleaning equipment off-site; and

.2 Protection of any other drainage structures not identified here with filter fences and/or silt socks, if required.

.9 Protection of the roadways from tracking of mud, soil and debris needs to be maintained throughout the work.

.10 Ensure that equipment and machinery is properly maintained to minimize unnecessary noise pollution. Consider local municipal noise bylaws when mobilizing equipment.

.11 All utilities must be located prior to excavation.

1.12 Noncompliance

.1 Departmental Representative will inform Contractor in writing of observed noncompliance with federal, provincial or municipal environmental laws, regulations, permits, or other environmental procedure violations.

.2 After receipt of notice, inform the Departmental Representative of the proposed corrective action. Corrective action will be subject to acceptance of Departmental Representative.

.3 Do not take action until after receipt of written acceptance.

.4 Departmental Representative will issue stop order of Work until satisfactory corrective action has been taken.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Not Used.

1.4. Laws, Regulations, Permits

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

1.4.2. Provincial 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 or municipal laws and regulations apply on Federal lands, activities or undertakings.

1.4.3. Comply with certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work that have already been obtained.

1.4.4. Obtain and pay for certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work that have not already been obtained or that are required to be amended.

1.4.5. Provide applicable authorities with plans and information required for issue of acceptance certificates.

1.4.6. Furnish inspection certificates in evidence that the Work installed conforms with the requirements of the authority having jurisdiction.

1.5. Codes, Bylaws, Standards

1.5.1. Meet or exceed requirements of Contract, standards, and codes applicable to the performance of the Work and referenced documents.

1.5.2. In any case of conflict or discrepancy, the most stringent requirements will apply.

1.5.3. Perform Work in accordance with the *National Building Code* of Canada (NBC), and other requirements or codes in accordance with the Contract, construction standards and/or any other code or bylaw applicable to the performance of the Work.

1.5.4. Certificates, licenses and other permits enforced at the location concerned required by regulatory federal, provincial or municipal authorities to complete the Work: see Section 01 11 00.

1.5.5. Comply with all attachments, references, and reports relevant to Work, including environmental protection.

1.6. Smoking Environment

1.6.1. Smoking on the Site is not permitted.

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

Part 1 General

1.1 Installation and Removal

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.2 Dewatering

.1 Provide temporary drainage and pumping facilities to keep excavations and sites free from standing water, as detailed in Section 01 35 13.43 [Special Procedures for Contaminated Sites].

1.3 Temporary Heating and Ventilation

.1 Provide temporary heating as required during the Work period, including attendance, maintenance and fuel.

.2 Construction heaters used inside buildings must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment.

.4 Pay costs for maintaining temporary heat.

.5 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

- .1 Conform to applicable codes and standards.
- .2 Enforce safe practices.
- .3 Prevent abuse of services.
- .4 Prevent damage to finishes.
- .5 Vent direct-fired combustion units to outside.

.6 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.4 Temporary Power and Light

.1 Contractor will pay for and provide for temporary power during construction for temporary lighting, water treatment facility and operating of power tools etc. No power is available at the site.

.2 Contractor will pay for and provide for temporary power during construction for the Site User's facilities, including residential trailers.

.3 Provide and maintain temporary lighting throughout project.

1.5 Temporary Communication Facilities

.1 Provide and pay for all required temporary communications to complete the project. No communication utilities (including cellular phone reception) are available at the site.

1.6 Fire Protection

.1 Provide and maintain temporary fire protection equipment during performance of Work required governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on the site.

1.7 Temporary Water

.1 Contractor will pay for and provide for water that may be needed during construction for backfill compaction. No water is available at the site.

END OF SECTION

Part 1 General

1.1 Submittals

.1 Provide submittals in accordance with Section 01 33 00 [Submittal Procedures]. Submit within 14 days of Contract award.

1.2 Installation and Removal

.1 Prepare site plans indicating proposed location and dimensions of the area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area, and details of fence installation for the site.

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such facilities after use.

1.3 Construction Parking

.1 Parking will be permitted on site provided it does not disrupt performance of Work, site residents, and Site User.

.2 Provide and maintain adequate access to the project site.

1.4 Offices

.1 Provide office space heated to 20 degrees C, lighted, ventilated, of sufficient size to accommodate site meetings and furnished with a drawing laydown table, and with 110V power made available for the Departmental Representatives to use as a work space. Office space to be furnished with two work stations, including at minimum a desk, chair and 110V fridge (approx. 100L size) for the Departmental Representative’s use.

.2 Subcontractors to provide their own temporary offices as necessary. Location of these offices to be accepted by Departmental Representative.

1.5 First Aid

.1 Provide marked and fully stocked first-aid case in a readily available location.

1.6 Sanitary Facilities

.1 Provide sanitary facilities for Contractor and Departmental Representatives in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.7 Protection and Maintenance of Traffic

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during Work period except as otherwise specifically directed by Departmental Representative.

.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.

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor is responsible for repair of damage to roads caused by construction operations, including grading and any necessary maintenance of the gravel access road from km 258 to the Man and Beast Pit prior to start of Work, after completion of Work, and any other times necessary to maintain the road is useable condition.

.7 Construct access and haul roads on site and at the Man and Beast Pit as necessary.

.8 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.12 Provide snow removal if required, during period of work.

.13 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.8 Clean-up

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack new or salvaged material not in construction facilities.

END OF SECTION

Part 1 General

1.1 Installation and Removal

.1 Provide temporary controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

1.2 Fencing

.1 Provide temporary fencing around excavation areas to prevent public access and wildlife access. Protect from damage by equipment and Work procedures.

.2 Temporary fencing around the excavation areas should remain in place until Work is completed.

1.3 Access to Site

.1 Provide and maintain access roads, ramps and construction runways as may be required for access to Work.

1.4 Public Traffic Flow

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform work and protect public.

1.5 Fire Routes

.1 Maintain access to property including overhead clearances for use by emergency response vehicles.

1.6 Protection for Off-site and Public Property

.1 Protect surrounding private and public property from damage during performance of work.

.2 Be responsible for damage incurred.

1.7 Protection of Building Finishes

.1 Provide protection for finished and partially finished building finishes and equipment during performance of work.

.2 Provide necessary screens, covers, and hoardings.

.3 Be responsible for damage incurred due to lack of or improper protection.

END OF SECTION

1. PART 1 - GENERAL

1.1. Measurement Procedures

1.1.1. See 01 11 00.

1.2. Definitions

1.2.1. See 01 11 00.

1.3. Action and Informational Submittals

1.3.1. Product Data: at least 5 Working Days prior to use, Submit data on products to be used in Work. Include:

1.3.1.1. Manufacturers' catalogue sheets, MSDS sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products or any other information in accordance with the Contract.

1.3.1.2. Delete information not applicable to project.

1.3.1.3. Supplement standard information to provide details applicable to project.

1.3.1.4. Cross-reference product data information to applicable portions of Contract.

1.3.2. Substitution: at least 5 Working Days prior to use and after Contract award, Submit proposals for substituting products, if required. Include statements of respective costs of items originally in accordance with the Contract and the proposed substitution.

1.3.3. Quality of Work: at least 5 Working Days prior to Work, Submit alternate means to meet or correct quality of work, if required.

1.4. Products, Material and Equipment

1.4.1. Use new products, material and equipment in accordance with the Contract. The term "products" is referred to throughout the specifications.

1.4.2. Use products of one manufacturer for material and equipment of the same type or classification in accordance with the Contract.

1.4.3. Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation method in accordance with the Contract s.

1.4.4. Notify Departmental Representative in writing of any conflict between Contract and manufacturer's instructions. Departmental Representative will instruct which document is to be followed.

1.4.5. Deliver, store and maintain packaged material and equipment with manufacturer's seals and labels intact.

1.4.6. Prevent damage, adulteration and soiling of products during delivery, handling and storage. Immediately remove rejected products from Site.

1.4.7. Store products in accordance with Suppliers' instructions.

1.5. Quality of Products

1.5.1. Products, materials and equipment (referred to as products) incorporated into Work must be new, not damaged or defective, and of the best quality (compatible with the specifications) for the purpose intended. As instructed by the Departmental Representative, furnish evidence as to type, source, and quality of the products provided.

1.5.2. Defective products will be rejected regardless of previous inspections.

1.5.2.1. Inspection does not relieve responsibility, but is precaution against oversight or error.

1.5.2.2. Remove and replace defective products.

1.5.3. Retain purchase orders, invoices and other documents to prove that all products utilized in the Work meet the requirements of the Contract. Produce documents as instructed by the Departmental Representative.

1.5.4. Should any dispute arise as to quality or fitness of products, the decision rests strictly with the Departmental Representative in accordance with the Contract.

1.5.5. Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.6. Availability of Products

1.6.1. Immediately upon signing the Contract, review product delivery requirements and anticipate foreseeable supply delays for any items.

1.6.2. If delays in supply of products are foreseeable, Notify Departmental Representative of such in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of the Work.

1.6.3. In event of failure to Notify Departmental Representative at the start of Work and should it subsequently appear that the Work may be delayed for such reason, the Departmental Representative reserves the right to substitute more readily available products of similar character.

1.7. Manufacturer's Instructions

1.7.1. Install or erect products in accordance with the manufacturer's instructions in accordance with the Contract.

1.7.1.1. Do not rely on labels or enclosures provided with products.

1.7.1.2. Obtain written instructions directly from the manufacturer.

1.7.2. Notify Departmental Representative in writing of any conflict between Contract and manufacturer's instructions. Departmental Representative will instruct which document is to be followed.

1.7.3. Improper installation or erection of products, due to failure in complying with these requirements, authorizes the Departmental Representative to instruct the removal and re-installation.

1.8. Contractor's Options for Selection of Products for Tendering

1.8.1. Products specified by "Prescriptive" specifications: select any product meeting or exceeding requirements in accordance with the Contract.

1.8.2. Products specified by performance and referenced standard: select any product meeting or exceeding the referenced standard.
1.8.3. Products specified to meet particular design requirements or to match existing materials: use only material in accordance with the Contract.
1.8.4. When products are specified by a referenced standard or by performance specifications, as instructed by the Departmental Representative obtain from manufacturer and independent laboratory report showing that the product meets or exceeds the requirements in accordance with the Contract.

1.9. Storage, Handling and Protection

1.9.1. Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions.
1.9.2. Store packaged or bundled products in original and undamaged condition with manufacturer's seals and labels intact. Do not remove from packaging or bundling until required in Work.
1.9.3. Store products subject to damage from weather in weatherproof enclosures.
1.9.4. Remove and replace damaged products as instructed by the Departmental Representative.

1.10. Transportation

1.10.1. Pay costs of transportation of products required in performance of Work.
1.10.2. Transport products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
1.10.3. Transport products subject to damage from weather in weatherproof enclosures.
1.10.4. Transport in an efficient manner that does not cause delays to the Work schedule.

1.11. Quality of Work

1.11.1. Ensure quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately Notify Departmental Representative if required Work is such as to make it impractical to produce results in accordance with the Contract. Provide alternate means to meet or correct quality of work, as accepted by the Departmental Representative.
1.11.2. Do not employ anyone unskilled in their required duties.
1.11.3. Perform Work to standard of fitness of Quality of Work in accordance with any decision by the Departmental Representative.

1.12. Coordination

1.12.1. Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

1.13. Remedial Work

1.13.1. Perform remedial Work required to repair or replace parts or portions of Work as instructed by the Departmental Representative as defective or unacceptable. Coordinate adjacent affected Work as required.

1.13.2. Perform remedial Work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.14. Storage Tanks

1.14.1. Abide by the *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* for stored petroleum products and allied petroleum products tank system located on federal or Aboriginal land, or within federal jurisdiction as described in the regulations.

1.14.2. Temporary storage tanks must be registered.

1.14.3. Mobile tanks must be certified to be mobile.

1.14.4. Storage tanks to meet the following minimum requirements:

1.14.4.1. Corrosion protection.

1.14.4.2. Secondary containment.

1.14.4.3. Containment sumps, if applicable.

1.14.4.4. Overfill protection.

1.14.5. All components of tank system must bear certification marks indicating that they conform to the standards set out in the regulations.

1.14.6. Product transfer area must now be designed to contain spills.

1.14.7. Emergency plan in place before tank system receives its first fill.

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 of sites, designs and projects.

3. PART 3 - EXECUTION

1.1. Not Used

1.1.1. Not Used.

END OF SECTION

Part 1 General

1.1 Project Cleanliness

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or the Site User.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by Departmental Representative.

.3 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.4 Provide on-site containers for collection of waste materials and debris.

.5 Dispose of waste materials and debris off-site.

1.2 Final Cleaning

.1 When work is substantially performed remove surplus products, tools, machinery, and equipment not required for performance of remaining work.

.2 Remove waste products and debris other than that caused by others, and leave site clean and suitable for occupancy.

.3 Prior to final review remove surplus products, tools, construction machinery and equipment.

.4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.5 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.

.6 Remove dirt and other disfiguration from exterior surfaces.

.7 Sweep and wash clean paved areas.

END OF SECTION

Part 1 General

1.1 Inspection and Declaration

.1 Contractor's Inspection: Contractor Design-Builder and Subcontractors: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Design-Builder's Inspection and that corrections have been made.

.2 Owner Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies.

.1 Structural and Geotechnical Engineers will be present at various stages of the Work to conduct inspections of Work and to identify obvious defects or deficiencies. Contractor Design-Builder to correct work accordingly.

.2 Final Site grading will be as approved by Departmental Representative.

.3 Completion: submit written certificate that following have been performed:

.1 Work has been completed and inspected for compliance with Contract Documents.

.2 Defects have been corrected and deficiencies have been completed.

.3 Operation of systems have been demonstrated to the Site User and Owner's personnel.

.4 Work is complete and ready for final inspection.

1.2 Submittals

.1 Submittals: in accordance with Section 01 33 00 [Submittal Procedures].

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Copy will be returned after final inspection, with Departmental Representative’s comments.

.4 Revise content of documents as required prior to final submittal.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in work.

.6 Furnish evidence, if requested, for type, source and quality of products provided.

.7 Defective products will be rejected, regardless of previous inspections. Replace defective products at own expense.

.8 Pay costs of transportation.

1.3 As-Builts and Samples

.1 Maintain at site one record copy of:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.3 Label record documents and file in accordance with section number listings in list of contents of this project specification. Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

.6 Contractor is required to submit to Departmental Representative an as-built record in of the site, including buildings, facilities, utilities, and Biocell configuration, at the completion of work. Provide 1 set of CDs in AutoCAD 14 file format with all as-built information on the CDs. The Departmental Representative will provide the original AutoCAD files for “as-built” purposes.

.7 For As-Built documents, surveying will be completed by the Contractor’s Land Surveyor upon the completion of specified tasks as determined by the Departmental Representative (e.g. at the limits of each excavation prior to backfilling). Registered surveyor to provide as-built drawings of all services, including buildings, facilities, utilities, and Biocell configuration to Departmental Representative.

.8 Attend final onsite inspection to confirm final site condition and work completed according to the contract documents.

END OF SECTION

Part 1 General

1.1 Summary

.1 Work Includes:

.1 Pumping of ponded water, including dewatering of sand placed above the liner, inside the Biocell to the outside of the Biocell, prior to soil placement in the facility.

.2 Provision and installation of materials and equipment necessary to complete remediation.

.3 Identification of subsurface utilities, disconnection of utilities and temporary supply of utilities as required, and, reinstatement of all utilities and infrastructure following excavation.

.4 Implementation of safety work zones, site-specific Health and Safety Plan, and Emergency Response Plan, and Environmental Protection Plan.

.5 Construction of dewatering system and wastewater storage and treatment system for contaminated waters generated during soil remediation work, including separation, recovery and elimination of free-phase hydrocarbons, if encountered. The treatment system must consist of a minimum of two water storage tanks and capable of treating liquid/solid mixtures while not causing delay to dewatering operations. A storage capacity of approximately 30,000 L for each tank is recommended. The Contractor should provide contingency for up to 11 days minimum water storage capacity to allow for testing, laboratory analysis, and communication of results.

.6 Water from the Water Treatment Facility will be transfer the storage tanks prior to discharge for sampling and characterization. It is the responsibility of the Contractor to sample water in the storage tank prior to discharge and have that sample analyzed by a CALA certified laboratory. The laboratory results of the water store in the tanks must be provided to the Departmental Representative and accepted prior to discharge. For the laboratory results to be valid, no additional water can be added to the storage tank between the time of sampling and the time of discharge. The discharge location must be accepted by the Departmental Representative.

.7 Excavate and transport to the on-site Biocell approximately 6,920 m^3 of hydrocarbon-contaminated soil. Approximately 1,385 m^3 of this soil, excavated from surface to between 1.0 and 2.0 m depth, will be screened with a 19 mm (¾") screener prior to transport to the Biocell.

.8 Excavate approximately 25 m^3 of soil containing hydrocarbons > BC Hazardous Waste Regulation standards. Transport and disposal at an off-site permitted facility.

.9 Screened overs will be temporarily stockpiled on-site for use as backfill as determined by the Contractor's geotechnical engineer and accepted by the Departmental Representative. Screened overs may require washing prior to use as backfill, as determined by the Departmental Representative. Contain and transfer for treatment in the water treatment facility any screened overs wash water.

.10 Allowing and assisting the Departmental Representative to collect soil samples from the excavation for characterization purposes to confirm that sufficient remediation has taken place. The Contractor must provide equipment for the Departmental Representative to collect soil samples.

.11 Air monitoring (conducted by the Contractor) around remediation areas and Biocell during work ensuring applicable federal and British Columbia health and safety laws and regulations are met.

.12 Construction of water control and recovery structures for any water ponding in the Biocell during remediation work as described below in Section 4.2.1.2.

.13 Placement and compaction of backfill to geotechnical specifications. Backfill will consist of screened 19 mm (¾") washed overs from the excavated material, off-site imported material supplied by the Contractor, and imported backfill made available by PWGSC free of charge from two locations 1) the Man and Beast Pit, located down a road to the east of km 258 of the Alaska Highway (a distance of approximately 17 km from the site); and 2) from the site, within 500m of the excavation. The location of the Man and Beast Pit and route from the SMC site is shown on Drawing 7. The Contractor will be responsible for screening with a 38 mm screen and loading the backfill at the pit and the site, transporting the backfill from the pit and within the site to the backfill area, placement and compaction of the backfill onsite, and geotechnical inspection of the backfilling by the Contractor's geotechnical engineer as per Section 31 23 33.01 [Excavating, Trenching, and backfilling] to ensure that the backfill compaction meets the Contract specification requirements.

.14 Maintaining erosion and sediment control at the site, including covering stockpiles, silt fencing and appropriately managing any excavation water.

.15 Dismantling facilities and cleaning site following inspections and acceptance of work by Departmental Representative.

.2 Unit Prices.

.1 Provide unit costs for soil remediation in the Unit Price Table form provided.

1.2 References (latest Edition)

.1 Applicable health and safety laws and regulations for British Columbia.

.2 CCME (Canadian Council of Ministers of the Environment) Contaminated Sites, Contaminated Soil and Groundwater, and Remediation of Contaminated Sites most current publications.

.3 British Columbia Environmental Management Act, Contaminated Sites Regulation, and Hazardous Waste Regulation.

.4 National Fire Code.

1.3 Submittals

.1 Submit within 14 days of Contract Award.

.2 Documentation Submittals:

.1 Identify subcontractors and provide evidence of appropriate licensing if they are involved with transport of contaminated soils or Hazardous Waste.

.2 Identify the offsite disposal facility that will be used to treat and/or dispose of the Hazardous Waste soil identified. Provide evidence and permits showing that it is authorized and/or licensed to accept, treat and dispose of hazardous waste hydrocarbon soil. Work will NOT proceed until the Departmental Representative

is satisfied the receiving facility is appropriately qualified and affords PWGSC suitable liability protection.

.3 Quality Assurance and Quality Control Submittals.

.1 Submit Quality Assurance and Quality Control Submittals in accordance with Section 01 33 00 [Submittal Procedures] as follows:

.1 Description of site-specific emergency plans in case of breakdown, spill or other problem.

.2 Description of contingency plan in case of variations of critical parameters during system operation.

.3 Waste management plan and complete list of wastes that will be generated by activities.

.4 Environmental Protection Plan.

.5 Detailed plan of soil and excavation water remediation.

.6 Air quality monitoring program.

.7 Information on proposed technology to be used during the work, including environmental impacts.

Part 2 Delivery, Storage, and Handling

2.1 Contaminated Soil:

.1 The Departmental Representative will be responsible for laying out the initial excavation areas as shown in the Drawings in Appendix A.

.2 A Table summarizing the excavated soil volumes by soil destination is included in Section 01 11 00 [Summary of Work].

.3 The excavation zones are shown on the Drawings in Appendix A.

.4 Load, screen (required materials), and transport excavated impacted soils from the excavation to the Biocell.

.5 The Contractor shall take extra care when placing the impacted soils to not puncture the Biocell liner.

.6 After all impacted material has been placed in the Biocell the Contractor will till/turn the soils in the Biocell in a manner to thoroughly aerate and mix in fertilizer evenly.

.7 The Contractor shall till/turn the soils in the Biocell in such a way to not compromise the integrity of the Biocell liner.

.8 The Contractor shall supply and apply fertilizer with a high nitrogen granular fertilizer such as granular urea at a rate of 0.15 kg/m^3 of soil to the Biocell contents during the till / turn process. Biocell soil will be turned / tilled until the fertilizer is mixed homogeneously, as directed by the Departmental Representative.

.9 The Contractor shall supply and add water as required during the till / turn process for optimum biocell performance, or as directed by the Departmental Representative.

.10 One till / turn event is expected to take at approximately 4 to 8 hours not including the initial fertilizer application and mixing.

.11 Once all soils have been properly tilled / turned and soil amendments have been added the Contractor shall combine all of the material into one level stockpile that does not exceed 2.0 m in height.

.12 Segregate topsoil from non-contaminated and contaminated subsoils.

.13 Prevent compaction of topsoil such that it can be reused during site reinstatement.

2.2 Equipment

.1 Trucks.

.1 Cleaned between loads of contaminated soil and clean fill.

.2 Cleaned at end of Work.

.3 Use watertight truck bodies for transporting contaminated soil.

2.3 Project/Site Conditions

.1 Existing Conditions.

.1 Review plans, cross-sections and analytical results in Appendix A which summarize the extent of soil contamination.

.2 Contaminated soil removal:

.1 This phase of work will focus on removing the hydrocarbon-impacted soil at the site. Refer to Drawings in Appendix A for estimated extent of contamination.

.2 Restore excavated portions of the site with screened ¾" (19 mm) over and PWGSC-supplied imported backfill that is deemed geotechnically suitable by the Contractor's geotechnical engineer.

.3 Protect non-contaminated material from coming into contact with contaminated water or soil stored at the site.

2.4 Sequencing

.1 If floating free phase product is present, remove free phase product from saturated soil without further contaminating soil or groundwater prior to commencing other decontamination work.

.2 Store free phase product in properly sealed 205 Litre drums for off-site disposal.

.3 Decontaminate equipment used during remediation and in decontamination procedures before removing equipment from the job site.

Part 3 Products

3.1 Materials

.1 Fill.

.1 For fill not supplied by PWGSC, material must be characterized as < CCME RL guidelines (metals and hydrocarbons) and compacted to meet remedial objectives set out for the site. Compaction requirements as defined in Section 31 23 33.01 [Excavating, Trenching and Backfilling].

Part 4 Execution.

4.1 Preparation

.1 The Biocell must be de-watered and prepared by the Contractor prior to receiving soils as described below in Section 4.2, below.

.2 All Biocell de-watering and preparation must be completed before soil is placed in the Biocell.

4.2 Biocell Preparation

.1 Biocell preparation includes:

.1 Repair of biocell liner including 5 x 1m^2 welded patches.

.2 Grading the Biocell floor to one corner to allow for water flow to a constructed sump.

.3 Maintenance of the existing dewatering sump. The effectiveness of the existing dewatering sump must be maintained as deemed acceptable by the Departmental Representative.

.4 Dewatering the Biocell to an appropriate location outside the Biocell which is accepted by the Departmental Representative.

.5 Maintaining positive drainage around the Biocell, allowing runoff to drain away from the facility.

.6 Placing of supplied plywood sheeting above the sand layer prior to placement of soils.

.7 Biocell and impacted soil must be covered with a 15 mil minimum woven polyethylene UV and hydrocarbon resistant cover with welded seams (provided by the Contractor) after soils have been placed in the facility.

.8 Procure and transport securements to secure the biocell cover. Securements and method must be accepted by the departmental representative.

.9 A means of restricting access and signage must be provided.

4.3 Protection:

.1 Keep excavation and Biocell free of water throughout work and manage recovered water accordingly as per Section 01 35 13.43 [Special Procedures for Contaminated Sites].

.2 Protect excavation from rainwater.

.3 Provide temporary structures to divert flow of surface waters around the excavation.

4.4 Soil Transport

.1 Other than the initial fertilizing and tilling of the soils following the placement of contaminated material in the Biocell, all further bioremediation work is not covered under this Contract and will be completed in future years.

4.5 Restoration

.1 Re-instate surface grading to give the site the same appearance as before remediation work. Final surface grading to be accepted by Departmental Representative.

.2 Clean permanent access roads of contamination resulting from project activity at request of Departmental Representative.

4.6 Equipment Decontamination

.1 Decontaminate equipment used during the remediation and remove from site at end of treatment activities.

END OF SECTION

Part 1 General

1.1 Related Sections

.1 Not Used.

1.2 Measurement Procedures – Mobilization, Site Facilities, Standby, Site Preparation, Closure, Demobilization, and As-Built Documents

.1 Pre-mobilization Submittals will be paid in accordance with lump sum price established for all design, planning, health and safety, and other submittals identified or required to be submitted prior to mobilization to site.

.2 Mobilization will be paid in accordance with lump sum price established for mobilizing all necessary equipment, materials, supplies, facilities, and personnel to site. Includes insurance, bonding, and permits.

.3 Site Facilities Provision and Operation will be paid in accordance with lump sum price established to design, temporarily provide for duration of Work, and erect all infrastructure, including, but not limited to, the following: temporary structures and facilities, sanitary facilities, roadways, security, and services. Includes time to operate and maintain all infrastructure, including but not limited to, the following: temporary structures and facilities, sanitary facilities, roadways, security, and services. Includes meetings, progress submittals, traffic control, health and safety, environmental protection, provision of 6-mil polyethylene liner for covering soil stockpiles, and cleaning. Includes living out allowances, including travel, room and board. Time will only be paid for duration indicated and amendments accepted by Departmental Representative.

.4 Standby will be paid in accordance with unit rate price established for time Work is unable to proceed due to non-specified delays caused solely by the Departmental Representative. Reviews, sampling, or other work conducted by Departmental Representative which have a time duration identified will not result in an increase in either the Contract price or the Contract time.

.5 Site Preparation will be paid in accordance with lump sum price established to prepare the site for planned construction works, including clearing and grubbing, utility location and protection, and any grading of the gravel access roads on site required to conduct the Work. Includes removal of any incidental or generated material.

.6 Water Treatment Facility Provision will be paid in accordance with lump sum price established to construct and maintain dewatering system and wastewater storage and treatment system for contaminated waters generated during soil remediation work, including separation, recovery and elimination of free phase hydrocarbons, if encountered. The treatment system must consist of a minimum of two water storage tanks and capable of treating liquid/solid mixtures while not causing delay to dewatering operations. A storage capacity of approximately 30,000 L for each tank is recommended.

.7 The Contractor should provide for water storage capacity to allow for the Contractor's testing, laboratory analysis, and communication of results.

.8 Site Closure will be paid in accordance with lump sum price established to restore the site to make suitable for post-remediation use. Includes removal of any incidental or generated material.

.9 Demobilization will be paid in accordance with lump sum price established for demobilizing all equipment, materials, supplies, facilities, and personnel from the site, decontaminating all equipment prior to removal from site, preparing site for closure.

.10 As-built Documents will be paid in accordance with lump sum price established for providing as-built plans, drawings, and completion submittals.

1.3 Measurement Procedures – Dewatering and Water Treatment Facility Operation

.1 Water Treatment Facility Operation will be paid at a daily rate. The daily rate will be paid only on days when dewatering of the excavation, dewatering of the Biocell, or pumping of wash water is underway and water is being treated. Water Treatment Facility Operation will not be paid for days when treated water is being held in the tanks.

.2 Water from the Water Treatment Facility will be transfer the storage tanks prior to discharge for sampling and characterization. It is the responsibility of the Contractor to sample water in the storage tank prior to discharge and have that sample analyzed by a CALA certified laboratory. The laboratory results of the water store in the tanks must be provided to the Departmental Representative and accepted prior to discharge. For the laboratory results to be valid, no additional water can be added to the storage tank between the time of sampling and the time of discharge. The discharge location must be accepted by the Departmental Representative.

1.4 Measurement Procedures – Excavation, Trucking, Screening, and Backfilling

.1 Excavated materials will be measured in accordance with the following procedure:

.1 For each distinct type of soil excavated, the Departmental Representative and Contractor will:

.1 Fill a truck and/or truck and pup to an agreed upon level that represents a specific volume of soil. This volume will be used to estimate the excavated and transported volume for the measure of payment.

.2 For hydrocarbon-contaminated soil designated for treatment in the Biocell:

.1 The truck and/or truck and pup will transport and deposit the material in the screening area of the site for screening through a 19 mm (¾”) screen.

.2 The truck and/or truck and pup will then transport and deposit the screened material to the Biocell treatment facility.

.3 For Hazardous Waste hydrocarbon-contaminated soils to be transported offsite for disposal:

.1 The truck and/or truck and pup will then transport and deposit the material offsite for disposal at a permitted facility.

.4 The Departmental Representative will monitor the loading of all trucks and reserves the right to request addition of material if trucks have not been filled to the specified load height.

.2 Excavated and screened materials will be measured by:

1. Fill a truck and/or truck and pup to an agreed upon level that represents a specific volume of soil that is deposited to the screening area of the site.
2. This volume will be used to estimate the screened volume for the measure of payment.

.3 For any soils transported offsite for disposal, weigh scale tickets from the disposal facility (in tonnes) will form the basis of payment. It is noted that the estimated excavation soil volumes presented in the Summary of Work are in-situ, pre-screened soil volumes measured in m^3. In the attached unit price table these volumes were converted to estimated tonnes using a screening reduction of 15% and a mass density of 2.0 tonnes / m^3 for the screened material.

.4 Any sheeting and bracing used will be left in place on direction of the Departmental Representative or the Contractor's geotechnical engineer and will be measured in square metres of surface area of plane surface of sheeting.

.5 Backfilling to authorized excavation limits will be measured in cubic metres (m^3) for the screened ¾" (19 mm) washed overs and deemed geotechnically suitable for use as backfill by the Contractor's geotechnical engineer. A truck and/or truck and pup will be filled with screened ¾" (19 mm) overs to an agreed upon level that represents a specific volume of soil that is used as backfill.

.6 Imported backfill will be made available by PWGSC free of charge from two locations 1) the Man and Beast Pit, located down a road to the east of km 258 of the Alaska Highway (a distance of approximately 17 km from the site); and 2) from the site, within 500m of the excavation . The location of the Man and Beast Pit and route from the SMC site is shown on Drawing 7. The Contractor will be responsible for screening with a 38 mm screen and loading the backfill at the pit and the site, transporting the backfill from the pit and within the site to the backfill area, and placement and compaction of the backfill onsite. The basis of payment for transported screened backfill will be cubic metres (m^3), measured by the volume of a truck and/or truck and pup as described above. Basis of payment for the screener used in backfill screening/preparation will be days in operation and includes mobilization/demobilization to and from site and Man and Beast Pit.

.7 The Contractor will retain the services of a geotechnical engineer to ensure compliance with specification requirements and Contractor design. Soil testing and backfill compliance will be verified by the geotechnical engineer, registered in British Columbia, who will stamp and seal all inspection documents.

1.5 References

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM D422-632002, Standard Test Method for Particle-Size Analysis of Soils.

.2 ASTM D4318-05, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.6 Definitions

.1 Three excavation classes will be recognized:

.1 Excavation of hydrocarbon-impacted soil that will be screened and placed in the onsite Biocell.

.2 Excavation of hydrocarbon-impacted soil that will be directly placed in the onsite Biocell without screening.

.3 Excavation of Hazardous Waste hydrocarbon-impacted soil that will be transported offsite for disposal without screening.

.2 Waste material: excavated material unsuitable for use in Work or surplus to requirements.

.3 Backfill or borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.

.4 Recycled fill material: material, considered inert, obtained from alternate sources and engineered to meet requirements of fill areas.

.5 Unsuitable materials:

.1 Weak, chemically unstable, and compressible materials.

.2 Frost susceptible materials:

.1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422: Sieve sizes to CAN/CGSB-8.1CAN/CGSB-8.2.

1.7 Submittals

.1 Make submittals in accordance with Section 01 33 00 [Submittal Procedures]. Submit within 14 days of Contract award:

.2 Samples (as required):

.1 Collect samples of Borrow or proposed imported backfill material, other than that made available by PWGSC, and conduct standard Proctor testing.

.2 Provide results of standard Proctor testing to Departmental Representative.

.3 Collect samples of Borrow or proposed imported backfill material, other than made available by PWGSC, and conduct laboratory analysis for metals in accordance with British Columbia Ministry of Environment Technical Guidance Document No. 1.

.4 Provide laboratory analytical results to Departmental Representative for review and acceptance prior to import to the site. Do not use imported soil material until written report of soil analytical results are reviewed and accepted by the Departmental Representative.

.3 Submit proof of good standing with WorkSafe BC.

.4 Submit excavation designs.

.5 Design and supporting data submitted to bear stamp and signature of qualified professional engineer registered or licensed in British Columbia, Canada.

.6 Keep design and supporting data on site.

.7 Health and Safety Requirements:

.1 Work be conducted in accordance with Section 01 35 29.14 [Health and Safety Requirements].

1.8 Existing Conditions

.1 Examine Drawings and tables located in Appendix A, photographs located in Appendix B, the GeoPacific Consultants geotechnical reports located in Appendix C, the Scouten and Associates Engineering Ltd. Proposed Building Relocation Report and Supplementary Report included in Appendix D, the site borehole logs located in Appendix E, the Thurber Engineering Ltd. Grain Size Analysis and maximum Density Testing memorandum in Appendix F, and the SNC-Lavalin Regulated Building Materials report in Appendix G.

.2 Note that the proposed new Maintenance Garage location investigated by GeoPacific Consultants for their geotechnical report in Appendix C is not the current new Maintenance Garage building location shown on Drawing 3 in Appendix A. However, the new Maintenance Garage building location is in an area of native soil, and subsurface conditions are expected to be consistent to those described in the GeoPacific Consultants geotechnical investigation report.

.3 Buried services:

.1 Before commencing work verify the location of buried services on and adjacent to site.

.2 Arrange with appropriate authority for relocation of buried services that interfere with execution of work: pay costs of relocating services.

.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

.4 Size, depth and location of existing power poles and overhead power and structures as indicated on Drawing 3 in Appendix A are for guidance only. Completeness and accuracy are not guaranteed.

.5 Prior to beginning excavation Work, notify applicable Departmental Representative and authorities having jurisdiction and establish location and state of use of buried utilities and structures. Clearly mark such locations to prevent disturbance during Work.

.6 Maintain and protect from damage, water, sewer, gas, electric, and other utilities and structures encountered.

.7 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before removing and re-routing.

.8 Contractor shall survey the location of all maintained, re-routed and abandoned underground lines.

.4 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, service poles, wires, which may be affected by work at the time of the site kickoff meeting.

.2 Protect existing buildings and surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by Departmental Representative.

.5 The Biocell must be prepared as per Specification Section 02 61 00.01, Part 4.2.

1.9 Work Done Under Separate Contract

.1 The following Work is the responsibility of the Site User, and will be completed under separate contract.

.1 The decommissioning and disposal of the sign shed and the old diesel generator shed.

.2 Movement of Site User (Emcon) tools and equipment from the existing Maintenance Garage location into a temporary secured container and, after the building is relocated, movement of the tools and equipment into the new Maintenance garage location.

Part 2 Products

2.1 Materials

.1 Imported backfill will be supplied by PWGSC free of charge from two locations 1) the Man and Beast Pit, located down a road to the east of km 258 of the Alaska Highway; and 2) from the site, within 500m of the excavation. The Contractor will be responsible for screening with a 38 mm screener and loading the backfill at the pit and site, transporting the backfill from the pit and from within the site to the backfill area, and placement and compaction of the backfill onsite.

.2 Screened overs will be placed in a manageable stockpile as directed by the Departmental Representative.

Part 3 Execution

3.1 Site Preparation

.1 Remove obstructions from surfaces to be excavated within limits indicated.

.2 Backfill, compaction, and grading the infrastructure and AST relocation area and 10m buffer around it, (as shown on Drawing 3) to 897 m geodetic elevation and soil compaction testing by a geotechnical engineer prior to building relocation.

3.2 Preparation/Protection

.1 Protect existing features in accordance with Section 01 56 00 [Temporary Barriers and Enclosures].

.1 Keep excavations clean and free of standing water and loose soil.

.2 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative approval.

.3 Protect natural and man-made features required to remain undisturbed. Unless otherwise indicated or located in an area to be occupied by new construction, protect existing trees from damage.

.4 Protect buried services that are required to remain undisturbed.

3.3 Dewatering

.1 Keep excavations free of water while work is in progress.

.1 Protect open excavations against flooding and damage due to surface run-off.

.2 All water collected from the excavation and Biocell must be treated for hydrocarbons and total suspended solids as specified below and then transferred to storage tanks for settling and testing by the Departmental Representative prior to discharge. The discharge location will be determined by the Departmental Representative depending on treated water quality. The treatment system must consist of a minimum of two water storage tanks and capable of treating liquid/solid mixtures while not causing delay to dewatering operations. The Contractor should provide contingency for up to 11 days minimum water storage capacity to allow for testing, laboratory analysis, and communication of results.

.3 Treated water results for benzene, ethylbenzene, toluene, and xylenes (BETX), PHC fractions F1 to F4, and polycyclic aromatic hydrocarbons (PAHs) will be compared to the Canadian Council of Ministers of the Environment (CCME) Interim Groundwater Quality Guidelines (Tier 2) and the Guidelines for Canadian Drinking Water Quality (CDWQ).

.4 Dispose of treated water in a manner not detrimental to public and private property, in accordance with all applicable regulatory requirements, and accepted by the Departmental Representative. Do not allow for erosion or siltation in the discharge area.

.2 Provide any required storage tanks, flocculation tanks, settling basins, or other treatment facilities to remove suspended solids, contaminants, or other materials before discharging to the site.

3.4 Excavation

.1 A Table summarizing the excavated soil insitu volumes by soil destination is included in Section 01 11 00 [Summary of Work].

.1 The excavation zones are shown on Drawing 4 in Appendix A. The maximum depth of excavation is approximately 6 m.

.2 Excavation must not interfere with bearing capacity of existing structures.

.3 Keep excavated and stockpiled materials a safe distance away from the excavation and in an area provided by the Departmental Representative.

.4 Restrict vehicle operations directly adjacent to open trenches.

.5 Do not obstruct flow of surface drainage or natural watercourses.

.6 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.

.7 Obtain Departmental Representative approval of completed excavation.

.8 Following removal of hydrocarbon-contaminated material, the Contractor will assist the Departmental Representative in collection of confirmatory samples at all vertical and horizontal limits of the excavations, to ensure that all impacted soil has been removed. The Contractor must make clean the bottom and walls of the excavation (including water and other waste material), provide clear access and equipment for the Departmental Representative to collect soil samples. The Contractor must anticipate time and equipment assisting the Departmental Representative confirmatory sample collection.

.9 Contractors will not be paid for time associated with analytical turn around time (TAT). Analytical TAT includes 4 days for collection, shipping and tabulation of data and an additional 3 work days (Monday-Friday, excluding statutory holidays) for laboratory analysis. The Contractor must anticipate time pending confirmation of remediation.

.10 Backfill and compaction of the excavation cannot occur without clear direction from the Departmental Representative.

3.5 Screening

.1 A portion of the contaminated soil will be screened onsite using a 19 mm (¾") screen prior to transport to the Biocell. Screened overs will be temporarily stockpiled onsite for use as backfill as determined by the Departmental Representative.

.2 Screened overs may require washing prior to use as backfill, as determined by the Departmental Representative. If washing of the screened over is required, contain and transfer for treatment in the water treatment facility any screened overs wash water.

.3 Screened overs will be temporarily stockpiled onsite for use as backfill as determined by the Contractor's geotechnical engineer and accepted by the Departmental Representative.

3.6 Stockpiling

.1 After screening, transport hydrocarbon-contaminated soil to the Biocell facility.

.2 Stockpile imported backfill materials in areas designated by Departmental Representative.

.3 Protect backfill materials from contamination.

.4 Place polyethylene sheeting underneath and over top of any potentially contaminated soils stockpiled on the site as directed by the departmental representative.

3.7 Placement of Screened Soil in Biocell

.1 Load and transport screened hydrocarbon-impacted soils from the screening area to the Biocell.

.2 Load and transport hydrocarbon-impacted soils that do not require screening directly from the excavation to the Biocell.

.3 The Contractor shall take extra care when placing the hydrocarbon-impacted soils to not puncture the Biocell liner.

.4 The Contractor shall till/turn the soils in a manner to thoroughly aerate and mix in fertilizer evenly after all hydrocarbon-impacted material has been place in the Biocell.

.5 The Contractor shall till/turn the soils in the Biocell in such a way to not compromise the integrity of the Biocell liner.

.6 During the initial till/turn process the Contractor shall supply and apply a high nitrogen granular fertilizer such as granular urea for nitrogen at a rate of 0.15 kg/m^3 of soil to the Biocell contents. This equates to approximately 2500 kg of urea assuming an N-P-K of 46-0-0.

.7 During the till/turn process, the Contractor shall supply and add water as required for optimum Biocell performance, or as directed by the Departmental Representative.

.8 Upon completion of the till/turn process the Contractor shall combine all soils into one large stockpile that does not exceed 2.0 m in height throughout the entire Biocell.

.9 Supply, place and secure the Biocell cover once tilling is complete and amendments have been added.

3.8 Fill Types and Compaction

.1 Backfill will consist of three fill types;

.1 The screened ¾” (19 mm) overs from the excavated soil;

.2 Off-site imported material supplied by the Contractor; and

.3 Imported backfill made available by PWGSC free of charge from two locations 1) the Man and Beast Pit, located down a road to the east of km 258 of the Alaska Highway (a one-way distance of approximately 17 km from the site); and 2) from the site, within 500m of the excavation.

.1 A copy of the Thurber Engineering Ltd. (TEL) Man and Beast Pit backfill grain size analysis and maximum density testing memorandum is included in Appendix F.

.2 The backfill material at the Man and Beast Pit and from within the site shall be screened by the Contractor to remove all particles sizes retained on the 38 mm sieve. After screening, the backfill material shall not have greater than 8% passing the 0.075 mm (No. 200) sieve.

.2 All backfill shall be placed in lifts not exceeding 300 mm thickness, and compacted to a minimum of 95% of the Modified Proctor Maximum Dry Density (MPMDD), which shall be determined in accordance with ASTM D 1557 and corrected for the fraction of oversize particles (% retained on the 19 mm sieve) contained within the volume of soil tested to determine field density. The standard practice for correction of field densities

for soils containing oversize particles given in ASTM D 4718 shall not be used for soils containing greater than 30% material retained on the 4.75 mm sieve. For material having greater than 30% material retained on the 4.75 mm sieve, oversize correction factors shall be selected from the list of oversize correction factors determined from the vibratory table test results provided in Appendix C of the TEL memorandum included in Appendix F, or from similar testing carried out by the Contractor.

.1 The Contractor's geotechnical engineer shall carry out at least one Modified Proctor Maximum Dry Density (MPMDD) test in accordance with ASTM D 1557, for every 2,000 m^3 of screened backfill material placed and compacted. A complete sieve analysis shall be conducted on each sample of material tested to determine MPMDD.

.2 The minimum field density testing frequency for QC purposes shall be 1 test for every 200 m^2 of area for each lift. Field density testing shall be conducted in accordance with ASTM D 2950, or using an alternate method proposed by the Contractor and subject to the review and acceptance by the Departmental Representative. The nuclear densometer probe shall extend to a minimum depth of 200 mm, but the average depth from all tests shall be at least 250 mm.

.3 The field density testing reports prepared by the Contractor's geotechnical engineer and submitted by the Contractor for review by PWGSC shall include the following at a minimum:

.1 The elevation of the surface of each lift (accurate to the nearest 0.1 m),

.2 A sketch showing the approximate location in plan view of each field density test,

.3 The source of the backfill material,

.4 The estimated fines content of the material at each field density test location,

.5 The estimated oversize fraction of the material at each field density test location,

.6 The most applicable Modified Proctor test results for the material at each field density test location,

.7 The assumed over-size correction factor that is considered to be applicable to the material at each field density test location,

.8 The oversize-corrected MPMDD,

.9 The depth of soil tested at each location,

.10 The measured wet density, water content, and dry density, and

.11 The measured dry density as a percent of the oversize-corrected MPMDD.

.3 For every 12 field density tests or fewer, a sample of the volume of material tested by the nuclear densometer shall be collected and the fines content and oversize fraction shall be measured through sieve analysis conducted in accordance with ASTM C 136. The results of the sieve analyses shall be used to ensure that appropriate MPMDD and over-size corrections are being selected by the Contractor's geotechnical engineer.

.4 The Contractor will coordinate backfill testing with the Contractor's geotechnical engineer.

.5 Placement and compaction of all backfill material must be inspected, stamped and sealed by the Contractor's geotechnical engineer, registered in British Columbia, to ensure it meets the 95% of the Modified Proctor Maximum Dry Density.

.6 The Contractors geotechnical engineer may propose alternative materials and testing criteria for suitable engineered ground. Any proposed alternative materials, testing methodologies and procedures must be accepted by the Departmental Representative.

.7 Any areas not meeting compaction specifications must be rectified at the Contractor's cost. If the backfill material is frozen, alternate compaction verification might be employed with approval from the Contractor's geotechnical engineer and the Departmental Representative.

3.9 Backfilling

.1 Screened ¾" (19 mm) washed overs from the excavated soil will be used for backfilling if deemed to be geotechnically suitable by the Contractor's geotechnical engineer. Any screened ¾" (19 mm) overs not considered geotechnically suitable will be placed onsite as determined by the Departmental Representative.

.2 Areas to be backfilled must be free from debris, snow, ice, organics, debris, and water.

.3 Avoid using backfill material that is frozen or contains ice, snow, organics, or debris.

.4 Contractor must ensure that the clean backfill does not come into contact with the any remaining impacted in-situ material. At minimum the contractor must placed a 6-mil polyethylene liner between clean backfill and adjacent soil and ensure that this is not damaged during the placement of backfill.

.5 Backfill the deepest part of the excavation with the screened ¾" (19 mm) overs and place any imported backfill above.

.6 Stockpile backfill materials on site in areas designated by Departmental Representative. Protect backfill materials from contamination.

.7 Place backfill material and compact in no greater than 300 mm lifts or as directed by the Contractor's geotechnical engineer. Add control moisture content as required to achieve specified density.

.8 Final drainage direction should be confirmed with the Departmental Representative.

.9 Contractor must not proceed with backfilling operations unless final excavation limits are accepted by the Departmental Representative and have been surveyed by the Contractor's Land Surveyor.

Part 4 Restoration

4.1 Cleaning and Reinstatement

.1 Upon completion of Work, remove waste materials and debris, and correct defects as directed by Departmental Representative.

.2 Clean and reinstate areas affected by Work as directed by Departmental Representative.

.3 Final grading as directed by the Departmental Representative.

4.2 As-Built Survey

.2 The Contractor will be required to provide an as-built survey, completed by the Contractor's Land Surveyor, stamped and sealed by a qualified land surveyor registered in British Columbia, following remediation that at minimum identifies the following:

.1 Excavation footprint and topography.

.2 New utility locations (including power pole, lines, etc).

.3 New Maintenance Garage location (including associated new structures/infrastructure, etc.).

.4 Decommissioned and/or abandoned utilities encountered.

.5 Utilities encountered not on current Drawings.

.6 Any repairs made to the Biocell (e.g. positive drainage).

.7 Height of soil placed in Biocell after tilling.

.8 Final site grading.

END OF SECTION

Part 1 General

1.1 SUMMARY

Section includes the following (please note that not all foundation types described below need be incorporated into this project, likewise foundation systems not named in this performance specification may also be proposed.)

.1 The performance and installation criteria of:
  .1 New foundations for the relocated maintenance building
  .2 Proposed refueling containment slab

.2 Grade Beams:
  .1 Material: concrete, reinforced
  .2 Under Beams: compacted granular base and void forms.

.3 Strip Footings:
  .1 Material: concrete, reinforced.

.4 Spread Footings:
  .1 Material: concrete, reinforced.

.5 Concrete Raft Slab:
  .1 Material: concrete, reinforced.

.6 Foundation Walls:
  .1 Material: concrete, reinforced

.7 Slab-On-Grade
  .1 Material: concrete, reinforced

1.2 REFERENCES

.1 National Research Council Canada (NRC)
  .1 British Columbia Building Code 2012
  .2 2010 User's Guide – NBC 2010 Structural Commentaries (Part 4 of Division B)

.2 Canadian Standards Association (CSA)
  .1 CSA 23.1/A23.2 Concrete Materials and Methods of Concrete Construction
  .2 CSA 23.3 Design of Concrete Structures
  .3 CSA 30.18 Billet-Steel Bars for Concrete Reinforcement

.3 American Society for Testing and Materials (ASTM)
  .1 ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
  .2 ASTM A497 Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete
  .3 ASTM A185 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete

.4 Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Above Ground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products PN 1326

.5 Site Specific Geotechnical Information

.1 Geotechnical Investigation and Report completed by GeoPacific Consultants Ltd. for the Sikanni Maintenance Yard dated November 30th, 2011

1.3 DESIGN/PERFORMANCE LOADS

.1 The specified concrete performance described in this section and Section 2.2 *Materials – Reinforced Concrete, Grade Beams, Footings, Slabs, and Foundation walls* represents the minimum performance required by these items of work.

.2 Seismic Resistance:

.1 Seismic Design Parameters: As noted in GeoPacific Consultants Ltd. geotechnical report

.2 Design seismic resistance and horizontal acceleration of foundation structure in accordance with the current BC Building Code.

.3 Design foundation to ensure yielding will occur in the superstructure and not the foundation.

.3 Foundation Support Loads:

.1 To be determined from structural analysis of the existing maintenance building. See Scouten Engineering drawings 1027-02 G-101, and S-101 to S-103, for record drawings of the existing structure.

.2 Assess dead, live, wind, and snow loads on the building, which contribute to the foundation support loads, in accordance with the current edition of the BC Building Code.

.3 Slab-on-grade loads, with respect to the proposed building floor slab-on-grade, and exterior containment slab-on grade, are to be in accordance with:

.1 BC Building Code 2012 Table 4.1.5.3. *Specified Uniformly Distributed Live Loads on an Area of Floor or Roof*, for *Garages for Vehicles exceeding 9000kg gross weight* i.e. a uniformly distributed load of 12 kPa

.2 BC Building Code Table 4.1.5.9. *Specified Concentrated Live Loads on an Area of Floor or Roof*, for *Floors and areas used by vehicles exceeding 9000 kg gross weight* i.e. a minimum specified concentrated load of 54 kN

.3 BC Building Code 2012 Table 4.1.5.3. for office and storage uniformly distributed live loads

.4 BC Building Code 2012 Appendix A 4.1.5.3

.5 Above ground Storage Tank (AST) support loads from the existing AST's to be relocated.

.4 The loads on the proposed generator slab are to be estimated following a review of the existing generator equipment and enclosure

.4 The elevation(s) of the new building foundations are to be such that they maintain the current building height with respect to the floor level, and suit the plan dimensions of the maintenance building.

.5 Water Table:

.1 See GeoPacific Consultants Ltd. geotechnical report for information on the ground water conditions.

.6 Frost Line:

.1 See GeoPacific Consultants Ltd. geotechnical report for information on how to account for freezing ground conditions.

.7 Design of refueling containment slab:

1. Plan dimensions of this slab to suit refueling equipment, vehicles being refueled and Canadian Council of Ministers of the Environment (CCME) Environmental Code of Practice for Above Ground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products PN 1326. See Scouten Engineering Drawing C-102 for the approximate extent of the proposed containment slab.

2. Slab profile and surface gradients to suit slab drain positions and ground surface conditions around the edge of the containment slab.

1.4 SUBMITTALS

.1 Submittals in accordance with Section [01 33 00 - Submittal Procedures].

.2 Engineering Drawings:

.1 Submit structural engineering drawings of the proposed foundations, including but not limited to specification notes, design criteria notes, general arrangements, anchor bolt details, and reinforcement details, sealed by a Professional Engineer, registered in the Province of British Columbia, for review.

.3 Shop Drawings

.1 Submit shop drawings and other technical documentation for proprietary products incorporated into the proposed foundation design.

.4 Other

.1 *Schedule B Assurance of Professional Design and Commitment for Field Review*, from the current BC Building Code, completed and sealed by each Professional Engineer involved in the design of the items of work covered in this specification.

.2 Proposed concrete mix design

.3 Proposed method for batching concrete i.e. permanent concrete plant, mobile batching plant, or other.

.4 Concrete test results, including slump, compressive strength, and entrained air content.

.5 Engineer Of Record (EOR) field review records. Field review records to include; pertinent notes, photographs and sketches that record the elements of construction reviewed, issues discussed, and proposed course of action for these issues as required.

.6 Upon substantial completion of the items of work and final site visit(s) submit *Schedule C-B Assurance of Professional Field Review and Compliance*, from the

current BC Building Code, completed and sealed by each Professional Engineer involved in the design of the items of work covered in this specification.

.7 Upon substantial completion of the items of work and final site visit(s) complete and submit record drawings of the foundations. Record drawings are to include any construction period revisions.

1.5 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section [01 35 29.14 - Health and Safety For Contaminated Sites]

1.6 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

Part 2 Products

2.1 MATERIALS

.1 Not Used.

2.2 REINFORCED CONCRETE GRADE BEAMS, FOOTINGS, SLABS, AND FOUNDATION WALLS

.1 Reinforcement: deformed steel bars conforming to CSA –G30.18 Grade 400 MPa unless noted otherwise.

.2 Concrete Materials: See table below.

CONCRETE ELEMENT	EXPOSURE CLASS	28-DAY COMPRESSIVE STRENGTH	MAX. AGGREGATE SIZE	AIR CONTENT	MAX. W/C-RATIO	CEMENT TYPE (1)
EXTERIOR						
FOUNDATIONS	F-2	30 MPa [4,350 psi]	20 mm [3/4"]	4 - 7 %	0.50	GU (2)
RETAINING WALLS	F-2	30 MPa [4,350 psi]	20 mm [3/4"]	4 - 7 %	0.50	GU
SLABS-ON-GRADE (3)	C-2	32 MPa [4,600 psi]	20 mm [3/4"]	5 - 8 %	0.45	GU
WALLS & COLUMNS	F-2	30 MPa [4,350 psi]	20 mm [3/4"]	4 - 7 %	0.50	GU
FLOOR SLABS & BEAMS	F-2	30 MPa [4,350 psi]	20 mm [3/4"]	4 - 7 %	0.50	GU
INTERIOR						

SLABS-ON-GRADE (3)	N	30 MPa [4,350 psi]	20 mm [3/4"]	NONE	0.50	GU
WALLS & COLUMNS	N	30 MPa [4,350 psi]	20 mm [3/4"]	NONE	0.50	GU
FLOOR SLABS & BEAMS	N	30 MPa [4,350 psi]	20 mm [3/4"]	NONE	0.50	GU
COMPOSITE STEEL DECK	N	25 MPa [3,600 psi]	14 mm [1/2"]	NONE	0.55	GU
MASONRY FILL	N	15 MPa [2,200 psi]	10 mm [3/8"]	NONE	0.55	GU

Notes:

(1) BLENDED GENERAL USE HYDRAULIC CEMENT (TYPE GUb) OR HIGH-EARLY-STRENGTH HYDRAULIC CEMENT (TYPE HE OR HEb) MAY BE USED IF APPROVED BY THE ENGINEER

(2) UNLESS SULPHATE-RESISTANT CEMENT (TYPE MS, MSb, HS OR HSb) IS REQUIRED BY GEOTECHNICAL ENGINEER

(3) USE SPECIFICATION FOR EXTERIOR SLAB-ON-GRADE FOR GARAGE FLOOR SLABS

Part 3 Execution

3.1 INSTALLATION – RENFORCED CONCRETE FOUNDATIONS

.1 Concrete shall conform to and be placed in accordance with CSA-A23.1

.2 Footings to support and resist imposed loads.

.3 Form concrete for component configuration and dimensions.

.4 Accommodate utilities that pass through slab with sleeves, detailed to allow for differential movement.

.5 Place reinforcing steel in accordance with good construction practice, and the guidance given in CSA A23.1 and A23.2

.6 Place concrete in such a way to reduce the risk of segregation of concrete components, such as aggregate, honey combing, and other defects that can result from poorly placed or compacted concrete.

.7 Trowel top surface smooth and level.

3.2 QUALITY CONTROL

.1 Field Tests: required. See submittals described above, and to be at the discretion of the Engineer of Record (EOR.)

.2 Field Inspection: required, by the EOR. Number, frequency, and timing of field inspections to be at the discretion of the EOR and to allow them to confirm the foundations have been built in general accordance with the engineering drawings, and

complete and submit a *Schedule C-B Assurance of Professional Field Review and Compliance*, from the current BC Building Code.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Standard Slabs-on-Grade.

.2 Structural Slabs-on-Grade.

.3 Inclined Slabs-on-Grade.

.4 Trenches.

.5 Pits and Bases.

.6 Subdrainage System.

.7 Insulation.

.8 Other Slabs-on-Grade.

.9 Note: This Section is to be read in conjunction with Section A1010 *Standard Foundations*.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM)

- .1 ASTM A48, Specification for Gray Iron Castings.
- .2 ASTM C136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- .3 ASTM D1751, Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.
- .4 ASTM E96, Test Methods for Water Vapor Transmission of Materials.

.2 Canadian Construction Materials Centre (CCMC)

.3 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-19.24, Multicomponent, Chemical-Curing Sealing Compound.
- .2 CAN/CGSB-37.2, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
- .3 CGSB 51-GP-51M, Polyethylene Sheet for Use in Building Construction.
- .4 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series.

.4 Canadian Standards Association (CSA)

- .1 CSA A23.1/A23.2, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
- .2 CSA A23.-, Design of Concrete.
- .3 CSA A3000, Cementitious Materials Compendium (Consists of A5-98).
- .4 CSA G30.5, Welded Steel Wire Fabric for Concrete Reinforcement.

.5 CAN/CSA-G30.18, Billet-Steel Bars for Concrete Reinforcement.

.6 CSA G40.20/G40.21, General Requirements for Rolled or Welded Structural Quality Steel.

.7 CAN/CSA-G164, Hot Dip Galvanizing of Irregularly Shaped Articles.

.8 CSA O86.1, Engineering Design in Wood (Limit States Design).

.9 CSA O121, Douglas Fir Plywood.

.10 CSA W59, Welded Steel Construction (Metal Arc Welding) (Metric Version).

.5 Reinforcing Steel Institute of Ontario (RSIO)

.1 Detail reinforcing steel in accordance with Manual of Standard Practice of R510.

.6 Underwriters= Laboratories of Canada (ULC)

.1 CAN/ULC-S701, Thermal Insulation, Polystyrene, Boards and Pipe Coverings.

1.3 PERFORMANCE REQUIREMENTS

.1 Slabs on Grade

.1 Design Slabs on Grade in accordance with:

.1 CSA A23.3.

.2 Sub-Surface Investigation Report.

.3 Soil, environmental and climatic conditions.

.4 Varied building uses and occupancies.

.5 Provide slab depressions and slopes to drains.

.6 Floor grates.

.7 Provide housekeeping pads for mechanical and electrical equipment.

.8 Treat surface of new slabs with a proprietary hardener.

.2 Design Criteria:

.1 See Section *1.3 Design/Performance Loads* in Section A1010 Standard Foundations for design loads.

.2 Exterior slab design to also account for Aboveground Storage Tank (AST) loads and good engineering practice for the design of AST foundations..

.3 Heavy usage, exposure to de-icing agents and freeze-thaw conditions at exterior door locations.

.4 Surface tolerances: to CSA A23.1. Clause 22, straight edge method: conventional

.5 Slab drainage inside the maintenance building and the exterior containment slab.

.3 Control Joint:

.1 Provide control joint to eliminate uncontrolled shrinkage cracking. Sawcut control joints. Maximum spacing 5.0 m. Fill with joint sealer/filler.

.4 Expansion Joint:

.1 Install premoulded joint filler in expansion and isolation joints full depth of slab flush with finished surface.

.5 Waterstops:

.1 Install waterstops to provide continuous water seal.

.2 Do not distort or pierce waterstop in such a way as to hamper performance.

.3 Do not displace reinforcement when installing waterstops.

.4 Use equipment to manufacturers requirements to field splice waterstops.

.5 Tie waterstops rigidly in place.

.2 Damproof Membrane

.1 Install damproof membrane under concrete slab-on-grade inside building and under proposed containment slab.

.2 Lap damproof membrane minimum 150 mm at joints and seal.

.3 Seal punctures in damproof membrane before placing concrete. use patching material at least 150 mm larger than puncture and seal.

.3 Subdrainage System

.1 Ensure graded subgrade, subbase, and/or base (as required) conforms with required drainage pattern before placing bedding material.

.2 Gradations to be within limits specified when tested to ASTM C136. Sieve sizes to CAN/CGSB-8.1.

.3 Lay pipe drains on prepared bed, true to line and grade with inverts smooth and free of sags or high points. Ensure barre of each pipe is in contact with bed throughout full length.

.4 Make watertight connections to existing drains, new or existing manholes and catch basins.

.5 Weeping tile corrugated, perforated PVC pipe complete with cloth filter fabric sock and washed drainage aggregate mixture of crushed stone or crushed gravel.

1.4 SUBMITTALS

.1 Product Data: Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section [01330 - Submittal Procedures].

.2 Shop Drawings: Submit in accordance with Section [01330 - Submittal Procedures].

.1 Submit shop drawing to indicate size, shape, location and all necessary details of reinforcing in accordance with Manual of Standard Practice of RSIO.

.2 Drawings submitted showing formwork and falsework design in accordance with CSA A23.1.

.3 Samples: Submit in accordance with Section [01330 - Submittal Procedures].

.1 Submit insulation including CCMC listing.

.2 Weeping tile complete with cloth filter fabric sock.

.4 Quality Assurance Submittals: Submit in accordance with Section [013300 – Submittal Procedures].

.1 Sealed: Formwork, Falsework, bracing, and shoring required to complete work must bear stamp and signature of professional engineer licensed in the Province of British Columbia as required by Part 20 of the WorksafeBC Regulations.

.2 Certificates: Times from charging mixer to final deposit to be submitted in writing.

.3 Test Reports: Submit report determining granular fill beneath concrete slabs is compacted. Independent testing laboratory must indicate compliance with specifications and physical properties.

.4 Affidavit: Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples take. Indicate curing compounds compatible with applied concrete finish.

.5 Cylinders: Testing of concrete and concrete materials will be carried out by a testing laboratory in accordance to CSA A23.1.

.6 Non-Destructive Methods: Testing concrete shall be in accordance with CSA A23.2. Reports will be made on form conforming to CSA A23.2, App. B.

.7 Instructions: Submit manufacturer's installation instructions for topping products used before base course has completely set in accordance with CAN/CSA-A23.1 and topping manufacturers' instructions.

.8 Manufacturer's Reports: Arrange involvement of manufacturer's representative and submit copies of manufacturer's field reports to ensure proper installation as required.

.9 Maintenance Data: Submit maintenance data for incorporation into manual specified in Section [01780 - Closeout Submittals].

1.5 QUALITY ASSURANCE

.1 Inform PWGSC and relevant engineer of record prior to placing concrete, allowing enough notice to organise and complete field reviews to see the work before concrete, vapour barrier, and reinforcement (as required) is placed, and for any corrective work to be completed satisfactorily.

1.6 PRE-INSTALLATION CONFERENCE

.1 Pre-installation meeting: Comply with Section [013119 - Project Meetings].

.1 Conduct pre-installation meeting 2 weeks prior to start of installation with general contractor, manufacturer and installer to:

.1 Examine sub-surface investigation report and recommendations.

.2 Discuss known underground utility lines and buried objects to be reviewed.

.3 Ensure building substrate will be firm, straight, dry, free of snow, ice or frost and clean of dust and debris. Report must be submitted determining granular fill beneath concrete slabs is compacted before casting concrete on it.

.4 Ensure graded subgrade, sub-base, and/or base (as required) conforms with required drainage pattern before placing bedding material.

.5 Review manufacturers' installation instructions and manufacturers' warranty requirements as required.

.6 Concrete slab finish.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Do not place concrete in rain. Protect exposed surfaces from rain and other adverse weather conditions until final set occurs.

.2 In cold weather conditions, where concrete is exposed to temperatures below 5EC, carry out non-destructive testing to CSA A23.2, Appendix A and related ASTM Standards to determine concrete strength prior to stripping formwork. Report results to the Engineer.

.3 Ensure concrete has cured 28 days minimum and is dry.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Deposit packaging materials in appropriate container on site for recycling or reuse.

.3 Avoid using landfill waste disposal procedures when recycling facilities are available.

.4 Collect and separate plastic, paper packaging and corrugated cardboard.

.5 Dispose of corrugated cardboard, polystyrene and plastic packaging material in appropriate on-site bin.

1.9 WARRANTY

.1 Project Warranty: Refer to construction contract for project warranty provisions.

Part 2 Products/Materials

.1 Standard Slabs-on-Grade

- .1 Subgrade: In accordance with good engineering design and the engineered drawings and specifications submitted by the contractor.
- .2 Finished Grade: In accordance with good engineering and construction practices. Tolerances: plus or minus 12 mm in 3000 mm.
- .3 Moisture Barrier: poly sheet.
- .4 Concrete: cast-in-place – See specification *A1010 Standard Foundations*.
- .5 Reinforcing: deformed steel billet bars, Grade 400

.2 Trenches

- .1 As per .1 Standard Slabs-on-Grade unless noted otherwise.
- .2 Trench Drain Frames: Fabricate frames from steel, L55 x 55 x 6 frame. Finish: galvanized.
- .3 Trench Covers: grey iron to ASTM A48 Class B. Steel fabricate from 6 mm thick raised pattern plate. Supply trench covers in 1200 mm removable lengths. Finish: galvanized.
- .4 Prefabricated, trench drain systems: precast concrete trench drains with galvanized steel covers.

.3 Pits and Bases

- .1 As per .1 Standard Slabs-on-Grade unless noted otherwise.
- .2 Frames: Fabricate frames from steel, L55 x 55 x 6 frame. Finish: galvanized.

.3 Covers: grey iron to ASTM A48 Class B. Steel fabricate from 6 mm thick raised pattern plate. Supply trench covers in 1200 mm removable lengths. Finish: galvanized.

.4 Subdrainage System

.1 Subgrade Drainage Aggregate: nominal 25 mm, washed, graded mixture of crushed stone or crushed gravel.

.2 Weeping tile: 100 mm diameter, perforated PVC pipe complete with cloth filter fabric sock.

.5 Below Slab Insulation

.1 Insulation: Provide below slab insulation in accordance with the British Columbia Building Code. Note that it is not the intention to fully comply with the energy efficiency requirements of the BC Building Code.

.6 Accessories

.1 Grout: non-shrink, non-metallic, flowable, with a minimum 28 day compressive strength of 50MPa to be placed under all bearing and base plates in accordance with manufacturer's installation requirements.

.2 Steel sections and plates: to CSA G40.20/G40.21 Grade 300W minimum.

.3 Hot Dip Galvanizing: to CAN/CSA-G164.

.4 Welded Steel Construction (Metal Arc Welding): to CSA W59.

.5 Formwork: dimensional lumber and plywood to CSA O121 and CSA O86.1.

.6 Reinforcing steel: welded steel wire fabric to CSA G30.5 billet steel, deformed bars to CAN/CSA-G30.18 Grade: 400.

.7 Joint filler: bituminous impregnated fibre board to ASTM D1751.

.8 Damproofing: to CAN/CGSB-37.2, emulsified asphalt, mineral colloid type, unfilled.

.9 Polyethylene film: to CGSB 51-GP-51M. Minimum 6 mils. Maximum practical width.

.10 Damproofing membrane: to ASTM E96, premoulded membrane, Method B, 0 transmission rate.

.11 Accessories: Waterstops. Control joints and expansion joints.

.12 Portland cement: to CAN/CSA-A5, type 10.

.13 Water: to CSA A23.1.

2.2 SYSTEM PERFORMANCE

.1 As required to achieve specified performance criteria; functionally compatible with adjacent materials and components, at a minimum meet the requirements and relevant standards listed under Reference Standards and Section A1010 *Standard Foundations*.

.2 Performance will provide appropriately finished slabs-on-grade for the fuel containment area, and the floor of the relocated maintenance building that are appropriate for anticipated usage and traffic in each area per following criteria.

2.3 SOURCE QUALITY CONTROL

.1 Installer/Supplier Qualifications:

.1 Submit a letter of competence issued by manufacturer indicating minimum 5 years experience related to installation of product.

.2 Submit proof that qualified concrete contractors are members in good standing.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheet.

3.2 INSTALLATION

.1 Install slabs-on-grade, trenches, pits and bases, subdrainage system, perimeter insulation and accessories as required in accordance with the engineered drawings and specifications, issued for construction and reviewed by the project Owner and/or Owner's representative, or manufacturer's written instructions, product data, References and authorities having jurisdiction as applicable.

3.3 FIELD QUALITY CONTROL

.1 Field Tests: required. See submittals described above, and to be at the discretion of the Engineer of Record (EOR)

.2 Field Inspection: required, by the EOR. Number, frequency, and timing of field inspections to be at the discretion of the EOR and to allow them to confirm the foundations have been built in general accordance with the engineering drawings, and complete and submit a *Schedule C-B Assurance of Professional Field Review and Compliance*, from the current BC Building Code.

.3 Manufacturer's Services (as required:)

.1 Ensure manufacturer's representative review work involved in handling, installation/application, protection and cleaning, of products and submit written reports, in acceptable format, to verify compliance of Work with Contract.

.2 Manufacturer's Site Review: Provide manufacturer's site review consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work, at stages that suit the adequate field review of the products and any on-site defects that are addressed during the work.

.4 Obtain report, within 3 days of review, and submit, immediately, to the Owner's lead consultant.

.4 Verification:

.1 Independent Concrete Inspection and Testing Agency Services:

.1 The independent concrete inspection and testing agency will evaluate and report upon the proposed equipment, mixing and quality control procedures and storage arrangements planned for site mixed concrete for concrete construction. Minimum acceptable standard of quality is CSA A23.1. This agency shall also test aggregate and design proposed mixes.

.2 Notify testing agency of concreting schedule. Ensure supervisory personnel are on hand when concrete is being cast so that placing and curing procedures will be observed. Provide samples and standard test cylinders. Provide group of 3 test cylinders for each standard strength test. One cylinder will be tested at 7 days and two at 28 days. Take samples at discharge end of pipe when concrete is pumped.

.5 Concrete Tests:

.1 One standard strength is required for each 35 m^3 of concrete placed, but not less than one test for each mix design of concrete placed each day.

.2 One standard air entrainment test is required for each 35 m^3 of air-entrained concrete or portion thereof placed each day.

.3 Make slump tests in accordance with CSA standard CAN3-A23.2, Test Method A23.2-5C, with each standard strength test.

.6 Reinforcement:

.1 Adjust reinforcement immediately before concrete placed to ensure that all bars are secured in their correct positions. Arrange to have a crew of reinforcing setters on hand as concrete is placed.

.2 Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions and professional engineer responsible for this items of the work.

.3 Verify dimensions, tolerances, deflection, expansion and control joints and method of attachment with other work on-site.

.4 Finish concrete to engineer's drawings, specifications, and instructions.

.5 Concrete floor to have finish hardness equal or greater than Mohs hardness in accordance with CSA A23.1.

3.4 FINISHING

.1 Use curing compounds compatible with applied finish on concrete surfaces. Provide written affidavit that compounds used are compatible.

.2 Applied Finishes:

.1 Interior concrete slabs are to be left exposed and require a smooth surface: initial finishing operation followed by final finishing comprising steel trowelling as specified in CSA A23.1 to produce hard, smooth, dense trowelled surface free from blemishes; finishing tolerance classification: flat.

.2 Exterior concrete slabs are to be left exposed and are to be finished with a concrete broom providing a brushed finish.

3.5 CLEANING

.1 Remove rubbish and surplus materials.

.2 Clean installed products in accordance with manufacturer's recommendation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Structural timber framed floors and walls
- .2 Structural steel framed floors.
  - .1 Structural steel.
  - .2 Steel joists.
  - .3 Metal fabrications
- .3 Floor construction fireproofing.
- .4 Floor construction firestopping and smoke seals.
- .5 The supplementary diagonal steel bracing identified in the Scouten Engineering drawings and described in the '*Summary of Work*' is also be designed, fabricated, and installed in accordance with this section.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CAN/CSA-S16, Limit States Design of Steel Structures.
- .2 CSA S136, North American Specification for the Design of Cold-Formed Steel Structural Members.
- .3 CSA S136.1, Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.
- .4 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
- .5 CAN/CSA-W48, Filler Metals and Allied Materials for Metal Arc Welding (Developed in cooperation with the Canadian Welding Bureau).
- .6 CSA W55.3, Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .7 CAN/CSA-W59, Welded Steel Construction (Metal Arc Welding).
- .8 CSA-O86, Engineering Design in Wood

.2 Canadian Sheet Steel Building Institute (CSSBI)

- .1 CSSBI 12M, Standard for Composite Steel Deck.

.3 National Research Council (NRC) / Institute for Research in Construction (IRC)

- .1 British Columbia Building Code 2012 (BCBC).

.4 Canadian Wood Council

- .1 Wood Design Manual

.5 The Master Painters Institute (MPI) / Architectural Painting Specification Manual -

- .1 MPI #18, Organic Zinc Rich Primer.
- .2 MPI #19, Inorganic Zinc Rich Primer.
- .3 MPI #23, Oil Alkyd Primer.

.4 MPI #76, Quick Dry Alkyd Metal Primer.

.5 MPI INT 5.1 A to Z, Structural Steel and Metal Fabrications Systems

.6 Underwriters' Laboratories Inc. (UL)

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S101, Fire Endurance Tests of Building Construction and Materials.

.2 ULC-S115, Fire Tests of Firestop Systems.

.8 Underwriters' Laboratories of Canada (ULC) / Firestop Systems and Components - 2003 Edition

.1 Guide No.40U19.13-[2003], Firestop System Components.

.2 Guide No. 40U19.15-[2003], Fittings and Outlet Boxes for Service Penetrations.

1.3 DESIGN PERFORMANCE REQUIREMENTS

.1 Floors:

.1 Limit floor joist deflection due to specified live load to 1/360 of span. Limit floor joist deflection due to specified load to 1/180 of span.

.2 Design floor for specific mechanical equipment weights but uniform dead load not to be less than 1.0 kPa in addition to self-weight.

.3 Provide mechanical pads under floor mounted equipment. Provide sleeves, raceways and integrate mechanical and electrical requirements.

.4 Design live load not to be less than 4.8 kPa.

.5 Construction to mitigate vibration caused by mechanical equipment.

.2 Vertical and lateral load resisting elements.

.1 Interior walls: non-loadbearing and non-lateral load resisting to permit future modifications.

.2 Interior columns: regularly spaced and to accommodate architectural requirements.

.3 Reinforce walls for mounted items and openings.

.4 Lateral loads due to nominal design loads or earthquake loads are to be resisted by steel braced frames, moment frames, or sheathed wood framed walls.

.5 The performance of the new supplementary diagonal steel bracing is to be designed in accordance with Part 4 of the British Columbia Building Code, and to suit site specific climatic data and seismic hazard values. Site specific climatic data is available from Environment Canada.

.3 Structural steel:

.1 Design details and connections to CAN/CSA-S16 or CSA S136 to resist forces, moments, shears and allow for movements.

.2 Design steel joists and bridging to carry design loads in accordance with CAN/CSA-S16 or CSA S136.

.3 Steel structure to be exposed or may be exposed in future renovations. Steel structural elements to be regular with uniform spacing of elements. Welds or bolted connections to be neat and compact. Bridging to be straight with neat, compact connections.

.4 Structural wood framing:

.1 Design and detail in accordance with CSA-O86 to resist forces, moments, shears and allow for movements.

.5 Metal fabrications:

.1 Design metal fabrications to withstand service loads and service environment.

.6 Floor construction fireproofing:

.1 Design fireproofing to suit the fire safety requirements of the British Columbia Building Code 2012.

.2 Use only ULC, UL, WH, and NRC/IRC certified systems. Use tested assemblies or as determined by standard calculation method.

.7 Floor construction firestopping and smoke seal.

.1 Asbestos-free materials and systems installed in accordance with tested assemblies acceptable to authorities having jurisdiction to provide effective barrier against passage of fire, smoke and gasses, firefighter's hose stream, and where specifically designated, passage of liquids.

.2 System to provide fire-resistance rating (flame and temperature) not less than fire-resistance rating of surrounding floor, wall or other assembly.

.3 Service penetration components and assemblies, including back-up materials and supports to be certified in accordance with ULC-S115, CAN/ULC-S101, and be ULC listed.

.4 Design combined and/or built-up site systems in accordance with ULC, FM or WH system restrictions and technical evaluation acceptable to authorities having jurisdiction.

.1 Ensure systems provide flame and temperature rating in accordance with those outlined in NBC, and provide effective barrier against passage of flame, smoke and gasses.

.5 Sealants and putty for overhead and vertical joints: non-sagging; seals for floors are to be self-levelling.

.6 Compressive strength of products to provide self support at penetrating item, and their integrity as tested in ULC vertical application.

.7 Products: compatible with abutting dissimilar architectural coatings and finishes at floors, walls, ceilings and waterproofing membranes.

1.4 SUBMITTALS

.1 Make submittals in accordance with Section [01 33 00 - Submittal Procedures.

.2 Engineering Drawings:

.1 Submit structural engineering drawings of the proposed work, including but not limited to specification notes, design criteria notes, general arrangements, anchor bolt details, and other details, sealed by a Professional Engineer, registered in the Province of British Columbia, for review.

.2 *Schedule B Assurance of Professional Design and Commitment for Field Review*, from the current BC Building Code, completed and sealed by each Professional

Engineer involved in the design of the items of work covered in this specification.

.3 Engineer Of Record (EOR) field review records. Field review records to include; pertinent notes, photographs and sketches that record the elements of construction reviewed, issues discussed, and proposed course of action for these issues as required.

.4 Upon substantial completion of the items of work and final site visit(s) submit *Schedule C-B Assurance of Professional Field Review and Compliance*, from the current BC Building Code, completed and sealed by each Professional Engineer involved in the design of the items of work covered in this specification.

.5 Upon substantial completion of the items of work and final site visit(s) complete and submit record drawings of the foundations. Record drawings are to include any construction period revisions.

.3 Shop drawings:

.1 Submit shop drawings to indicate project layout, including details, fabrication and erection details.

.2 Submit drawings stamped and signed by qualified professional engineer registered or licensed in the Province of British Columbia, Canada.

.4 Quality Assurance Submittals: Submit the following in accordance with Section [01 33 00 – Submittal Procedures].

.1 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and data sheet.

.5 Indicate and provide MSDS for following:

.1 Sealants.

.2 Tape.

.3 Proprietary Joints.

.6 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities having jurisdiction prior to beginning of Work as required.

1.5 QUALITY ASSURANCE

.1 Companies to be certified under CSA W47.1 for fusion welding of steel joists and CSA W55.3 for resistance welding.

.2 Field Review

.1 As deemed appropriate by the EOR to allow them to complete and submit a Schedule CB as described above.

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section [01 35 29.19 - Health and Safety For Contaminated Sites].

1.6 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.
- .5 Place materials defined as hazardous or toxic in designated containers in accordance with Section [01 35 43 - Environmental Procedures].
- .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .7 Ensure emptied containers are sealed and stored safely in accordance with Section [01 35 43 - Environmental Procedures].
- .8 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.7 INDOOR AIR QUALITY (IAQ) MANAGEMENT PLAN

.1 Develop and implement Indoor Air Quality (IAQ) Management Plan in accordance with Section [01 33 00 - Submittal Procedures] and Section [01 35 29.14 – Health and Safety For Contaminated Sites] for construction and preoccupancy phases of building.

Part 2 Products

2.1 STRUCTURAL STEEL

.1 Columns and beams supporting floors:

- .1 Structural steel: to CSA G40.20/G40.21 Grade 350W or Grade 300W.
- .2 Anchor bolts: to CSA G40.20/G40.21, Grade 300W.
- .3 Bolts, nuts and washers: to ASTM A325 except anchor bolts may be to ASTM A193 Grade B7, and bolts connecting secondary structural members may be to ASTM A307.
- .4 Welding materials: to CAN/CSA-W59 and certified by Canadian Welding Bureau.
- .5 Shop paint primer: as per *2.1.3.2 Fabrication* (see below.)
- .6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m^2.

.2 Floor joists.

- .1 Fabricate steel joists and accessories in accordance with CAN/CSA-S16, CSA S136 and in accordance with reviewed shop drawings.
- .2 Weld in accordance with CAN/CSA-W59
- .3 Provide diagonal and horizontal bridgings and anchorages.

.3 Fabrication.

.1 Fabricate structural steel in accordance with CAN/CSA-S16, CSA S136 and in accordance with approved shop drawings.

.2 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16 except where members to be encased in concrete.

2.2 METAL

.1 Steel sections, rolled steel, bar stock and plates: to CSA G40.21, Grade 300W or 350W to suit project requirements.

.2 Hollow structural sections: to CSA G40.21, Grade 350W.

.3 Steel pipe: to ASTM A53/A53M, Type E or S, Grade B, use ANSI Schedule 40, black or galvanized finish to suit expose.

.4 Welding materials: to CAN/CSA-W59.

.5 Welding electrodes: to CAN/CSA-W48.

.6 Field connection bolts and anchorbolts.

.1 Structural connectors: ASTM A325M, heavy structural bolt, hexagonal nut and 1 hardened washer.

.2 Non-structural connectors: ASTM A307, hexagonal bolt, nut and washer.

.7 Galvanizing:

.1 ASTM A123/A123M for zinc (hot galvanized) coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip.

.2 CAN/CSA-G164 for galvanizing of irregularly shaped articles.

.3 ASTM A123/A123M zinc coating (hot dip) on assembled steel products.

.8 Shop paint prepaint finish:

.1 Cold phosphate treatment to galvanized surfaces: ASTM D2092.

.2 Primer for interior exposure: MPI #76.

.9 Touch-up for galvanized surfaces: zinc rich ready mix organic primer.

.10 Fabrication:

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Fabricate in accordance with reviewed shop drawings.

.3 Fabricate structural components to requirements of CAN/CSA-S16.

.4 Supply fastenings, anchors and accessories required for fabrication and erection.

.5 Hot dip galvanize items occurring on or in exterior wall or slab.

2.3 Wood

.1 National Lumber Grades Authority (NLGA)

.2 Standard Grading Rules for Canadian Lumber [2005].

.3 Lumber: unless specified otherwise, softwood, SPF, moisture content 19% (S dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 Forestry Stewardship Council (FSC) certified.

.4

2.4 FLOOR CONSTRUCTION FIREPROOFING

.1 Sprayed fireproofing: ULC certified cementitious or asbestos-free fireproofing qualified for use in ULC Designs specified.

.2 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.

.3 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.

2.5 FLOOR CONSTRUCTION FIRESTOPPING AND SMOKE SEAL

.1 Fire stopping and smoke seal systems: in accordance with ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.

.2 Service penetration components, assemblies and back-up materials: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40U19.

.3 Service penetration firestop components: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No.40U19.13 and ULC Guide No. 40U19.15 under the Label Service of ULC.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water, when applicable: potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

.11 Fibre firestopping: bearing ULC label, mineral fibre material capable of being compressed into space at top of masonry partitions.

Part 3 Execution

3.1 INSTALLATION: STRUCTURAL STEEL

.1 Columns and Beams:

.1 Install steel structure, details and connections in accordance with requirements of CAN/CSA-S16 and CSA S136 with CSA S136.1 to resist forces, moments and shears.

.2 Welds or bolted connections to be neat and compact.

.2 Steel joists:

.1 Install steel joists, bridging details, other secondary framing elements and connections in accordance with CAN/CSA-S16 and approved erection and fabrication drawings.

.2 Welds or bolted connections to be neat and compact.

.3 Bridging to be straight with neat, compact connections.

3.2 INSTALLATION: WOOD FRAMING

.1 Comply with requirements of the British Columbia Building Code 2012 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.4 Countersink bolts where necessary to provide clearance for other work.

.5 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.3 INSTALLATION: METAL FABRICATIONS

.1 Do welding work in accordance with CAN/CSA-W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Exposed fastening devices to match finish and be compatible with material through which they pass.

.4 Make field connections with bolts to CAN/CSA-S16, or weld.

.5 Provide suitable means of anchorage including dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.6 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection with primer.

.7 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

3.4 INSTALLATION: FLOOR CONSTRUCTION FIREPROOFING

.1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.

.2 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings.

.3 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.

.4 Apply fireproofing directly to open web joists without use of expanded lath.

.1 Tamp smooth, surfaces visible in finished work

.2 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.

.3 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer where fireproofing is to be painted.

3.5 INSTALLATION: FLOOR CONSTRUCTION FIRESTOPPING AND SMOKE SEAL

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and application for interior stairs.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA S16, Limit States Design of Steel Structures.
.2 CSA W47.1, Certification of Companies for Fusion Welding of Steel.
.3 CSA W59, Welded Steel Construction (Metal Arc Welding).
.4 CAN/CSA W117.2, Safety in Welding, Cutting and Allied Processes (Developed in co-operation with the Canadian Welding Bureau).
.5 CAN/CSA O86, Engineering Design in Wood

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS).

.1 Material Safety Data Sheets (MSDS).

.3 National Research Council Canada (NRC)

.1 British Columbia Building Code 2012
.2 2010 User's Guide – NBC 2010 Structural Commentaries (Part 4 of Division B)

1.3 SYSTEM DESCRIPTION

.1 Provide stairways consisting but not limited to the following:

.1 Stairway to access the replacement mezzanine floor in the relocated maintenance shop and associated guard and handrails in accordance with Part 3 and Part 4 of the British Columbia Building Code 2012

1.4 DESIGN REQUIREMENTS

.1 Design stairway in accordance with the British Columbia Building Code 2012 and to suit the light industrial use of the maintenance building.

.2 Design stairway to carry minimum uniform live load of 4.8kPa (100 psf) on projected plan area.

.3 Design details and connections in accordance with requirements of CAN/CSA-S16 (steel) or CAN/CSA–O86 (wood) as applicable to resist forces, moments, and shears.

.4 Design anchorage inserts for installation as part of other Sections of Work.

1.5 SUBMITTALS

.1 Make submittals in accordance with Section [01 33 00 - Submittal Procedures]

.2 Submit engineered drawings (and shop drawings as required) and including as a minimum.

.1 Plans, elevations, sections, and details of stringers, headers, treads, nosings, risers, landings, handrails and guardrails.

.2 Materials, sizes, thicknesses, finishes, connections, method of anchorage, number of anchors, supports, and accessories.

.3 Setting diagrams for installation of anchors, location of pockets, weld plates, and blocking.

.4 Submittal drawings are to be signed and sealed by a professional engineer or registered in the Province of British Columbia.

.3 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with authorities having jurisdiction prior to beginning of Work.

.4 Quality Assurance Submittals: submit following in accordance with Section [01 33 00 – Submittal Procedures].

.1 *Schedule B Assurance of Professional Design and Commitment for Field Review*, from the current BC Building Code, completed and sealed by each Professional Engineer involved in the design of the items of work covered in this specification.

.2 Engineer Of Record (EOR) field review records. Field review records to include; pertinent notes, photographs and sketches that record the elements of construction reviewed, issues discussed, and proposed course of action for these issues as required.

.3 Upon substantial completion of the items of work and final site visit(s) submit *Schedule C-B Assurance of Professional Field Review and Compliance*, from the current BC Building Code, completed and sealed by each Professional Engineer involved in the design of the items of work covered in this specification.

1.6 QUALITY ASSURANCE

.1 Retain qualified professional engineer, registered in the Province of British Columbia with experience in Work of comparable complexity and scope, to perform following services.

.1 Design stairway in accordance with design requirements and to resist live, dead, lateral, wind, and seismic loads:

.2 Review, stamp, and sign shop drawings.

.2 Execute welding by firms certified in accordance with CSA W47.1

.3 Ensure welding operators are licensed per CSA W47.1for types of welding required by Work.

.4 Submit certification from fabricator that stairways conform to design requirements specified herein.

.5 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section [01 35 29.14 - Health and Safety For Contaminated Sites].

1.7 DELIVERY, STORAGE AND HANDLING

.1 Handle work of this section in accordance with NAAMM AMP 510.

.2 Protect finished surfaces with [wrapping] [strippable coating].

.1 Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

.3 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.

.5 Place materials defined as hazardous or toxic in designated containers in accordance with Section [01 35 43 - Environmental Procedures].

.6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.7 Ensure emptied containers are sealed and stored safely in accordance with Section [01 35 43 - Environmental Procedures].

.8 Fold up metal and plastic banding, flatten and place in designated area for recycling..

Part 2 Products

2.1 SUSTAINABLE REQUIREMENTS

.1 Not Used.

2.2 MATERIALS

.1 Materials in accordance with those described in *Section B1010 Floor Construction*

.2 Include materials, products, accessories, and supplementary parts necessary to complete assembly and installation of Work of this Section.

.3 Incorporate only new materials free from defects which impair strength, durability.

.1 Visible defects not allowed.

.4 Welding materials: to CSA W59.

2.3 FABRICATION

.1 Verify dimensions of existing Work before beginning fabrications and report discrepancies to Engineer.

.2 Fabricate stairway to reviewed engineered and shop drawings.

.3 Fit and assemble Work in shop where possible.

.1 Shop fabricate stairway in sections as large and complete as practicable.

.2 Where shop fabrication is not possible, make trial assembly in shop.

.4 Accurately cut, machine and fit joints, corners, copes and miters so that junctions between components fit together tightly and in true planes.

.5 Carefully make and fit details.

.1 Take special care with finished Work to produce neat and correct appearance to review of Owner, Owner's representative, or registered engineer.

.6 Weld joints tight, flush, and in true planes with base metals.

.1 Ensure exposed welds are continuous for length of each joint.

.2 File or grind exposed welds smooth and flush.

.7 Provide for differential movements within assemblies and at junctions of assemblies with surrounding construction where required.

.8 Assemble members without twists or open joints.

.9 Correctly size holes for connecting Work of other trades where such can be determined prior to fabrication.

.1 Show holes on shop drawings where possible.

.2 Place holes in manner to avoid reducing strength in member.

2.4 WELDING

.1 Execute welding to avoid damage or distortion to Work: execute welding in accordance with following:

.1 CAN/CSA W48 - for Electrodes. If rods are used, only coated rods are allowed.

.2 CSA W59

.3 CAN/CSA W117.2 - for safety.

.2 Thoroughly clean welded joints and expose steel for sufficient distance to perform welding operations.

.3 Test welds for conformance and remove Work not meeting specified standards and replace to the satisfaction of the reviewed by Engineer.

2.5 FINISHES

.1 Painted in accordance with good practices for interior exposed steelwork or wood as applicable.

Part 3 Execution

3.1 EXAMINATION

.1 Examine previously installed Work, upon which this Section depends, verify dimensions and condition of existing Work, and coordinate repairs, alterations, and rectification if necessary.

3.2 INSTALLATION

.1 Install stairway in accordance with reviewed engineering and shop drawings and good construction practices.

.2 Install plumb, true, square, straight, level, in exact locations.

.1 Provide anchor bolts, bolts and plates for connecting stairway to structure.

.3 Install Work in true vertical and horizontal planes, free from distortion, whip, or defects detrimental to appearance or performance.

.4 Fit joints and intersecting members accurately and with adequate fastenings.

.5 Perform welding as specified.

.6 Perform drilling of concrete and steel as required to fasten Work of this Section.

.7 Install proprietary handrails and guard rails in accordance with manufacturer's printed instructions, using recommended tools, where applicable.

.8 Make joints and mitres neat, tight and inconspicuous.

.1 Remove surplus material from joint.

.2 Provide solid return at exposed ends of handrail.

3.3 TOUCH-UP

.1 Touch up galvanized and shop primed surfaces burned or scratched during installation at completion of Work.

3.4 QUALITY CONTROL

.1 Field Inspection: by registered engineer, as described in 1.5 *Submittals* in this section.

.2 Manufacturer's Field Services where applicable: obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in 1.5 *Submittals* in this Section

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Description, performance specification, materials, and installation for the proposed sanitary waste system, including waste and vent piping, waste piping specialties, waste piping equipment and waste piping insulation.

.2 Scope of Work

.1 Provision of floor drainage to the maintenance building, which is to be installed as part of the relocation of, and the new foundations to, the maintenance building. The Maintenance building floor drainage is to drain water from melting snow and ice which has adhered to stored vehicles and equipment, and washing and maintenance activities.

.2 Below ground drainage to the highway maintenance vehicle containment area slab, including incidental run off from storm water and melting snow and ice.

.3 Design, installation, and operation of a below ground oil water separator to collect and treat the water and oils collected from the maintenance garage floor drainage and containment area slab.

.4 Design, installation, and operation of a below ground holding tank to collect the treated water from the oil water separator to allow for periodic water quality testing

.5 Below ground pipework to allow treated water from the system to discharge naturally to a low point, or natural drainage feature within the maintenance camp site (once it has been shown that the quality of water discharged meets the required quality criteria.)

.6 See system ‘flow chart’ on Scouten Engineering drawing 1027-02-C104 which illustrates the proposed drainage system.

.7 All associated below ground sanitary pipework.

.1 Waste and Vent Piping Systems:

.1 Cast iron soil pipe.

.2 Epoxy-coated cast iron soil pipe.

.3 Copper tube.

.4 ABS pipe for buried pipe

.5 PVC pipe for buried pipe

.2 Waste Piping Specialities:

.1 Clean-outs and clean-out access covers.

.2 Floor drains.

.3 Area drains.

.4 Planter drains.

.5 Sumps.

.6 Grease traps.

.3 Waste Piping Equipment:

.1 Submersible bilge and sewage pumps.

.4 Waste Piping Insulation:

1.2 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI B16.23, Cast Copper Alloy Solder Joint Drainage Fittings: DWV.

.2 ANSI B16.29, Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings: DWV.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM B32-08, Standard Specification for Solder Metal.

.2 ASTM B306-09, Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM B664-90(R2000), Standard Specification for 80% Silver-20% Graphite Sliding Contact Material.

.4 ASTM C564-12, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.5 ASTM D1002-10, Standard Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal).

.6 ASTM D2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

.7 ASTM D2564-12, Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

.8 ASTM D3138-04, Standard Specification for Solvent Cements for Transition Joints Between Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Non-Pressure Piping Components.

.9 ASTM G17-07, Standard Test Method for Penetration Resistance of Pipeline Coatings (Blunt Rod).

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 51-GP-52MA-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Canadian Standards Association (CSA International)

.1 CAN/CSA-B70-12, Cast Iron Soil Pipe, Fittings and Means of Joining.

.2 CAN/CSA-B1800-11-B181.1, ABS Drain, Waste and Vent Pipe and Pipe Fittings.

.3 CAN/CSA-B1800-11, B181.2, PVC Drain, Waste and Vent Pipe and Pipe Fittings.

.4 CAN/CSA-B1800-11-B182.11, Recommended Practice for the Installation of Thermoplastic Drain, Storm and Sewer Pipe and Fittings.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

.6 British Columbia Provincial Codes

.1 British Columbia Building Code 2012

.2 British Columbia Fire Code 2012

.3 British Columbia Plumbing Code 2012

.7 Canadian Council of Ministers of the Environment (CCME)

.1 Environmental Code of Practice for Above Ground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products PN 1326

.8 Master Municipal Construction Document (MMCD)

.1 Design Guideline Manual 2005

.2 Platinum Edition Volume II

1.3 PERFORMANCE REQUIREMENTS

.1 Design sanitary waste systems and install components in accordance with applicable regulations of the British Columbia Plumbing Code 2012, the MMCD Design Guideline Manual, and the CCME Environmental Code of Practice for Above Ground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products PN 1326.

.2 Provide water and drainage connections to equipment furnished by the engineer of record for the proposed sanitary drainage system.

.3 Design system to accommodate sanitary waste piping from fixtures in the relocated maintenance building and run off from the refueling containment slab with allowance for modest future expansion.

.4 Design grade for horizontal sanitary waste piping: minimum 2% in direction of flow.

.5 Route pipes in an orderly manner, and maintain proper grades.

.6 Design system to suit the local climatic conditions, including frost protection.

.7 The Contractor will install an oil water separator to contain water originating from the maintenance building and fuel containment slab. The water will be directed to an oil water separator designed and installed under the supervision of a suitably qualified professional. The oil water separator must conform to the following criteria:

.1 The separator is to be sized for a hydraulic flow rate of a 10 year return, 1–hour storm event (the 1–hour rainfall intensity data should be obtained for the nearest weather station);

.2 The separator is to be designed for an oil with a specific gravity of 0.90.

.3 The separator is to be designed to capture a spill of petroleum product of a volume equal to the amount of petroleum product transferred in 2 minutes at the highest pumping rate normally used within the area that drains to the oil/water separator; and

.4 The separator is to be designed based on the hydraulic retention time required to separate oil with a particle droplet size of 60 _m (microns) from stormwater.

.5 The oil water separator chamber volume must have a capacity to suit the peak storm runoff volume of water from the containment slab, based on local climatic conditions (local design rainfall intensity, duration, and snow melt.) The chamber must drain to a holding tank with a capacity of greater than or equal to the anticipated volume of water that will be collected during a six month period.

.6 There must be a manhole installed for access and inspection of the oil water separator

.7 There must be a manhole installed for access and inspection of the holding tank

.8 There must be a separate manual shut off value downstream of the holding tank and/or Separator to prevent water discharging from the system in the event of a significant spill.

.8 The Contractor will develop, implement and maintain records for an oil water separator maintenance program, which must be submitted to PWGSC for review and approval. As a minimum the program must incorporate the following:

.1 The separator and holding tank should be inspected monthly to determine if an excessive amount of oil or hydrocarbon residue is present at the top of the tank (There should be no more than 100mm in the separator compartment, if there is more residue it will be removed and disposed of appropriately)

.2 The water in the holding tank should be sampled semi-annually and submitted for analyses of volatile petroleum hydrocarbons (VPH), benzene, toluene, ethylbenzene and xylene (BTEX), Extractable petroleum hydrocarbons (EPH), and Poly-Aromatic Hydrocarbons (PAH), volatile organic carbon (VOC), and metals.

.3 Any resulting sludge must be sampled and tested for TCLP, VPH/BTEX, EPH/PAH, VOC and metals. The disposal of the sludge must be conducted appropriately in accordance with the laboratory analytical results and applicable regulations.

.9 Once it has been established that the water quality discharged by the system meets an acceptable standard, the drainage system is to discharge treated water to a natural low point, or existing natural drainage on the maintenance camp site i.e. it will no longer be stored. The outlet of the system should be detailed in such a way to reduce the risk of erosion at the point of discharge.

.10 Design of the sanitary drainage system to be in accordance with good and current engineering practice, and in accordance with the guidance given Sections 3.0 and 4.0 of the MMCD Design Guideline Manual.

1.4 SUBMITTALS

.1 Submittals in accordance with Section [01 33 00 - Submittal Procedures] and to include detailed engineering drawings and specifications of the sanitary drawings system at the following stages in the design process:

.1 Issued for Review drawings, at approximately half way through the design process

.2 Issued for Review drawings with complete design information immediately prior to issuing drawings for construction

.3 Issued for Construction Drawings, signed and sealed by the professional(s) responsible for the detailed design of the drainage system.

.4 ‘Record’ drawings following practical completion of the project, revised to suit significant changes made during the construction of the drainage system.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet for fixtures and equipment.

.3 Shop Drawings:

.1 Submit Shop Drawings to indicate project layout.

.1 Vertical and horizontal piping locations and elevations and connections details.

.2 Drain and trap locations, size, type, anchor and installation details, and finishes.

.3 Submit shop drawings for packaged submersible pumps and controls.

.4 Oil Water Separator and Holding Tank location, shop drawings and product literature.

.2 Submit information on operating mechanisms and electrical connections.

.3 Submit catalogue details for types of drainage fixtures to be included in the proposed sanitary drainage system illustrating profiles, dimensions and methods of assembly.

.4 Include schedule identifying units and their locations.

.4 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.5 Certificates: submit certificates signed by manufacturer, certifying that materials comply with specified performance characteristics and physical properties.

.6 Instructions:

.1 Submit manufacturer's installation instructions.

.2 Submit manufacturer's instructions for commissioning activities for equipment provided in this section.

.7 Manufacturer's Field Services: submit a copy of manufacturer's field reports.

.8 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section [01 78 00 - Closeout Submittals]

1.5 QUALITY ASSURANCE

.1 The quality of construction of the sanitary drainage system is to be tested to the satisfaction of the Engineer of Record for the drainage system, and to incorporate the tests described in MMCD Section 33 30 01 Sanitary Sewers.

.2 Copies of all testing results are to be submitted to PWGSC for their review.

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

- .1 Separate waste materials for reuse and recycling.
- .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.
- .4 Separate for reuse and recycling and place in designated containers Steel, Metal and Plastic waste in accordance with Waste Management Plan.
- .5 Place materials defined as hazardous or toxic in designated containers in accordance with Section [01 35 43 - Environmental Procedures].
- .6 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.
- .7 Ensure emptied containers are sealed and stored safely in accordance with Section [01 35 43 - Environmental Procedures].
- .8 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.7 WARRANTY

.1 See General Conditions.

Part 2 Products

2.1 MATERIALS

.1 Waste and Vent Piping Systems:

- .1 Cast iron soil pipe components:
  - .1 Pipe: cast iron soil pipe to CAN/CSA-B70.
  - .2 Mechanical joint components: hubless fittings, elastomeric gaskets and stainless steel mechanical joint couplings to CAN/CSA-B70.
- .2 Epoxy coated cast iron soil pipe components.
  - .1 Pipe: epoxy coated cast iron soil pipe to CAN/CSA-B70.
  - .2 Mechanical joint components: hubless fittings, elastomeric gaskets and stainless steel mechanical joint couplings to CAN/CSA-B70.
  - .3 Epoxy coating: interior surfaces of cast iron pipe and fittings coated with 250 um fusion bonded epoxy, meeting the following requirements: adhesion to ASTM D1002. Penetration resistance to ASTM G17.
- .3 Copper tube components.
  - .1 Pipe: DWV Copper Tube: to ASTM B306.
  - .2 Joint and fitting components.
    - .1 Wrought copper fittings: to ANSI B16.29.
    - .2 Cast copper, brass and bronze fittings: to ANSI B16.23.

.3 Solder joints: to ASTM B32.

.4 Brazed joints: to ASTM B664.

.4 ABS pipe components.

.1 Pipe: ABS plastic pipe: to CAN/CSA-B181.1.

.2 Joint and fitting components:

.1 Fittings: ABS fittings to CAN/CSA-B181.1.

.2 ABS solvent cement: to ASTM D2235.

.3 ABS - PVC solvent cement: to ASTM D3138.

.5 PVC Pipe Components:

.1 Pipe: PVC plastic pipe to CAN/CSA-B181.2.

.2 Joint and fitting components:

.1 Fittings: PVC fittings to CAN/CSA-B181.2.

.2 PVC solvent cement: to ASTM D2564.

.3 ABS-PVC solvent cement: to ASTM D3138.

.6 DWV Pipe Components:

.1 Pipe: DWV pipe: to CAN/CSA-B281.

.2 Mechanical joint and fittings consisting of:

.1 Hubless cast iron fittings: to CAN/CSA-B70.

.2 Adaptor ring: elastomeric pipe end protection component to CAN/CSA-B281.

.3 Gasket: double ribbed elastomeric gasket to CAN/CSA-B70.

.4 Joint coupling: stainless steel mechanical joint coupling to CAN/CSA-B70.

.2 Waste Piping Specialties:

.1 Clean-outs and clean-out access covers:

.1 Provide caulked or threaded type clean-outs extended to finished floor or wall surface. Provide bolted clean-out cover plates on vertical rainwater leaders only. Ensure ample clearance at clean-out for rodding of drainage system.

.2 Provide access covers for floors in unfinished areas: round with nickel bronze serrated frames and plates. Provide round access covers in finished areas with depressed centre section to accommodate floor finish. Provide wall clean-outs with chrome plated caps.

.2 Drains

.1 Floor Drains: lacquered cast iron body with double drainage flange, weep holes, combined two piece body, reversible clamping device and adjustable nickel/bronze strainer.

.2 Area Drains lacquered cast iron body, adjustable collar and galvanized ductile iron locking grate.

.3 Waste Piping Equipment:

.1 Submersible bilge and sewage pumps:

.1 Type: completely submersible, vertical, centrifugal.

Casing: cast iron volute and oil filled motor chamber.

.2 Impeller: bronze, non-clog with corrosion resistant alloy steel shaft.

.3 Bearings: anti-friction ball or roller.

.4 Accessories: oil resistant power cord with three prong connector on single phase, fractional horsepower units only.

.5 Duplex Controls: packaged pre-wired alternator with mercury type liquid level controls and control panel to cut in second pump on rising level or pump failure, and separate liquid level control for high level alarm.

.2 Waste Oil Tanks: ULC approved; conforming to the Environmental Code of Practice for Underground Storage Tank Systems containing Petroleum Products.

.1 Tank: construction gravity fed, with above ground connection to permit manual disposal and storage of other waste oil products.

.3 Sump: reinforced concrete sumps, complete with necessary drainage fittings, 10 mm checked steel plate covers with gasket seal frames anchor bolts.

.4 Oil/Water Separator: ULC approved; conforming to the Environmental Code of Practice for Underground Storage Tank Systems containing Petroleum Products.

.1 Separator: construction gravity fed, inert to petroleum products, with venting system.

.2 30 year manufacturer's warranty against leakage due to internal or external corrosion or structural failure.

.3 Capable of producing effluent free oil at 15 ppm.

.4 Shut-off valve installed downstream of the Separator that can be accessed independently of the Separator or storage tank.

.4 Waste Piping Insulation:

.1 Material: formed mineral fibre rigid insulation sleeving.

.2 "K" Value: maximum 0.035 W/m. degrees C at 24 degrees C mean temperature.

.3 Service Temperature: -14 degrees C to 100 degrees C.

.4 Jacket: factory applied vapour barrier jacket to CAN/CGSB 51-GP-52Ma, Type 1, with longitudinal lap seal.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.2 INSTALLATION

.1 General.

.1 Install components in accordance with CAN/CSA-B182.11.

.2 Route and install piping to maintain design grades.

.3 Install components to conserve headroom and space.

.4 Install concealed piping close to building structure to minimize furring.

.5 Group piping at common elevations.

.2 Floor Drains:

.1 Where floor drains are located over occupied areas, provide waterproof installation.

.2 Install trap primer to floor drains.

.3 Clean Outs: lubricate clean-out plugs with mixture of graphite and linseed oil. Prior to building turnover remove clean-out plugs, re-lubricate and reinstall using enough force to ensure permanent leakproof joint.

3.3 PIPE SCHEDULE

.1 Install sanitary drain and vent lines as follows:

SERVICE	PIPE	FITTING	JOINT
DWV, above grade	Cast Iron, Hub-less	Mechanical joint	Clamped
	DWV, Copper	Cast Bronze	Soldered 50-50, tin-lead
	DWV, Copper	Wrought Copper	Soldered 50-50, tin-lead
	PVC	PVC	Solvent Weld
DWV, Buried	Cast Iron, Hub-less	Mechanical joints	Clamped
	PVC	PVC	Solvent Weld
Special Waste	Epoxy Coated Cast Iron, Hub-less	Mechanical Joint	Clamped

3.4 INSULATION

.1 Insulate plumbing vents and above ground horizontal drain lines and exposed waste lines. Depth of insulation to match location climatic conditions and good engineering practice.

3.5 FIELD QUALITY CONTROL

.1 Design Professional or Engineer Of Record's Field Services

.1 The design professional, or Engineer Of Record for the sanitary drainage system shall carry out field reviews during the construction of the sanitary drainage system to allow them to confirm that the Work is being carried out in general accordance with their drawings and specifications.

.2 Field reviews and testing to be carried out at the Engineer of Record's discretion, and to follow the testing guidance given in the Master Municipal Specifications Section 3330 01 Sanitary Sewers.

.3 Following practical completion of the Works the design professional, or Engineer Of Record, shall carry out a final inspection to allow them to confirm that they have fulfilled their obligations for field reviews.

.4 Submit field review reports to PWGSC.

.2 Manufacturer's Field Services.

.1 If manufacturer's services are desired to verify an installed component(s) have manufacturer of products, supplied under this Section, review Work involved in handling, installation/application, protection and cleaning, of their products. Submit written reports, in format acceptable to PWGSC to verify compliance of Work with Contract.

.2 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review the Work, at stages listed:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.

.2 During progress of the Work at intervals to suit the manufactured product(s) installation, and other elements of the Work which may conceal, or otherwise prevent a field review from being carried out.

.3 Upon completion of the Work, after cleaning is carried out.

.4 Obtain reports and submit, immediately, to PWGSC

.3 Verification: provide verification to PWGSC that drainage lines are installed to the design grade in the direction of flow using the testing guidance given in MMCD Section 33 30 01 Sanitary Sewers.

3.6 CLEANING

.1 Perform cleaning operations in accordance with manufacturer's recommendations, MMCD Section 33 30 01, and so that the sanitary drainage system can perform as designed.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Demolition and relocation of building elements indicated on drawings and in this section.

.2 Relocation of buildings, site elements, and utilities.

1.2 REFERENCES

.1 Canadian Federal Legislation

.1 Canadian Environmental Protection Act (CEPA), 1999.
.2 Canadian Environmental Assessment Act (CEAA), 1995.
.3 Transportation of Dangerous Goods Act (TDGA), 1992.
.4 Motor Vehicle Safety Act (MVSA), 1995.

.2 Canadian Standards Association (CSA)

.1 CSA S350, Code of Practice for Safety in Demolition of Structures.
.2 CSA S16 Limit States Design of Steel Structures

.3 Other

.1 Canadian Institute of Steel Construction Handbook of Steel Construction

1.3 PERFORMANCE REQUIREMENTS

.1 Description of Proposed Relocation Works

.1 Maintenance Building Relocation - The existing maintenance building at the Sikanni Highway Maintenance Camp is to be relocated to allow ground remediation works to take place at the camp site. The existing maintenance building structure, and other building elements, is described in Scouten Engineering drawings 1027-02 G-101, C-101 to C103, and S-101 to S-103. The maintenance building is a pre-engineered steel framed type structure with exterior profiled metal cladding. The building appears to be founded on reinforced concrete foundations.

The project requires the existing maintenance building to relocated, requiring the construction of new building foundations and an interior partitioned office space, mezzanine floor, mezzanine floor access stairs and associated non-structural partitions, doors and windows. Please see Section A1010 for the performance specifications for new building foundations.

Following the maintenance building relocation, the existing foundations are to be demolished and removed from site.

.2 Generator and Seacan Enclosure Relocation – The existing generator together with its seacan enclosure is to be relocated and related services re-routed. The generator and enclosure is to be placed on a new reinforced concrete slab-on-grade foundation in its proposed new location.

.3 Above-ground Storage Tanks (AST's) – An existing 35,000 litre diesel AST, a 55,000 litre bitumen AST, and a 2,500 litre Waste Oil AST are to be relocated on a proposed containment slab adjacent to the related maintenance building. Relocation work is to also include the installation of services serving these tanks such as monitoring and alarm systems.

.4 Propane Tanks - Relocate two existing 1,900 litre above ground propane tanks, associated services and protective concrete jersey barriers. Propane tanks are to be reconnected to heating services in the maintenance building.

.2 Details of Maintenance Building Components to be Demolished or Relocated

.1 List of maintenance building items to be salvaged for reuse:

.1 Steel structure, including primary steel beams and columns., secondary steel members, cold formed steel girts and purlins, and bracing members

.2 Building cladding and insulation. Note that sheets of exterior metal building cladding that require temporary holes to be formed through as part of the demolition and relocation work are to be replaced with new following the building relocation. New sheets of cladding are to match the profile and colour of the existing cladding as closely as possible. Likewise, cladding sheets damaged as a result of building preparation and relocation work are to be repaired by replacing whole sheets of cladding.

.3 Overhead doors and man doors

.4 Mechanical and electrical building services including ceiling fans, lighting. Please see Specification Section 16010 for further information on the scope of proposed electrical work.

.5 Modular racking system

.2 Structures to be demolished are:

.1 Existing interior partitioned office space, mezzanine floor and access stairs

.2 Existing maintenance building foundations.

.3 Remove, protect and store other salvaged items as directed by the project Owner.

.4 Should material resembling spray or trowel applied asbestos be encountered in course of demolition, stop work, take preventative measures, and notify the project Owner immediately. Do not proceed until written instructions have been received.

.3 Perform work in accordance with requirements of this section

.4 Qualifications: Work shall be executed by company having a 5 year minimum continuous experience in structure demolition and relocation work.

.5 Protection:

.1 Prevent movement, settlement or damage of adjacent structures and services, Provide bracing and shoring as required. Report and repair damage caused by demolition or relocation of the maintenance building to the project Owner.

.2 Support affected structures and, if safety of structures being demolished or relocated appears to be endangered, take preventative measures and then cease operations and notify the project Owner.

.3 Prevent debris from blocking surface drainage systems, mechanical and electrical systems which must remain in operation.

.4 Ensure that demolition work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.

.5 Fires and burning of waste or materials is not permitted on site and is strongly discouraged off of site.

.6 Do not bury waste or materials on site unless approved in writing by project Owner.

.7 Do not dispose of waste or volatile materials such as: mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.

.8 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.9 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.10 Protect trees, plants and foliage on site and adjacent properties where indicated.

.11 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on temporary roads.

.12 Take precaution to protect adjacent structures, paving, and services from damage, movement, or settlement during demolition work. Make good damage caused by demolition.

1.4 SUBMITTALS

.1 The contractor`s Waste Management Coordinator (WMC) is responsible for ensuring reporting requirements are fulfilled to the satisfaction of the project Owner

.2 Product Data: Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01330 - Submittal Procedures.

.3 Shop Drawings: Submit in accordance with Section 01330 - Submittal Procedures.

.1 Submit Demolition and Building Relocation Plans for review, including detailed drawings and notes covering:

.1 Sequence of relocation and demolition work

.2 Method of maintenance building relocation, including crane lifting procedures if applicable.

.3 Any temporary support structures which form part of the demolition and relocation procedures including areas of exterior building cladding that will require replacement as a result of the installation of temporary support structures.

.4 Any permanent works to the maintenance building as shown on the project Owner's drawings, or as required to repair damage to the buildings incurred during the demolition and relocation works. Please note paragraph 1.3.2.1.2 on page 2 of this Section which describes how cladding damaged, necessarily or accidentally, by building relocation work and other construction activities is to be treated.

.2 Documentation submitted pertaining to the proposed Demolition and relocation to bear seal of qualified Professional Engineer licensed to practice in the Province of British Columbia.

Part 2 Execution

2.1 PREPARATION

.1 Inspect site with project Owner and verify extent and location of building and site elements designated for demolition, relocation, removal, disposal, and salvage. Identify and mark new location for items to be relocated. Verify source, capacity, and routing for utilities required to service relocated items.

.2 Identify and protect items designated to remain.

.3 Disconnect, cap, and re-route utilities entering buildings to be demolished or relocated. Co-ordinate with the Consultant to minimize disruption to base when work on

.4 Do not disrupt active or energized utilities traversing premises designated to remain undisturbed.

.5 Prior to commencement of demolition work remove contaminated or hazardous materials from site and dispose of at designated disposal facilities in safe manner and in accordance with the TDGA. Refer to 1.4.1, Existing Conditions.

2.2 SAFETY CODE

.1 Blasting operations are not permitted during demolition.

2.3 BUILDING AND SITE ELEMENTS DEMOLITION

.1 Demolish the existing interior office partitions, mezzanine floor and stairs structures, disassemble and carefully set to one side the modular racking system.

.2 Detached and remove the existing maintenance building structure, non-structural components, and services, from the existing foundations.

.3 Demolish and remove existing maintenance building foundations and site elements, as required by the works, which may include the following types of foundation elements:

.1 Slab-on-grade
.2 Slab-on-grade thickenings
.3 Foundation pedestal type elements
.4 Pad foundations

.4 The existing foundation type and arrangement below the visible slab-on-grade surface is not known

.5 At end of the day's work, leave work in safe condition so that no part is in danger of toppling or falling.

.6 Demolish to minimize dusting. Keep materials wetted as directed by project Owner

.7 Dispose materials not designated for salvage or reuse off site in designated landfill site.

.8 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

2.4 STRUCTURE AND SITE ELEMENTS RELOCATION

.1 Relocate structures and site elements indicated on drawings and as follows:

- .1 Steel structure, including primary steel beams and columns., secondary steel members, cold formed steel girts and purlins, and bracing members
- .2 Building cladding and insulation. Please note paragraph 1.3.2.1.2 on page 2 of this Section which describes how cladding damaged, necessarily or accidentally, by building relocation work and other construction activities is to be treated.
- .3 Overhead doors and man doors
- .4 Mechanical and electrical building services including ceiling fans, lighting. Please see Specification Section 16010 for further information on the scope of proposed electrical work.
- .5 Modular racking

.2 Carry out repairs to the building elements damaged during relocation, including the installation of column baseplates. Structural repairs should be designed to suit forces resulting from site specific climatic loads, such as wind and snow loads, and to account for the structural element forces as a result of the structural system of the maintenance building.

.3 Steelwork repairs should be designed in accordance with CSA-S16 'Limit States Design of Steel Structures' and the current edition of the Canadian Institute of Steel Construction (CISC) 'Handbook of Steel Construction'.

.4 Provide relocated structure and site elements with required utilities and services. Co-ordinate with the project team to minimize disruption to base when working on active or energized utilities is required. Make good damage caused by this work. Record the location of new and rerouted services.

.5 Adjust building elements that are to be retained but require coordination with new building foundations, such as the overhead and man doors.

.6 Engage qualified Professional Engineer registered to practice in the Province of British Columbia to design foundations to support relocated structures, and a replacement mezzanine floor structure and access stairs. Submit for review prior to construction. Construct the new foundations and other elements of new construction from the reviewed documentation.

.7 Engage a qualified building technologist or Professional Engineer to produce drawings and specifications for the non-structural elements of the office area and mezzanine floor including partitions, doors and windows. Submit for review prior to construction. Construct the non-structural elements of new construction from the reviewed documentation.

.8 Perform excavation, trenching, and backfilling for foundations in accordance with requirements of Section [31 23 33.01 Excavation Trenching and Backfilling].

.9 Connect required services to relocated items.

.10 Dispose material not designated for salvage or reuse off site in designated landfill sites.

2.5 UTILITY RELOCATION

.1 Locate utilities prior to starting demolition and relocation work. Verify location of existing services and review routing of proposed relocation with Engineer.

.2 Co-ordinate execution of work with Engineer to minimize disruptions to daily operations.

.3 Disconnect and cap utilities to be abandoned. Reroute utilities required by work in accordance with the relevant sections of the project performance specifications.

.4 Maintain services to other buildings and properties entering work area operational. Make good damage caused by this work. Record location of rerouted services.

2.6 RELOCATION CLEAN-UP

.1 Where appropriate i.e. coordinated with ground remediation works, restore areas and existing works outside areas of demolition to conditions that existed prior to commencement of work.

.2 Remove debris, trim surfaces and leave work site clean upon completion of work.

.3 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

.4 At end of day's work, leave work in safe and stable condition. Protect interiors of parts not to be demolished from exterior elements at all times.

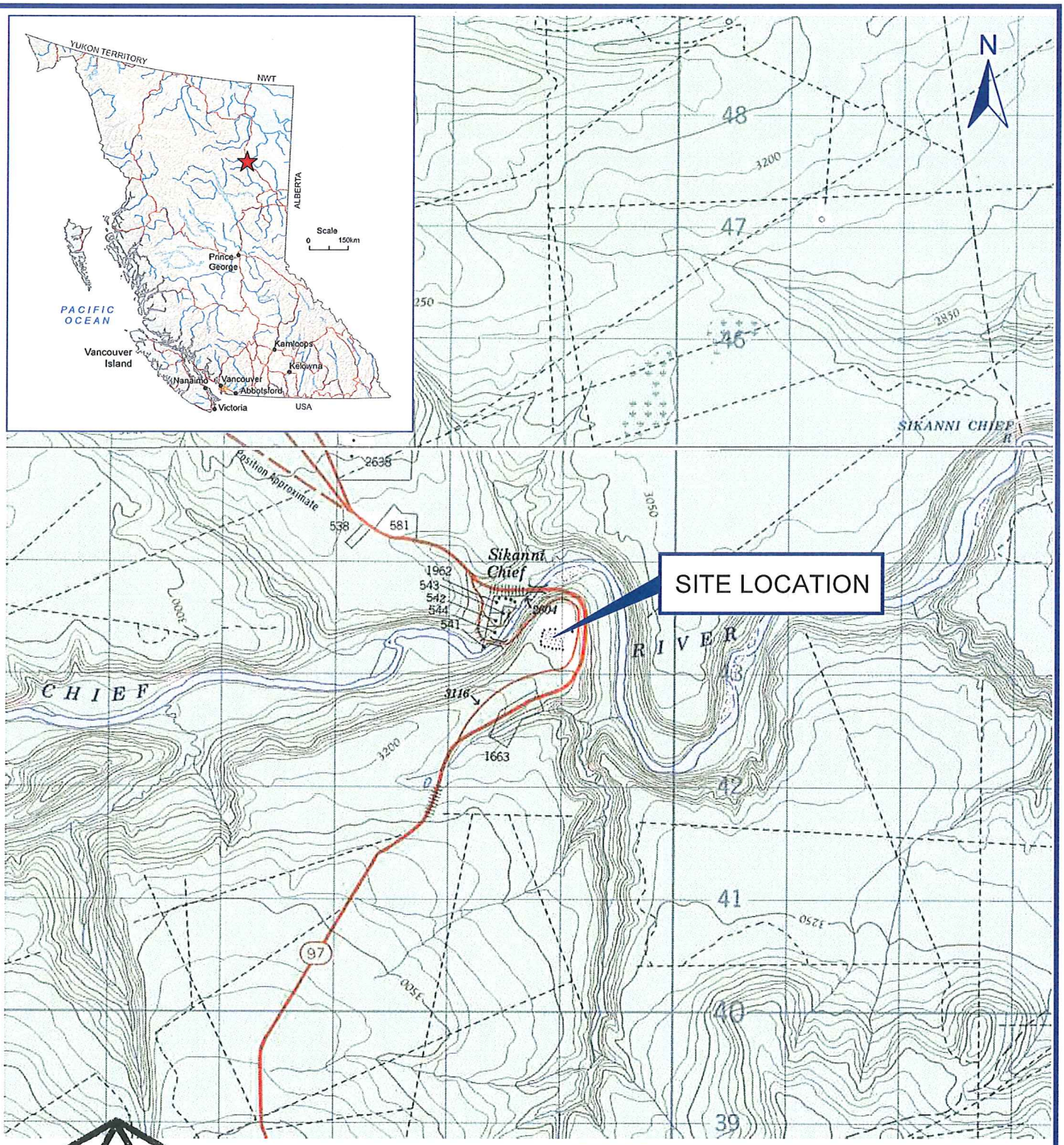
2.7 ENVIRONMENTAL:

.1 Remove contaminated or dangerous materials as defined by authorities having jurisdiction, relating to environmental protection, from site and dispose of in safe manner to minimize danger at site or during disposal.

END OF SECTION

APPENDIX A
Optional - Drawings, Including Site Location, Soil Analytical Summary, and Cross-Sections

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000



REFERENCED FROM TOPO MAP SYSTEM NTS MAP 94 G/02 & 94 G/07

BC Professional Chemist
2009202
Aaron Haegele
Association of the Chemical Profession of British Columbia

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SCALE 1:50,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR global environmental solutions

PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

SITE LOCATION MAP

Date: May 10, 2016	Drawing No. 1
Project No. 205.03768.00000	

Cadfile name: S_205-03768-00000-A4.dwg

N

NOTES:
REFERENCED FROM: HEMMERA DRAWING: PROPERTY BOUNDARY PLAN (MARCH, 2013), HEMMERA DRAWING: SOIL EXCEEDANCES AROUND THE MAINTENANCE GARAGE SHOWING SOURCE AREA AND SURFICIAL CONTAMINATION (MARCH, 2013), PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, DRAWING No. SK#5345.00, DATE 2012-07-11 AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION:
LOT - BLOCK - PLAN -
SOMEWHERE, CANADA

LEGEND:

- FEDERAL LEASE PROPERTY BOUNDARY
- CONTOUR (MINOR)
- CONTOUR (MAJOR)
- AREA OF ENVIRONMENTAL CONCERN (AEC)

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0 50 100 200 300 400 m

SCALE 1:7,500
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

SITE PLAN AND AREAS OF ENVIRONMENTAL CONCERN

Date: May 10, 2016
Project No. 205.03768.00000
Drawing No. 2

SLR global environmental solutions

Cadfile name: S_205-03768-00000-A4.dwg

NOTES:
REFERENCED FROM: HEMMERA DRAWING: PROPERTY BOUNDARY PLAN (MARCH, 2013), HEMMERA DRAWING: SOIL EXCEEDANCES AROUND THE MAINTENANCE GARAGE SHOWING SOURCE AREA AND SURFICIAL CONTAMINATION (MARCH, 2013), PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, DRAWING No. SK#5345.00, DATE 2012-07-11 AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION:
LOT - BLOCK - PLAN -
SOMEWHERE, CANADA

LEGEND:

- FEDERAL LEASE PROPERTY BOUNDARY
- FENCE - CHAIN LINK
- CONTOUR (MINOR)
- CONTOUR (MAJOR)
- PROPOSED FACILITY/FEATURE

UTILITIES AND SYMBOLS
- PP — POWER POLE
- O/H ELECTRICAL LINE
- U/G WATER LINE
- PROPOSED POWER LINE RELOCATION ROUTE

BIOCELL
GRAVEL PILES
GRAVEL PIT LIMIT
TREED
CONFIRMED INFRASTRUCTURE & AST RELOCATION AREA
CONTAINMENT PAD FOR FUEL ASTs AND OIL/WATER SEPARATOR
BITUMEN AST (55000 L)
SCRUB TREES
WASTE OIL AST (2500 L)
DIESEL AST (35000 L)
NEW GENERATOR
PROPANE TANKS
DOORS
GRAVEL ACCESS ROAD
POND
TRAILER
SHED
WATER LINE
GRASSED AREA
TREED
SITE LAYDOWN AREA
PROPANE
NEW TRAILER SHED
RESERVE BOUNDARY
GRAVEL ACCESS ROAD
JOIN LINE
COAL MIX PILE
SALT SHED
TOP OF BANK
STEEP CLIFF
TAR PIT
WASTE OIL AST #5
LOADING DOCK
BITUMEN AST #8
SIGN
35,000 L DIESEL AST
PROPANE TANKS
MAINTENANCE GARAGE
FUEL TANKS
OLD GENERATOR SHED
NEW GENERATOR SHED
GRASSED

N

0 20 40 80 120 m

SCALE 1:2,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

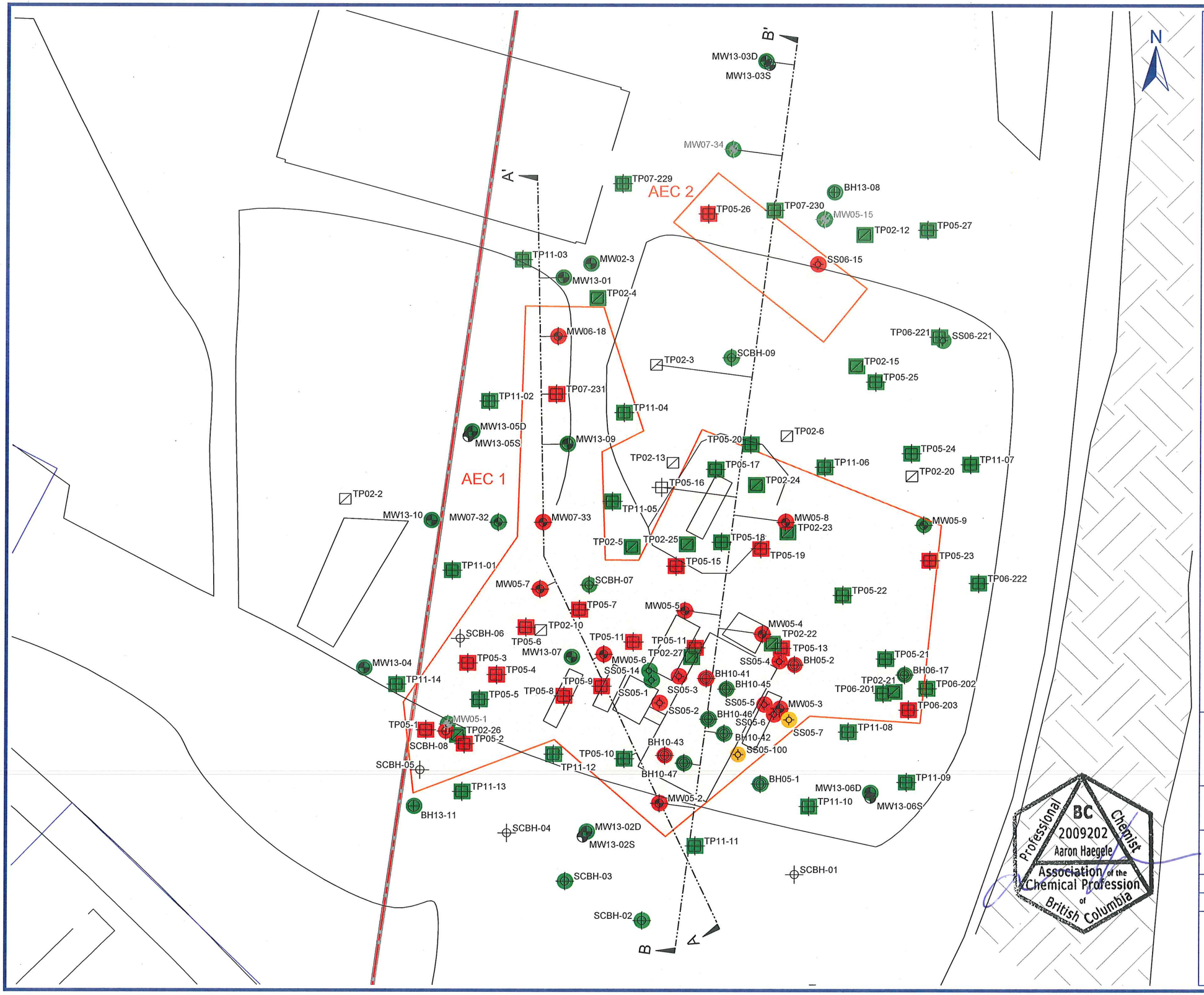
OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

PROPOSED MAINTENANCE GARAGE AND POWER LINE RELOCATION

Date: May 10, 2016
Project No. 205.03768.00000
Drawing No. 3

SLR global environmental solutions

Cadfile name: S_205-03768-00000-A4.dwg



NOTES:
REFERENCED FROM: HEMMERA DRAWING: PROPERTY BOUNDARY PLAN (MARCH, 2013), HEMMERA DRAWING: SOIL EXCEEDANCES AROUND THE MAINTENANCE GARAGE SHOWING SOURCE AREA AND SURFICIAL CONTAMINATION (MARCH, 2013), PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, DRAWING No. SK#5345.00, DATE 2012-07-11 AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION:
LOT - BLOCK - PLAN -
SOMEWHERE, CANADA

LEGEND:

- FEDERAL LEASE PROPERTY BOUNDARY
- AREA OF ENVIRONMENTAL CONCERN (AEC)
- BOREHOLE LOCATION (SLR)
- BOREHOLE LOCATION (PUBLIC WORKS AND GOVERNMENT SERVICES CANADA)
- BOREHOLE LOCATION (HEMMERA)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (SLR)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (HEMMERA)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (DESTROYED) (HEMMERA)
- TEST PIT LOCATION (SLR)
- TEST PIT LOCATION (HEMMERA)
- SURFACE SAMPLE LOCATION (HEMMERA)
- A A' — CROSS SECTION A-A'
  CROSS SECTION B-B'
  CROSS SECTION C-C'
  CROSS SECTION D-D'

GROUNDWATER LABORATORY ANALYSIS RESULTS

- PETROLEUM HYDROCARBON FRACTION AND BETX CONCENTRATION(S) LESS THAN OR EQUAL TO APPLICABLE CCME RL GUIDELINES AND CWS
- PETROLEUM HYDROCARBON FRACTION CONCENTRATION(S) GREATER THAN APPLICABLE CWS AND/OR BETX CONCENTRATIONS GREATER THAN APPLICABLE CCME RL GUIDELINES
- PETROLEUM HYDROCARBON CONCENTRATIONS GREATER THAN HAZARDOUS WASTE REGULATION STANDARDS

0 5 10 20 30 m

SCALE 1:600
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

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PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

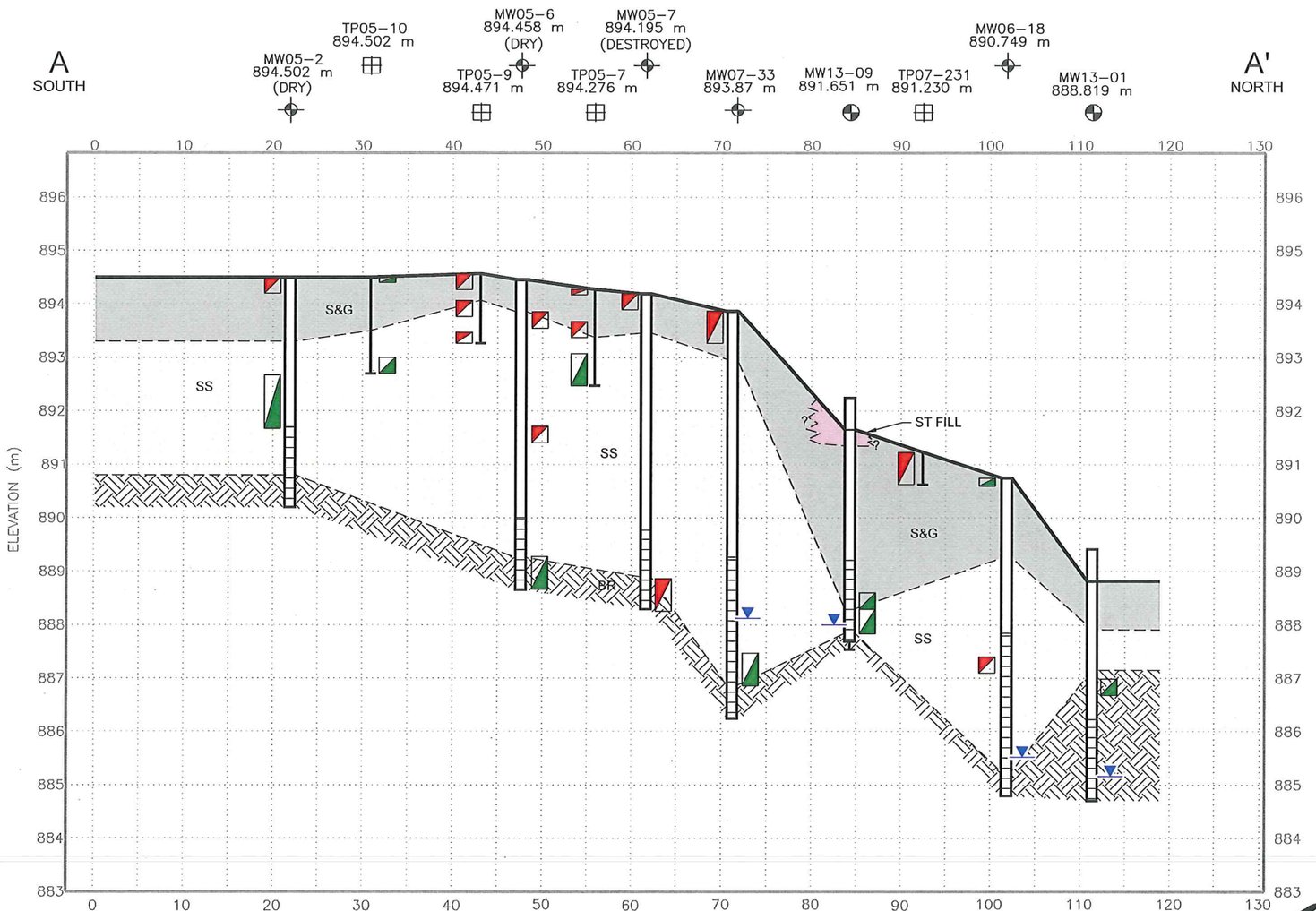
SUMMARY OF PETROLEUM HYDROCARBON RESULTS IN SOIL AND CROSS-SECTION LOCATIONS

Date: May 10, 2016
Project No. 205.03768.00000
Drawing No. 4

BC Professional Chemist
2009202
Aaron Haegele
Association of the Chemical Profession of British Columbia

SLR global environmental solutions

Cadfile name: S_205-03768-00000-A4.dwg



NOTES:
REFERENCED FROM: HEMMERA DRAWING: PROPERTY BOUNDARY PLAN (MARCH, 2013), HEMMERA DRAWING: SOIL EXCEEDANCES AROUND THE MAINTENANCE GARAGE SHOWING SOURCE AREA AND SURFICIAL CONTAMINATION (MARCH, 2013), PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, DRAWING No. SK#5345.00, DATE 2012-07-11 AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION:
LOT - BLOCK - PLAN -
SOMEWHERE, CANADA

LEGEND:

- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (SLR)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (HEMMERA)
- TEST PIT LOCATION (HEMMERA)
- WATER LEVEL (MARCH 2014)
- SOIL SAMPLE LOCATION
- ST FILL — SILT FILL
- S&G — SAND AND GRAVEL
- SS — SANDY SILT / SILTY SAND
- BR — WEATHERED SHALE BEDROCK

SOIL LABORATORY ANALYSIS RESULTS

- PETROLEUM HYDROCARBON FRACTION AND BETX CONCENTRATION(S) LESS THAN OR EQUAL TO APPLICABLE CCME RL GUIDELINES AND CWS
- PETROLEUM HYDROCARBON FRACTION CONCENTRATION(S) GREATER THAN APPLICABLE CWS AND/OR BETX CONCENTRATIONS GREATER THAN APPLICABLE CCME RL GUIDELINES

- WELL
- SCREENED INTERVAL
- BOREHOLE OR TESTPIT
- END OF HOLE

0 1 2 4 6 m
VERTICAL SCALE 1:100

0 5 10 20 30 m
HORIZONTAL SCALE 1:600
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

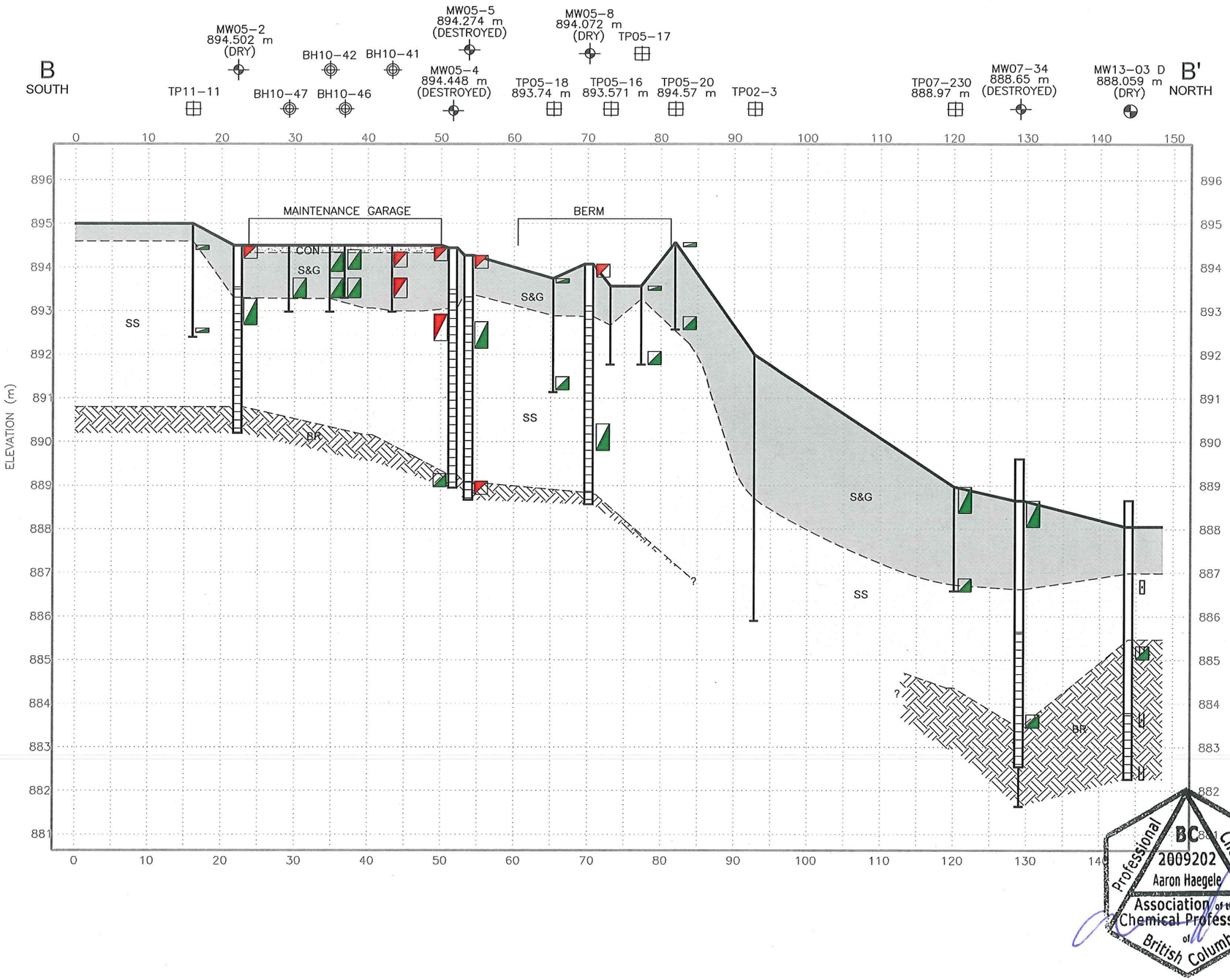
CROSS SECTION A-A'

Date: May 10, 2016
Project No. 205.03768.00000
Drawing No. 5

Professional Chemist BC 2009202 Aaron Haegele Association of the Chemical Profession of British Columbia

SLR global environmental solutions

Cadfile name: S_205-03768-00000-A4.dwg



NOTES:
REFERENCED FROM: HEMMERA DRAWING: PROPERTY BOUNDARY PLAN (MARCH, 2013), HEMMERA DRAWING: SOIL EXCEEDANCES AROUND THE MAINTENANCE GARAGE SHOWING SOURCE AREA AND SURFICIAL CONTAMINATION (MARCH, 2013), PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, DRAWING No. SK#5345.00, DATE 2012-07-11 AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION:
LOT - BLOCK - PLAN -
SOMEWHERE, CANADA

LEGEND:

- BOREHOLE LOCATION (HEMMERA)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (SLR)
- BOREHOLE LOCATION COMPLETED AS A MONITORING WELL (HEMMERA)
- TEST PIT LOCATION (HEMMERA)
- WATER LEVEL (MARCH 2014)
- SOIL SAMPLE LOCATION
- CON — CONCRETE
- S&G — SAND AND GRAVEL
- SS — SANDY SILT / SILTY SAND
- BR — WEATHERED SHALE BEDROCK

SOIL LABORATORY ANALYSIS RESULTS
- PETROLEUM HYDROCARBON FRACTION AND BETX CONCENTRATION(S) LESS THAN OR EQUAL TO APPLICABLE CCME RL GUIDELINES AND CWS
- PETROLEUM HYDROCARBON FRACTION CONCENTRATION(S) GREATER THAN APPLICABLE CWS AND/OR BETX CONCENTRATIONS GREATER THAN APPLICABLE CCME RL GUIDELINES

- WELL
- SCREENED INTERVAL
- BOREHOLE OR TESTPIT
- END OF HOLE

0 1 2 4 6 m
VERTICAL SCALE 1:100

0 5 10 20 30 m
HORIZONTAL SCALE 1:600
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

CROSS SECTION B-B'

Date: May 10, 2016
Project No. 205.03768.00000
Drawing No. 6

Professional Chemist
BC 2009202
Aaron Haegele
Association of the Chemical Profession of British Columbia

SLR global environmental solutions

Cadfile name: S_205-03768-00000-A4.dwg

NOTES:
REFERENCED FROM: HEMMERA DRAWING: PROPERTY BOUNDARY PLAN (MARCH, 2013), HEMMERA DRAWING: SOIL EXCEEDANCES AROUND THE MAINTENANCE GARAGE SHOWING SOURCE AREA AND SURFICIAL CONTAMINATION (MARCH, 2013), PUBLIC WORKS AND GOVERNMENT SERVICES CANADA, DRAWING No. SK#5345.00, DATE 2012-07-11 AND SITE RECONNAISSANCE INFORMATION.

LEGAL DESCRIPTION:
LOT - BLOCK - PLAN -
SOMEWHERE, CANADA

LEGEND:

FEDERAL LEASE PROPERTY BOUNDARY

ROUTE

Professional Chemist
BC
2009202
Aaron Haegele
Association of the Chemical Profession of British Columbia

0 0.25 0.5 1.0 1.5 km

SCALE 1:30,000
WHEN PLOTTED CORRECTLY ON A 11 x 17 PAGE LAYOUT
NAD 1983 UTM Zone 10 U

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

PUBLIC WORKS AND GOVERNMENT SERVICES
SIKANNI MAINTENANCE CAMP
KILOMETRE 254 OF THE ALASKA HIGHWAY
SOMEWHERE, CANADA

OPTIONAL - SIKANNI REMEDIAL SPECIFICATION

ROUTE FROM SITE TO MAN AND BEAST PIT

Date: May 10, 2016	Drawing No. 7
Project No. 205.03768.00000	

SLR
global environmental solutions

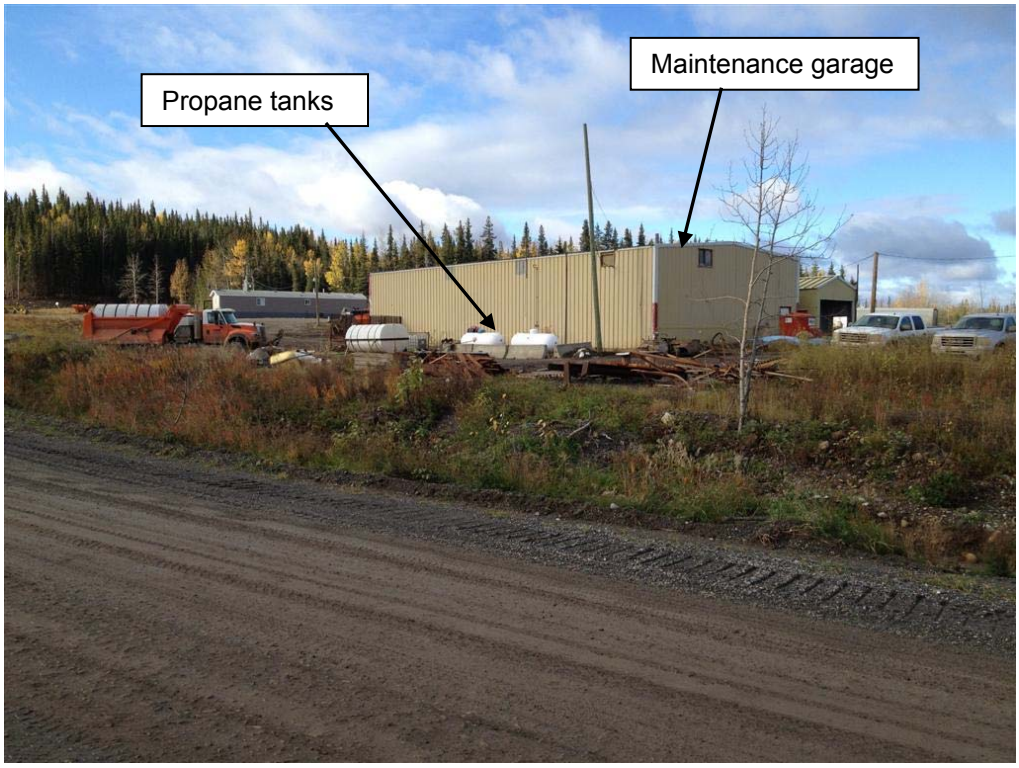
Cadfile name: S_205-03768-00000-A4.dwg

APPENDIX B
Site Photographs

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000

Photograph 1: 35,000L diesel AST, old diesel generator shed, and maintenance garage, looking east.

Photograph 2: New generator shed and old generator shed to the west of the maintenance garage, looking northeast.



Photograph 3: East side of maintenance garage and equipment, looking southwest.

Photograph 4: Salt shed, looking west.

Photograph 5: Spillage from fuel storage to be disposed of offsite as Hazardous Waste.

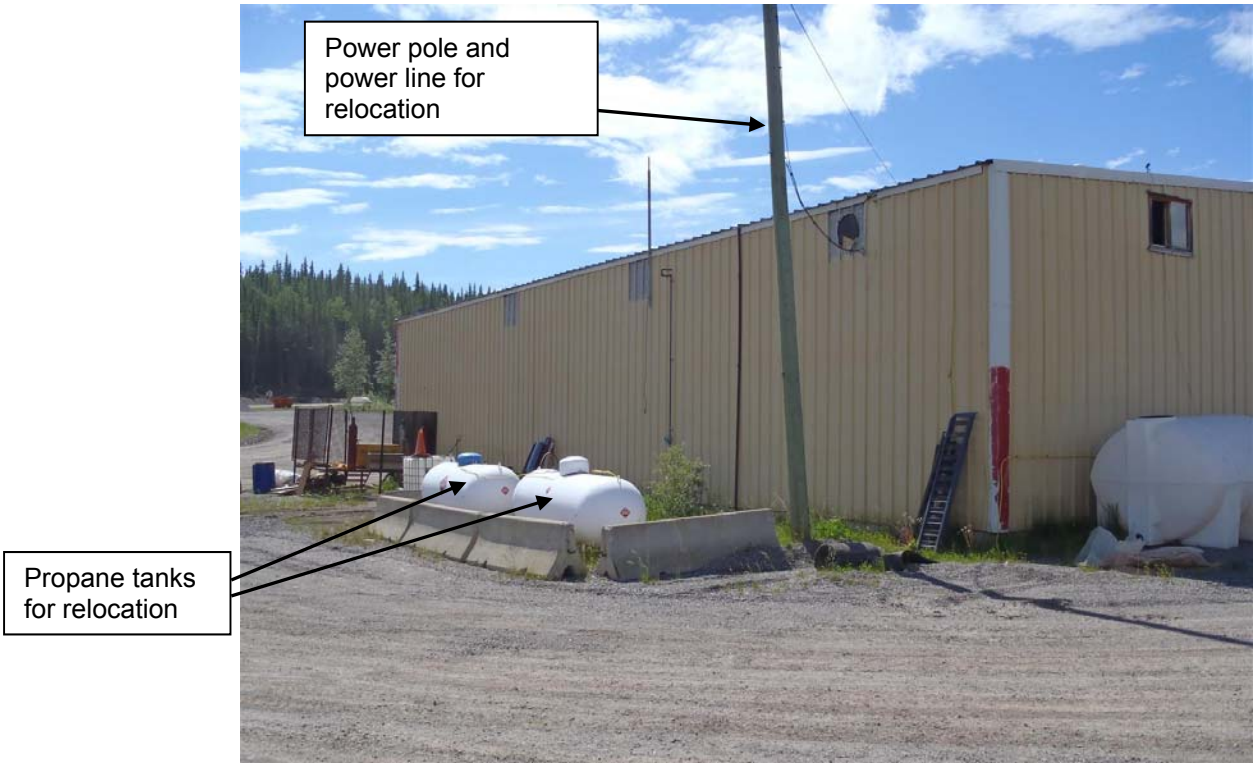
Photograph 6: The area northeast of the maintenance garage that will be remediated. Equipment and debris will be removed prior to remediation. View looking southwest.

Photograph 7: Sign shed to the west of the maintenance garage, as well as the existing above ground power lines. View looking southwest.

Photograph 8: Maintenance garage, looking east.

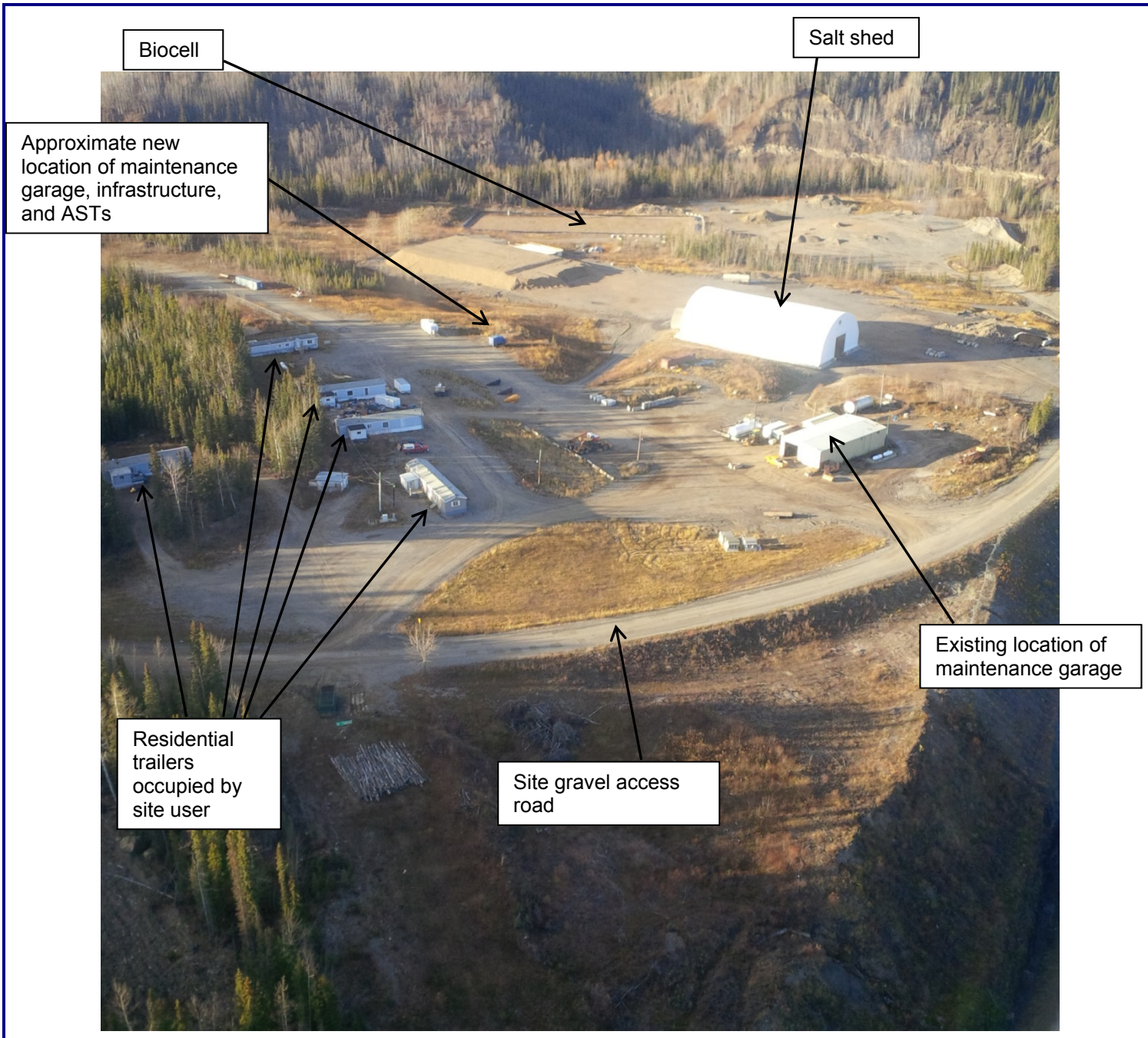
Photograph 9: View of the biocell, looking west.

Photograph 10: The waste oil AST #5 to the north of the maintenance garage, looking southwest.



Photograph 11: East side of maintenance garage and equipment, looking southwest.

Photograph 12: The bitumen AST #8 to the north of the maintenance garage, looking northwest.



Photograph 13: Air photograph of the site, looking northwest.

APPENDIX C
GeoPacific Consultants Ltd. – Geotechnical Assessments

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000

GeoPacific
Consultants Ltd.

#215 -1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Phone (604) 439-0922 / Fax (604) 439-9189

Hemmera Envirochem Inc.
250 – 1380 Burrard Street
Vancouver, BC
V6Z 2H3

November 30, 2011
File 8982

Attention: Mr. Tyler Wilen

Re: Geotechnical Investigation and Report, Sikanni Maintenance Yard – Remedial Work, Sikanni, KM 254 Alaska Highway, BC

1.0 INTRODUCTION

GeoPacific Consultants Inc. has been asked to provide a geotechnical assessment of the soil and groundwater conditions as they pertain to the remedial work being considered at the Sikanni Maintenance Yard. We understand that some of the soils may have been environmentally impacted and that it is intended to excavate and replace these materials. There are structures and improvements in these areas which are being considered for relocation.

GeoPacific carried out a geotechnical investigation of the soil conditions in the area of the existing structures on August 16th and 20th, 2010. We carried out an additional investigation on September 27, 2011, in the area where it was proposed to re-establish the building.

This report presents the findings of our investigations and makes preliminary geotechnical recommendations for the proposed remedial work and new building foundations.

2.0 SITE DESCRIPTION

The site is located on the west side of the Alaska Highway (HWY 97) at KM 254. There is an access road from the highway to the maintenance yard about 1 km in length. The camp is located on a relatively flat bench at an elevation of about 895 m above sea level. There is a higher bench at the south end of the site at an elevation of about 901 m, a lower bench to the north of the maintenance yard at an elevation of about 887 m and a fourth bench located at the north end of the site at an elevation of about 878 m. The site covers an area about 500 m in length north to south and 250 m in length east to west.

There are many structures on the site. In the main maintenance yard area there is a large garage, two sheds, a trailer, two waste oil storage tanks with surrounding berms, a salt shed, and several above ground storage tanks.

The main structure is a steel framed garage with metal cladding on the sides and roof. The structure is about 25 m long by 12.5 m wide. The structure is founded on conventional spread foundations with a concrete slab on grade. The sheds are steel framed with metal cladding. The northern shed covers an area of about 45 m^2 and the southern shed covers about 35 m^2.

There are trailer residences located on the first bench to the south of the maintenance area. This area includes 8 single wide trailers located in this area, a drinking water well with shed, and a sewage lagoon.

The proposed maintenance relocation area at the time of our investigation is located along the third bench, north of its current location, at an elevation of about 888 m.

3.0 SITE INVESTIGATION

GeoPacific carried out the initial site investigation in two stages. The first stage was completed on August 16th, 2010, and consisted of general site reconnaissance and the drilling of test holes inside of the main garage structure. Four test holes were advanced to refusal for the drilling equipment supplied at depths ranging from 1.2 to 1.8 m. In addition, test pits were dug adjacent to the building foundations to allow for foundation measurements.

The second stage of the investigation was completed on August 20th, 2010, and consisted of drilling test holes in the area surrounding the main garage and sheds. Three test holes were advanced to depths ranging from 3.4 to 7.0 m. Standard Penetration Testing (SPT) was carried out to provide an index value to the density of the underlying soils.

The most recent investigation of the proposed relocation area was carried out on September 27, 2011 and consisted of three excavated test pits. Samples were collected for further classification.

4.0 SUBSURFACE CONDITIONS

4.1 Soil and Groundwater Observations (Existing Maintenance Yard)

Seven test holes were drilled within the maintenance yard area. Four of the test holes were drilled within the main garage structure and three were drilled to the west and north of the garage. The general subsurface soil conditions are described below.

SAND AND GRAVEL (FILL)

Sand and gravel fill materials were identified at test hole locations TH10-01 and TH10-03. The fill contained fine to medium grained sand and variable fine grained gravel and was silty. These fill materials were found to be compact becoming dense with depth.

Gravelly, Silty, CLAY

The site was found to be overlain by clay which was noted to be gravelly and silty at test hole TH10-02. This deposit is expected to be glacial outwash and was noted to be stiff to very stiff in consistency. The clay was found to extend to a depth of 1.5 m.

SILT, SAND, AND GRAVEL (TILL)

Glacial till comprised of silt, sand, and gravel in varying proportions was identified underlying the fill materials and clay described above at test holes TH10-01 and TH10-02. This deposit was

noted to be compact to dense and extended to depths ranging from 2.4 to 5.8 m below site grades.

SILT / CLAY

Silt to silty clay deposits were found underlying the glacial till at test holes TH10-02 and TH10-03. These deposits were found to contain some angular gravel and trace sand and were noted to be of hard consistency. The silt/clay was found to extend to the underlying bedrock.

Bedrock (SHALE)

Shale bedrock was identified underlying all of the materials described above at test holes TH10-01 to TH10-03. The shale was weathered near its upper horizon and became very hard with depth.

The groundwater table was not established during our investigation. We expect that this is because of the generally low permeability of the underlying soils. Some perched water was observed within the granular fill materials overlying the weathered bedrock.

Review of the test hole logs prepared by Hemmera indicates that the groundwater level is at an elevation of about 889 to 890 m above sea level in the area around the maintenance area.

4.2 Soil and Groundwater Observations (Proposed Maintenance Yard Location)

Three test pits were dug in the vicinity of the proposed maintenance structure location along the third bench.

At all three locations the area was overlain by sandy gravel fill materials which are underlain by a silty gravel to cobble layer which is underlain by weathered shale at depth.

SANDY GRAVEL (FILL)

Sandy gravel fill materials were identified at test hole locations TH10-08 to TH10-10. The fill contained angular to sub-rounded gravel with fine sand and occasional cobbles and shale fragments. The fill was noted to be compact.

SILT, SAND, GRAVEL AND COBBLES (TILL-LIKE)

Glacial till-like deposits comprised of silt, sand, gravel and cobbles in varying proportions was identified underlying the fill materials. These soils were noted to be compact to dense and extend to depth of 1.8 m at TH11-01, greater than 2.1 m at TH11-02 and 2.4 m at TH11-03.

Bedrock (SHALE)

Shale bedrock was identified underlying the materials described above at test holes TH11-01 and TH11-03 and is expected to underlie TH11-02 at depths greater than 2.1 m. The shale was weathered and compact to dense.

The test hole logs in Appendix A should be referenced for specific soil descriptions at our test hole locations.

The groundwater table was not identified in the test pits carried out on the third bench in the proposed relocation area.

5.0 DISCUSSION

5.1 General

It is intended to remediate the soil beneath and to the west of the main garage structure in the maintenance area. We understand that it is being proposed to relocate the garage and sheds to allow for the proposed remedial work. We expect that once the structures are removed it will be possible to excavate potentially impacted soils and replace them with backfill materials. The type of backfill material used and recommended level of compaction would reflect the intended future use of the area.

The soils in the maintenance area generally consist of granular fills overlying compact to dense, or stiff, glacial till-like materials overlying shale bedrock at depth. Very little groundwater was encountered during our investigation. Review of these materials and groundwater conditions indicates that excavation slopes can be expected to be relatively stable during the remedial work.

5.2 Remediation

The remedial work will consists of excavating impacted soils and replacing them with approved fill materials. The details of the remedial excavation will be specified by Hemmera. The materials used as backfill and specified level of compaction will reflect the intended future use of the area. We have specified backfill materials in this report; however, we expect that other materials may be available on site or nearby. GeoPacific should be asked to review the suitability of any alternative materials prior to use.

5.3 Relocation of Buildings

It is intended to relocate the existing structures to allow the remedial work to be carried out. We understand that a structural engineer is reviewing whether it is feasible to move the buildings.

From a geotechnical standpoint, it will be necessary to prepare a suitable foundation subgrade for the relocated structures.

The main garage structure is currently founded on conventional spread foundations located about 0.6 m below the top of slab-on-grade. The northernmost shed is located on a 150 mm slab-on-grade and the southernmost shed is located on a 175 mm slab-on-grade. General geotechnical recommendations for support of the structures are provided in Section 7 of this report.

We expect that a building permit will be required from the local building authority and the standard British Columbia letters of assurance will be required.

5.4 Other Improvements / Considerations

For discussion purposes we have identified other site improvements which may require consideration in the event that the structures are relocated.

1. Utility Pole at northeast corner of the main garage
2. Utility Pole at the southwest corner of the main garage
3. Utility Pole at the northwest corner of the northern shed
4. AST's and no-post barriers along eastern site of main garage
5. Storage Tank and Berm at north end of main garage
6. Trailer to the east of main garage
7. Telephone Lines
8. Overhead / Underground Power Lines
9. Gas Connections / Propane
10. Sewer / Septic Connections
11. Underground Fuel Lines
12. Demolition of the existing slab and foundations
13. Access Roads and Road Structure to new building location

6.0 REMEDIATION RECOMMENDATIONS

6.1 Excavation

It is intended to excavate and replace impacted soils at the site. We recommend planned excavation slopes of 3 horizontal to 4 vertical (3H:4V) be considered where manned entry would be required.

It may be possible to achieve steeper slope cuts, specifically where no manned entry will be required, however, this will be addressed in the field on a case by case basis based on the actual soil and groundwater conditions encountered.

6.2 Backfill and Compaction

The type of material considered suitable for backfill depends on the intended future use of the area being backfilled.

6.2.1 Structural Backfill

If the area is to be used to support equipment, buildings or roadways the materials used should conform to our recommendation for structural fill. In the context of this report, structural fill is defined as clean sand to sand and gravel fill, compacted in 300 mm loose lifts to a minimum standard of 100% of its Standard Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

6.2.2 Non-Structural Backfill

If it is not intended to utilize the area in the future, then the backfilling requirements could be less rigorous. We recommend that non-structural backfill be considered. These materials could consist of various types and mixtures of materials or soils derived from other excavations on the site.

We recommend that non-structural backfill be compacted to a minimum standard of 95% of its Standard Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

7.0 PRELIMINARY BUILDING RECOMMENDATIONS

7.1 Siting of Buildings

At the time of our most recent investigation it was proposed to found the structure along the "third bench" in a relatively flat area at an elevation of about 888 m.

In general the area has been subjected to cutting and filling in the past to provide flat working areas. It is recommended that the main garage structure and the sheds be located on natural undisturbed ground or on a prepared structural fill subgrade as described below.

We have carried out a test pit program at this proposed third bench location. The results of this investigation are described in Section 4 above. We confirm that, from a geotechnical perspective, this is a viable location for the structure.

7.2 Site Stripping for Foundations and Grade Supported Slabs

Site stripping associated with foundations and grade supported slabs includes removing any organic topsoil, variable fill materials and any other material considered to compromise the design recommendations stated herein.

Any soft, loose or disturbed material should be removed in order to allow for construction on the proposed subgrade in its natural undisturbed state.

7.3 Grade Reinstatement beneath Structures

Following site preparation, any required grade reinstatement beneath foundations or concrete slabs should be done with structural fill. In the context of this report structural fill is defined as clean sand to sand and gravel fill, compacted in 300 mm loose lifts to a minimum standard of 100% of its Standard Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

7.4 Foundations

7.4.1 Bearing Capacity

The main garage structure consists of a large steel frame building. We expect that it will be supported on strip foundations along its perimeter. The building slab would be constructed on grade. Foundation loads are expected to be moderate with column loads in the range of 600 kN which would be distributed along the strip foundations.

For preliminary design purposes the foundation can be designed based on a serviceability limit state (SLS) bearing pressure of 150 kPa, and an ultimate limit state (ULS) of 300 kPa, for foundations

constructed on the dense glacial till or weathered bedrock. The actual bearing soils should be confirmed at the proposed location for the relocated structures.

Post construction settlement of foundations designed as recommended should be less than 25 mm total and 20 mm over a 10 m span.

7.4.2 Seismic Design of Foundations

We have considered a design earthquake with a 2% probability of exceedance over a 50 year period which equates to an earthquake with a return period of 1 in 2,475 years. Accordingly, we have considered an earthquake having a peak horizontal ground acceleration of 0.06g for this site.

This site qualifies as "Site Class C" as defined in Table 4.1.8.4.A of the British Columbia Building Code (BCBC).

7.4.3 General Foundation Requirements

Footings should be located a minimum of 1.2 m below final exterior grades for frost protection or be underlain to the same depth by granular fill which is not considered susceptible to frost heave.

Footing subgrades should be reviewed by GeoPacific prior to placing formwork.

7.5 Grade Supported Concrete Slabs

In order to provide suitable support for any concrete slabs-on-grade, we recommend that any fill placed under the slab should conform to our recommendation for engineered fill in Section 5.2 above.

The floor slab should be directly underlain by a polyethylene moisture barrier and a minimum of 150 mm of 19 mm clear crushed gravel fill to inhibit upward migration of moisture beneath the slab.

7.6 Site and Foundation Drainage

A passive mechanical perimeter drainage system should be included to ensure that water does not collect beneath the foundation or within the fill below the structure. The system should be connected to a sump and pump system.

7.7 Utility Installations

Site utilities will be required beneath the grade supported slab. The design of these systems must consider the location and the depth of the foundations. The service trenches and excavations should be outside of a 1H:1V slope measured downward and outward from the underside of foundations. Backfilling of trenches and excavations beneath the slab should be done with 19 mm clear crush gravel following the required pipe bedding.

All excavations and trenches must conform to the latest Occupational Health and Safety Regulation supplied by the Workers Compensation Board of BC.

8.0 FIELD REVIEWS

As would be required to satisfy the municipal "Letters of Assurance", GeoPacific Consultants Ltd. will carry out sufficient field reviews during construction to ensure that the geotechnical design recommendations contained within this report have been adequately communicated to the design team and to the contractors implementing the design. These field reviews are not carried out for the benefit of the contractors and therefore do not in any way effect the contractors obligations to perform under the terms of his/her contract. Field reviews are normally required at the time of the following activities:

1. Stripping	– Review of stripped subgrade prior to placement of fill
2. Filling	– Review of fill materials, placement and compaction
3. Foundations	– Review of subgrade for foundations
4. Slab-on-grade	– Review of the slab-on-grade preparation
5. Backfill	– Review of backfill materials, placement and compaction

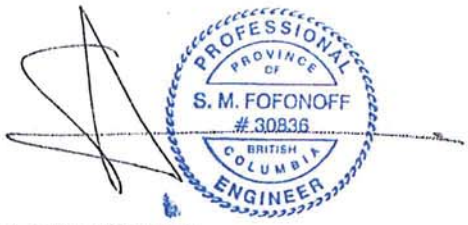
It is critical that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also critical that contractors working on the site view this document in advance of any work being carried out so that they become familiar with the sensitive aspects of the works proposed. It is the responsibility of the client to notify GeoPacific Consultants Ltd. when conditions or situations not outlined within this document are encountered.

9.0 CLOSURE

This report is prepared solely for Hemmera and others working on this project as described to the general standards of similar work for similar projects in this area and no other warranty of any kind is expressed or implied. GeoPacific accepts no responsibility for any other use of this report.

We are pleased to assist you with this project and we trust this information is helpful and sufficient for your purposes at this time. Please do not hesitate to call the undersigned if you should require any clarification or additional details.

For:
GeoPacific Consultants Ltd.



Steven Fofonoff, P.Eng.
Project Engineer

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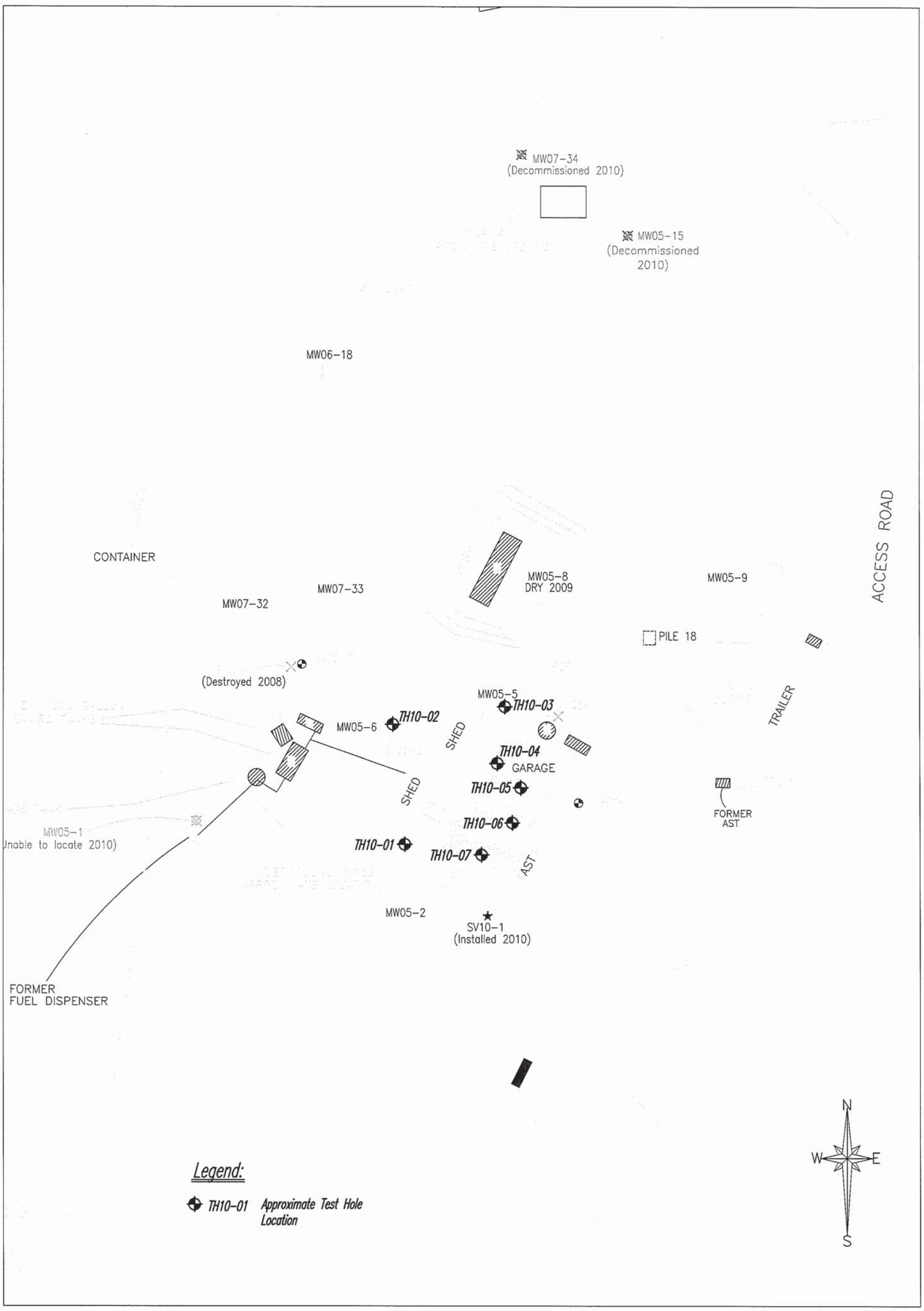
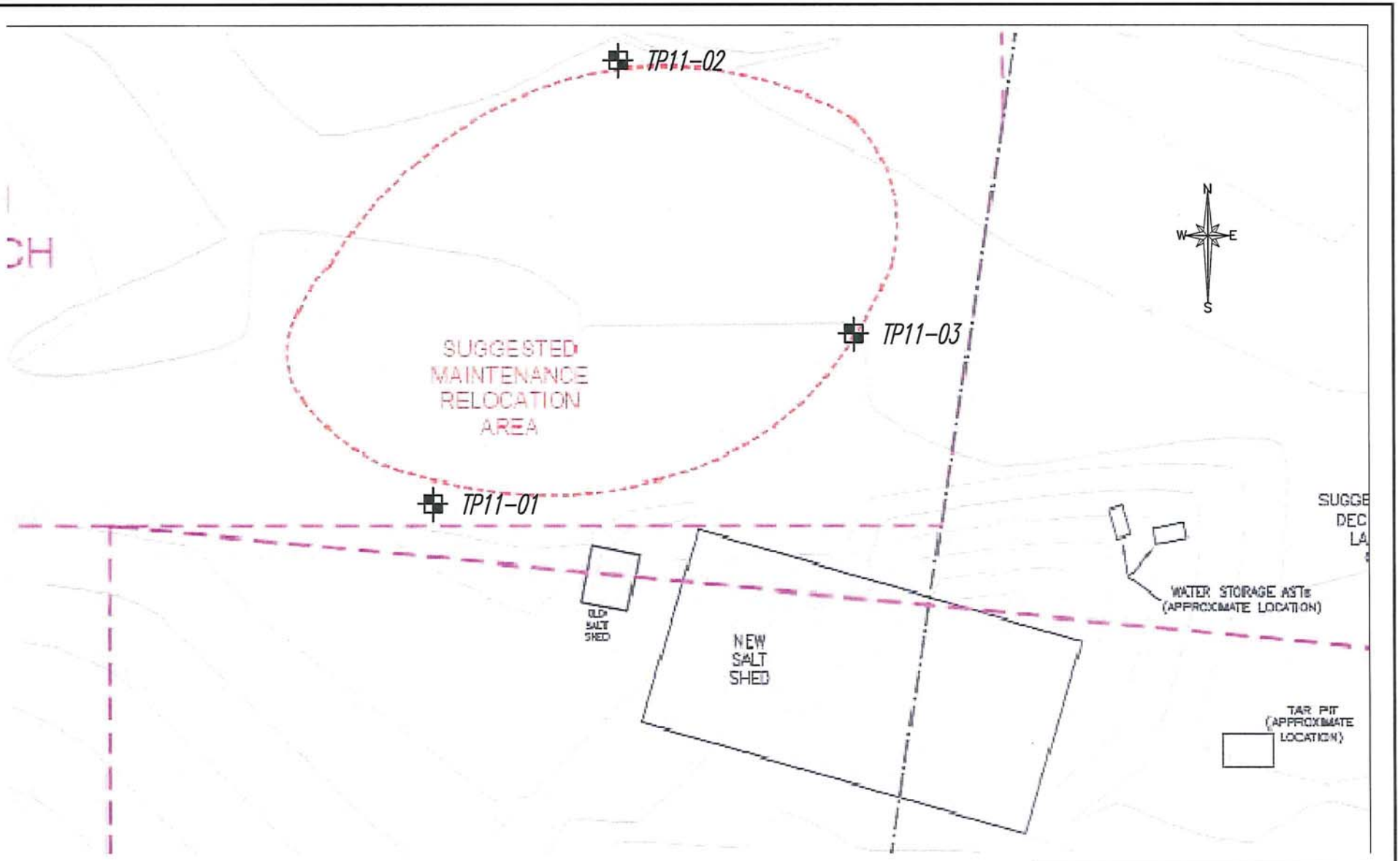


REVISIONS:
A.
B.
C.

REFERENCE: ARCHITECTS Hemmera PROJ. NO.: 376-118.12 DATE: January 2011	#215-1200 West 73-rd Ave. Vancouver, B.C. Canada V6P 6G5 Ph. (604) 439-0922 Fax (604) 439-9189 GeoPacific Consultants Ltd.	DATE: March 23, 2011 DRN. BY: MI APP'D. SMF SCALE: 1: 500	Sikanni Maintenance Yard Sikanni, BC TEST HOLE LOCATION PLAN	FILE NO.: 8982 DWG. NO.: 8982-1



Legend:

TP11-01 Test Pit (TP) Location

REFERENCE:
ARCHITECTS Hemmera
PROJ. NO.: 376-118.15
DATE: September 15, 2011

#215-1200 West 73-rd Ave.
Vancouver, B.C.
Canada V6P 6G5
Ph. (604) 439-0922
Fax (604) 439-9189
GeoPacific Consultants Ltd.

DATE: September 28, 2011
DRN. BY: MI APP'D. SMF
SCALE: Not To Scale

Sikanni Maintenance Yard
Sikanni, BC
Test Pit Location Plan

FILE NO.: 8982
DWG. NO.: 8982-2

REVISIONS:
A.
B.
C.

ORIGINAL PAPER SIZE 8.5"x11"

APPENDIX A

TEST PIT LOGS

Test Hole Log: TH10-01

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)
0 / 0		Ground Surface	
0 – 5.5		***SAND and GRAVEL (FILL)*** sand (fine to medium grained) and gravel (angular to rounded fine grained), silty, trace cobbles, damp, grey-dark brown compact to 3' dense below 3'	0.0
5.5 – 9		***SILT and GRAVEL (TILL)*** silt and gravel (angular to sub-angular fine to medium grained), clayey, some cobbles, very dense, damp, brown	5.5
9 – 11		***Weathered BEDROCK*** Weathered shale, intermixed with clayey silt and gravel	9.0
11		End of Borehole	11.0

Moisture Content (%)

SPT (blows per foot) 10 30 50 70 90

28, 34, 46
24, 30, 66
26, 40, 100

Groundwater / Well

Remarks

SPT Refusal @ 9'

Drill Refusal @ 11'

Logged: MI
Method: Solid Stem Auger
Date: August 20, 2010

Datum: Ground Surface
Figure Number: A.1
Page: 1 of 1

Test Hole Log: TH10-02

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)
0 / 0		Ground Surface	
0 – 5		***gravelly, silty CLAY*** silty clay, gravelly (fine to medium grained, sub-angular to sub-rounded), trace sand, stiff to very stiff, dry to damp, grey, becoming tan-brown below 2.5'	0.0
5 – 19		***SAND and GRAVEL (TILL)*** sand (fine to medium grained) and gravel (fine to coarse grained, angular to sub-rounded), silty, some clay, compact, damp, dark grey/brown gravelly sand lense noted from 7' to 7.5' dense below 14'	5.0
19 – 23		***SILT/CLAY*** silt/clay, hard, dry, dark grey	19.0
23		***Weathered BEDROCK***	23.0
		End of Borehole	

Moisture Content (%)

SPT (blows per foot) 10 30 50 70 90

10, 10, 24, 22, 18, 24, 14, 24, 24, 20, 24, 40, 46, 46

Groundwater / Well

Remarks

Drill Refusal @ 23' - assume bedrock

Logged: MI
Method: Solid Stem Auger
Date: August 20, 2010

Datum: Ground Surface
Figure Number: A.2
Page: 1 of 1

Test Hole Log: TH10-03

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
		SILT and GRAVEL (FILL) silt and gravel (angular to rounded, fine to medium grained), sandy (fine grained), very stiff/compact, damp, grey-dark brown wet below 2', saturated between 4' and 5'	0.0		16, 18, 40, 40		Perched groundwater observed between 4' and 5'
5			5.0				
		silty CLAY (TILL) clay, silty, some gravel (angular to sub-angular, fine to coarse grained), trace sand, hard, damp to moist, tan-brown	5.7		38, 52, 40, 30, 26		
10 / 3		***Weathered BEDROCK*** Weathered shale, intermixed with sand and gravel			80, 58, 58		
12		End of Borehole	12.0				
25 / 7							

Logged: MI
Method: Solid Stem Auger
Date: August 20, 2010

Datum: Ground Surface
Figure Number: A.3
Page: 1 of 1

Test Hole Log: TH10-04

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 – 4		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
4 / 1		End of Borehole	4.0				Auger Refusal @ 4'
5 – 25 / 2 – 7							

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.4
Page: 1 of 1

Test Hole Log: TH10-05

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION (INFERRED PROFILE)	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
4 / 1		End of Borehole	4.0				Auger Refusal @ 4'
25 / 7							

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.5

Test Hole Log: TH10-06

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE				Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)				
0		Ground Surface					
0 – 1		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
4		End of Borehole	4.0				Auger Refusal @ 4'
1 – 7							

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.6

Test Hole Log: TH10-07

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION (INFERRED PROFILE)	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
6 / 2		End of Borehole	6.0				Auger Refusal @ 6'

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.7
Page: 1 of 1

Test Pit Log: TP11-01

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (ft)	Moisture Content (%)	Groundwater	Remarks
0 / 0		Ground Surface				
		Sandy GRAVEL (FILL) sandy gravel (angular to subrounded, fine grained), some silt, compact, damp, grey-brown,	3.0			
3 / 1		***Silty GRAVEL (TILL-LIKE)*** silt gravel (angular to sub-angular fine to medium grained), trace cobbles, trace shale fragments, dense, damp to dry, grey	6.0			
6 / 2		***Weathered BEDROCK*** Weathered shale, some gravel, trace silt, compact to dense, dry, reddish-grey	9.5			Bedrock horizon is not well defined.
10 / 3		End of Test Pit				
13 / 4						
15						

Logged: MI
Method: Excavator
Date: September 27, 2011

Datum: Ground Surface
Figure Number: A.8
Page: 1 of 1

Test Pit Log: TP11-02

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth	Symbol	SOIL DESCRIPTION	Depth (ft)	Moisture Content (%)	Groundwater	Remarks
		INFERRED PROFILE				
0 ft / 0 m		Ground Surface				
0–1.5		***Sandy GRAVEL (FILL)*** sandy gravel (angular to subrounded, fine grained), trace silt, compact, damp, grey-brown	1.5			
1.5–7.0		***COBBLES*** Cobbles (subangular to rounded, up to 12" diameter), some sand and trace silt within cavities between cobbles, compact, damp, grey	7.0			
7		End of Test Pit				

ft: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
m: 0 1 2 3 4

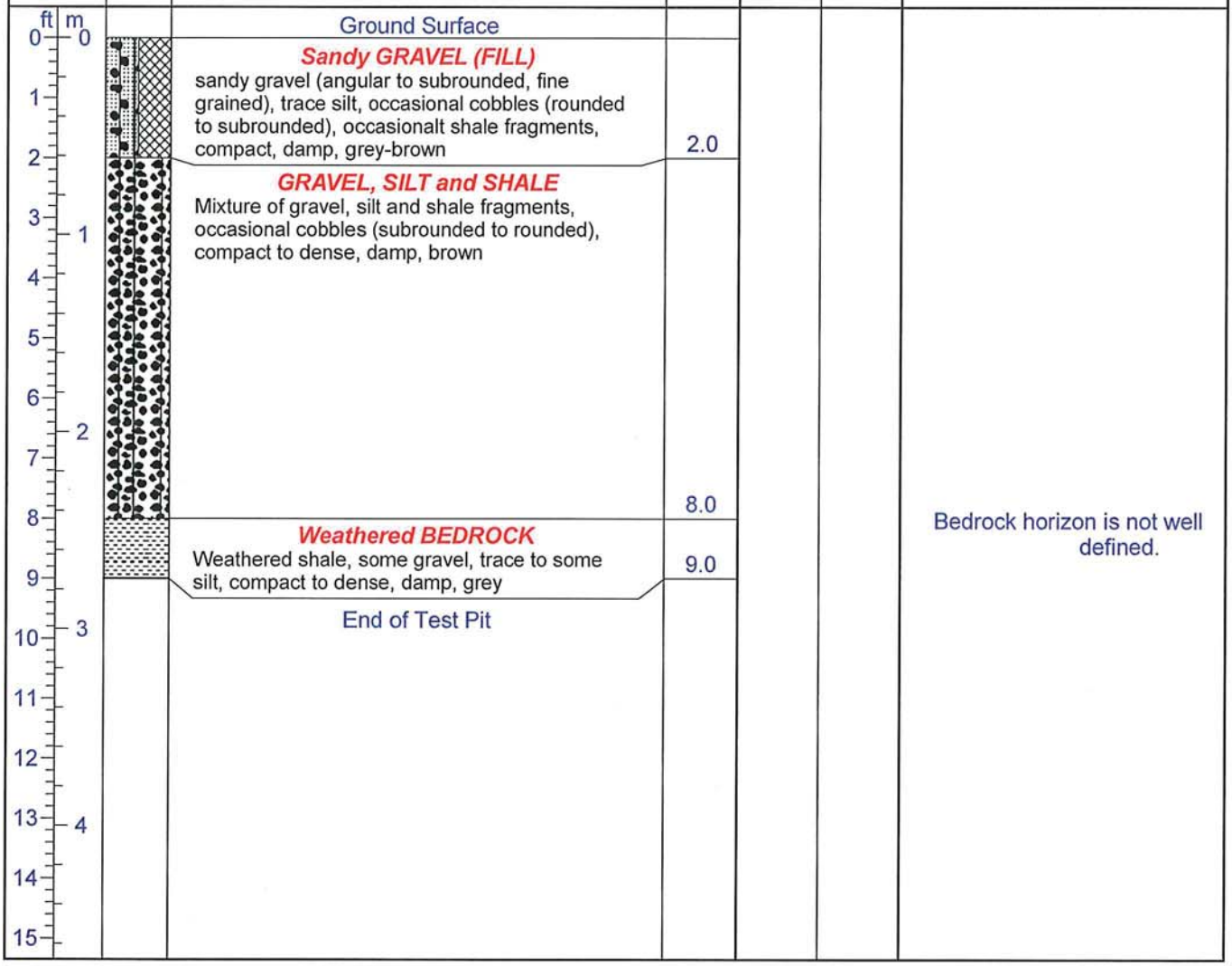
Logged: MI
Method: Excavator
Date: September 27, 2011

Datum: Ground Surface
Figure Number: A.9

Test Pit Log: TP11-03

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189



Logged: MI
Method: Excavator
Date: September 27, 2011

Datum: Ground Surface
Figure Number: A.8

GeoPacific
Consultants Ltd.

#215 -1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Phone (604) 439-0922 / Fax (604) 439-9189

Hemmera Envirochem Inc.
250 – 1380 Burrard Street
Vancouver, BC
V6Z 2H3

January 20, 2012
File 8982

Attention: Mr. Tyler Wilen

Re: Geotechnical Investigation and Report, Sikanni Maintenance Yard – Remedial Work, Sikanni, KM 254 Alaska Highway, BC

1.0 INTRODUCTION

GeoPacific Consultants Inc. has been asked to provide a geotechnical assessment of the soil and groundwater conditions as they pertain to the remedial work being considered at the Sikanni Maintenance Yard. We understand that some of the soils may have been environmentally impacted and that it is intended to excavate and replace these materials. There are structures and improvements in these areas which are to be relocated.

GeoPacific carried out a geotechnical investigation of the soil conditions in the area of the existing structures on August 16th and 20th, 2010. An additional investigation was carried out on September 27, 2011, along the third bench, where it was being considered to relocate the structures. It is now being considered to relocate the structures to an area about 200 metres west of their existing location along the first bench.

GeoPacific carried out a site review of this area on December 19, 2011. The site review consisted of a general site overview, review of existing ground conditions, and a review of several test pits dug within the building area.

This report presents the findings of our investigations and makes preliminary geotechnical recommendations for the proposed remedial work and new building foundations.

2.0 SITE DESCRIPTION

The site is located on the west side of the Alaska Highway (HWY 97) at KM 254. There is an access road from the highway to the maintenance yard about 1 km in length. The camp is located on a relatively flat bench at an elevation of about 895 m above sea level. There is a higher bench at the south end of the site at an elevation of about 901 m, a lower bench to the north of the maintenance yard at an elevation of about 887 m and a fourth bench located at the north end of the site at an elevation of about 878 m. The site is about 500 m from north to south and 250 m from east to west.

There are numerous structures on the site. In the main maintenance yard area there is a large garage, two sheds, a trailer, two waste oil storage tanks with surrounding berms, a salt shed, and several above ground storage tanks.

The main structure is a steel framed garage with metal cladding on the sides and roof. The structure is about 25 m long by 12.5 m wide. The structure is founded on conventional spread foundations with a concrete slab on grade. The sheds are steel framed with metal cladding. The northern shed covers an area of about 45 m^2 and the southern shed covers an area of about 35 m^2.

There are trailer residences located on the first bench located immediately south of the maintenance area. This area includes 8 single wide trailers located in this area, a drinking water well with shed, and a sewage lagoon.

It is currently proposed to relocate the maintenance area about 200 m to the west along the first bench.

3.0 SITE INVESTIGATION

GeoPacific carried out the initial site investigation in two stages. The first stage was completed on August 16th, 2010, and consisted of general site reconnaissance and the drilling of test holes inside of the main garage structure. Four test holes were advanced to refusal for the drilling equipment supplied at depths ranging from 1.2 to 1.8 m. In addition, test pits were dug adjacent to the building foundations to allow for foundation measurements.

The second stage of the investigation was completed on August 20th, 2010, and consisted of drilling test holes in the area surrounding the main garage and sheds. Three test holes were advanced to depths ranging from 3.4 to 7.0 m. Standard Penetration Testing (SPT) was carried out to provide an indication of the in situ density of the underlying soils.

A third investigation was carried out on September 27, 2012 along the third bench when it was proposed to relocate the maintenance area to that location. These results are not included in this report.

The most recent investigation consisted of review of the new proposed location, located about 200 m west along the first bench and a review of test pits which were being excavated for environmental purposes in order to assess the ground conditions at this location.

4.0 SUBSURFACE CONDITIONS

4.1 General Soil and Groundwater Observations (Existing Maintenance Yard)

A total of seven test holes were drilled within the maintenance yard area. Four of the test holes were drilled within the main garage structure and three were drilled to the west and north of the garage. The general subsurface soil conditions are described below.

SAND AND GRAVEL (FILL)

Sand and gravel fill materials were identified at test hole locations TH10-01 and TH10-03. The fill contained fine to medium grained sand and variable fine grained gravel and was silty. These fill materials were found to be compact becoming dense with depth.

Gravelly, Silty, CLAY

The fill is underlain by clay which was noted to be gravelly and silty at test hole TH10-02. This deposit was noted to be stiff to very stiff in consistency. The clay was found to extend to a depth of 1.5 m.

SILT, SAND, AND GRAVEL (TILL)

Glacial till comprised of silt, sand, and gravel in varying proportions was identified underlying the fill materials and clay described above at test holes TH10-01 and TH10-02. This deposit was noted to be compact to dense and extended to depths ranging from 2.4 to 5.8 m below site grades.

SILT / CLAY

Silt to silty clay deposits were found underlying the glacial till at test holes TH10-02 and TH10-03. These deposits were found to contain some angular gravel and trace sand and were noted to be hard. The silt/clay was found to extend to the underlying bedrock.

Bedrock (SHALE)

Shale bedrock was identified underlying all of the materials described above at test holes TH10-01 to TH10-03. The shale was weathered near its upper horizon and became very hard with depth.

The groundwater table was not established during our investigation. We expect that this is because of the generally low permeability of the underlying soils. Some perched water was observed within the granular fill materials overlying the weathered bedrock. A review of the test hole logs prepared by Hemmera indicates that the groundwater level is at an elevation of about 889 to 890 m above sea level in the area around the maintenance area.

4.2 Soil and Groundwater Observations (Proposed Maintenance Yard Location)

GeoPacific review the excavation of two test pits within the building area and review the results of a total of 9 test pits excavated in the general area under the direction of Hemmera. The test pits reviewed were located within the current gravel road area which is subject to heavy truck traffic and has been kept clear of snow. These conditions made it very difficult to dig test pits considering the density of the soil and the amount of frost present.

We were able to confirm that this area is underlain by road base gravels, comprised of 19 mm minus angular crushed rock, which are underlain by clear drain rock consisting of 19 mm clear crushed rock. Review of the further test pits carried out Hemmera indicates that the fill materials in this area extend to depths of up to 1.1 m below grade. The fill materials were noted to be underlain by sand, gravel and cobbles which are inferred to be dense or silt with some gravel and cobbles which is inferred to be very stiff.

The groundwater table was not identified in this investigation and is expected to be well below foundation depths.

5.0 DISCUSSION

5.1 General

It is intended to remediate the soil beneath and to the west of the main garage structure in the maintenance area. It is proposed to relocate the garage and sheds about 200 m to the west to allow for the proposed remedial work. We expect that once the structures are removed it will be possible to excavate potentially impacted soils and replace them with backfill materials. The type of backfill material used and recommended level of compaction would reflect the intended future use of the area.

The soils in the maintenance area generally consist of granular fills overlying compact to dense, or stiff, glacial till-like materials overlying shale bedrock at depth. Very little groundwater was encountered during our investigation. A review of these materials and groundwater conditions indicates that excavation slopes can be expected to be relatively stable during the remedial work.

5.2 Remediation

The remedial work will consist of excavating impacted soils and replacing them with approved fill materials. The details of the remedial excavation will be specified by Hemmera. The materials used as backfill and the specified level of compaction will reflect the intended future use of the area. We have specified backfill materials in this report; however, we expect that other materials may be available on site or nearby. GeoPacific should review the suitability of any alternative materials prior to use.

5.3 Relocation of Buildings

It is intended to relocate the existing structures to allow the remedial work to be carried out. We understand that a structural engineer is reviewing the feasibility of moving the buildings.

From a geotechnical standpoint, it will be necessary to prepare a suitable foundation subgrade at the new permanent location of the relocated structures.

The main garage structure is currently founded on conventional spread foundations located about 0.6 m below the top of slab-on-grade. The northernmost shed is founded on a 150 mm slab-on-grade and the southernmost shed is founded on a 175 mm slab-on-grade. General geotechnical recommendations for support of the structures are provided in Section 7 of this report.

We expect that a building permit will be required from the local building authority and the standard British Columbia letters of assurance will be required.

5.4 Other Improvements / Considerations

For discussion purposes we have identified other site improvements which may require consideration in the event that the structures are relocated.

1. Utility Pole at northeast corner of the main garage
2. Utility Pole at the southwest corner of the main garage
3. Utility Pole at the northwest corner of the northern shed
4. AST's and no-post barriers along eastern site of main garage
5. Storage Tank and Berm at north end of main garage
6. Trailer to the east of main garage
7. Telephone Lines
8. Overhead / Underground Power Lines
9. Gas Connections / Propane
10. Sewer / Septic Connections
11. Underground Fuel Lines
12. Demolition of the existing slab and foundations
13. Access Roads and Road Structure to new building location

6.0 REMEDIATION RECOMMENDATIONS

6.1 Excavation

It is intended to excavate and replace impacted soils at the site. We recommend excavation slopes of 3 horizontal to 4 vertical (3H:4V) be considered where manned entry is required.

It may be possible to achieve steeper slope cuts, specifically where no manned entry is required, however, this will be addressed in the field on a case by case basis based on the actual soil and groundwater conditions encountered.

6.2 Backfill and Compaction

The type of material considered suitable for backfill depends on the intended future use of the area being backfilled.

6.2.1 Structural Backfill

If the area is to be used to support equipment, buildings or roadways the materials used should conform to our recommendation for structural fill. In the context of this report, structural fill is defined as clean sand to sand and gravel fill, compacted in 300 mm loose lifts to a minimum standard of 100% of its Standard Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

6.2.2 Non-Structural Backfill

If it is not intended to utilize the area in the future, then the backfilling requirements could be less rigorous. Non-structural backfill materials could be considered. These materials could consist of various types and mixtures of materials or soils derived from other excavations on the site.

We recommend that non-structural backfill be compacted to a minimum standard of 95% of its Standard Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

7.0 PRELIMINARY BUILDING RECOMMENDATIONS

7.1 Siting of Buildings

This report considers relocating the maintenance garage about 200 m to the west along the third bench.

In general the area has been subjected to cutting and filling in the past to provide flat working areas. It is recommended that the main garage structure and the sheds be located on natural undisturbed ground or on a prepared structural fill subgrade as described below.

We have reviewed several test pits within the proposed building area and reviewed those carried out by Hemmera. The results of this investigation are described in Section 4 above. We confirm that, from a geotechnical perspective, this is a viable location for the new structure. However, it should be appreciated that at the time of the investigation excavating was very difficult and the investigation was limited to 1.6 m depth. Further, ground conditions different from those described in this report, may be encountered at other locations within the building footprint. Therefore, GeoPacific should be asked to confirm bearing materials at the time of construction.

7.2 Site Stripping for Foundations and Grade Supported Slabs

Site stripping associated with foundations and grade supported slabs includes removing any organic topsoil, organic materials, variable fill materials and any other material considered to compromise the design recommendations stated herein.

Any soft, loose or disturbed material should be removed in order to allow for construction on the proposed subgrade in its natural undisturbed state.

7.3 Grade Reinstatement beneath Structures

Following site preparation, any required grade reinstatement beneath foundations or concrete slabs should be done with structural fill. In the context of this report structural fill is defined as clean sand to sand and gravel fill, compacted in 300 mm loose lifts to a minimum standard of 100% of its Standard Proctor Maximum Dry Density (ASTM D698) while at a moisture content that is within 2% of its optimum for compaction.

7.4 Foundations

7.4.1 Bearing Capacity

The main garage structure consists of a large steel frame building. We expect that it will be supported on strip foundations along its perimeter. The building slab would be constructed on grade. Foundation loads are expected to be moderate with column loads in the range of 600 kN which would be distributed along the strip foundations.

For preliminary design purposes the foundation can be designed based on a serviceability limit state (SLS) bearing pressure of 150 kPa, and an ultimate limit state (ULS) of 300 kPa, for foundations constructed on the dense granular soils of very stiff silt described above.

Post construction settlement of foundations designed as recommended should be less than 25 mm total and 20 mm over a 10 m span.

7.4.2 Seismic Design of Foundations

We have considered a design earthquake with a 2% probability of exceedance over a 50 year period which equates to an earthquake with a return period of 1 in 2,475 years. Accordingly, we have considered an earthquake having a peak horizontal ground acceleration of 0.06g for this site.

This site qualifies as "Site Class C" as defined in Table 4.1.8.4.A of the British Columbia Building Code (BCBC).

7.4.3 General Foundation Requirements

Footings should be located a minimum of 1.2 m below final exterior grades for frost protection or be underlain to the same depth by granular fill which is not considered susceptible to frost heave.

Footing subgrades should be reviewed by GeoPacific prior to placing formwork.

7.5 Grade Supported Concrete Slabs

In order to provide suitable support for any concrete slabs-on-grade, we recommend that any fill placed under the slab should conform to our recommendation for engineered fill in Section 5.2 above.

The floor slab should be directly underlain by a polyethylene moisture barrier and a minimum of 150 mm of 19 mm clear crushed gravel fill to inhibit upward migration of moisture beneath the slab.

We expect that the structural engineer will specify a frost wall to address any further concerns associated with the expected frost depth.

7.6 Site and Foundation Drainage

A passive mechanical perimeter drainage system should be included to ensure that water does not collect beneath the foundation or within the fill below the structure. The system should be connected to a sump and pump system.

7.7 Utility Installations

Site utilities will be required beneath the grade supported slab. The design of these systems must consider the location and the depth of the foundations. The service trenches and excavations should be outside of a 1H:1V slope measured downward and outward from the underside of foundations. Backfilling of trenches and excavations beneath the slab should be done with 19 mm clear crush gravel following the required pipe bedding.

All excavations and trenches must conform to the latest Occupational Health and Safety Regulation supplied by the Workers Compensation Board of BC.

8.0 FIELD REVIEWS

As would be required to satisfy the municipal "Letters of Assurance", GeoPacific Consultants Ltd. will carry out sufficient field reviews during construction to ensure that the geotechnical design recommendations contained within this report have been adequately communicated to the design team and to the contractors implementing the design. These field reviews are not carried out for the benefit of the contractors and therefore do not in any way effect the contractors obligations to perform under the terms of his/her contract. Field reviews are normally required at the time of the following activities:

1. Stripping	– Review of stripped subgrade prior to placement of fill
2. Filling	– Review of fill materials, placement and compaction
3. Foundations	– Review of subgrade for foundations
4. Slab-on-grade	– Review of the slab-on-grade preparation
5. Backfill	– Review of backfill materials, placement and compaction

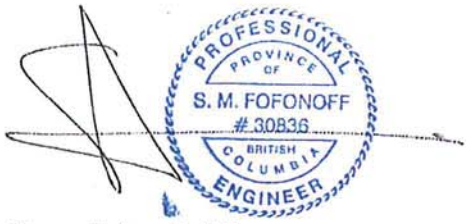
It is critical that these reviews are carried out to ensure that our intentions have been adequately communicated. It is also critical that contractors working on the site view this document in advance of any work being carried out so that they become familiar with the sensitive aspects of the works proposed. It is the responsibility of the client to notify GeoPacific Consultants Ltd. when conditions or situations not outlined within this document are encountered.

9.0 CLOSURE

This report is prepared solely for Hemmera and others working on this project as described to the general standards of similar work for similar projects in this area and no other warranty of any kind is expressed or implied. GeoPacific accepts no responsibility for any other use of this report.

We are pleased to assist you with this project and we trust this information is helpful and sufficient for your purposes at this time. Please do not hesitate to call the undersigned if you should require any clarification or additional details.

For:
GeoPacific Consultants Ltd.



Steven Fofonoff, P.Eng.
Project Engineer

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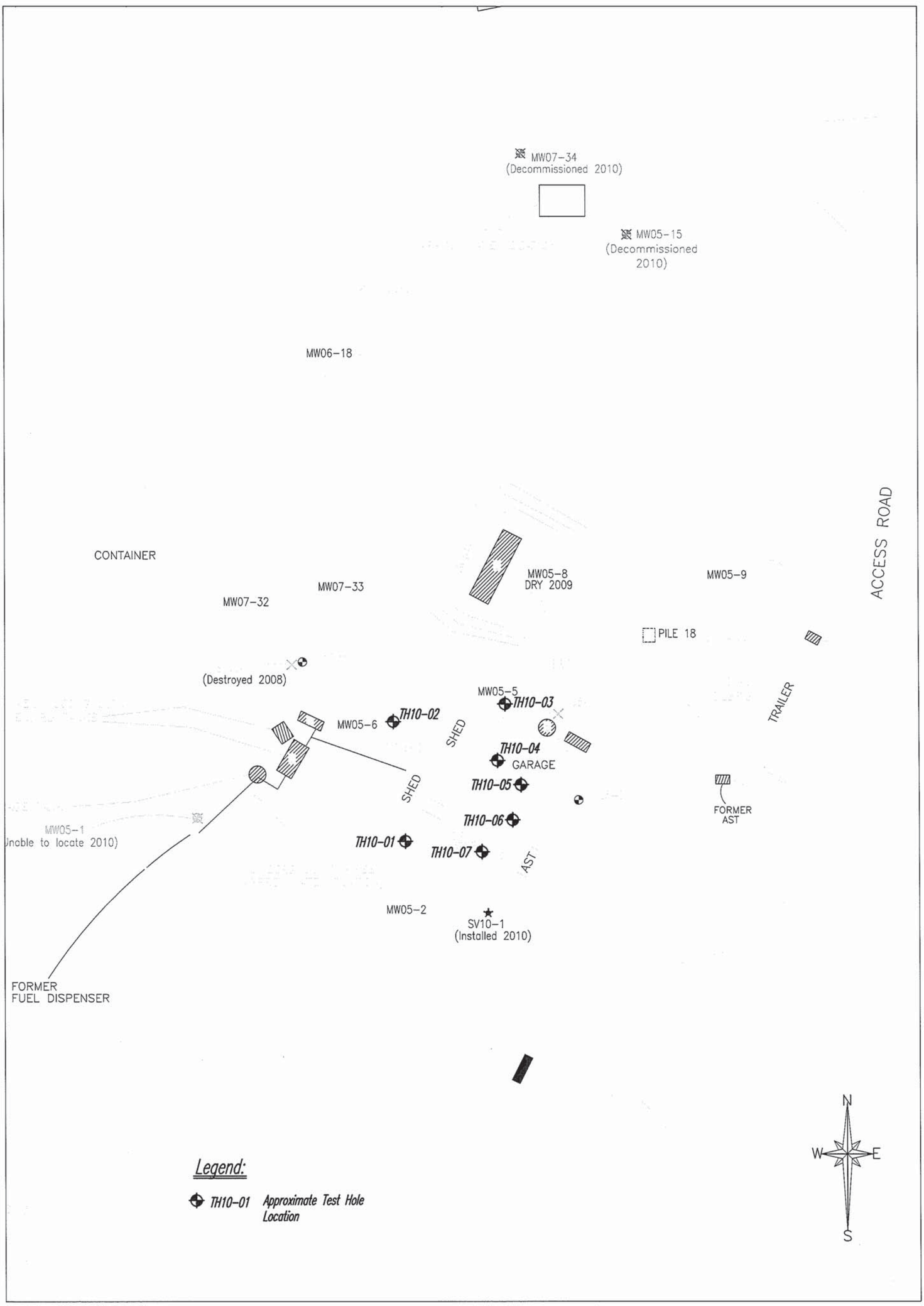

REVISIONS:
A.
B.
C.

REFERENCE: ARCHITECTS Hemmera PROJ. NO.: 376-118.12 DATE: January 2011	#215-1200 West 73-rd Ave. Vancouver, B.C. Canada V6P 6G5 Ph. (604) 439-0922 Fax (604) 439-9189 GeoPacific Consultants Ltd.	DATE: March 23, 2011 DRN. BY: MI APP'D. SMF SCALE: 1: 500	Sikanni Maintenance Yard Sikanni, BC TEST HOLE LOCATION PLAN	FILE NO.: 8982 DWG. NO.: 8982-1

APPENDIX A

TEST PIT LOGS

Test Hole Log: TH10-01

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)
0 / 0		Ground Surface	
0 – 5.5		***SAND and GRAVEL (FILL)*** sand (fine to medium grained) and gravel (angular to rounded fine grained), silty, trace cobbles, damp, grey-dark brown compact to 3' dense below 3'	0.0
5.5 – 9		***SILT and GRAVEL (TILL)*** silt and gravel (angular to sub-angular fine to medium grained), clayey, some cobbles, very dense, damp, brown	5.5
9 – 11		***Weathered BEDROCK*** Weathered shale, intermixed with clayey silt and gravel	9.0
11		End of Borehole	11.0

Moisture Content (%)

SPT (blows per foot) 10 30 50 70 90

28, 34, 46
24, 30, 66
26, 40, 100

Groundwater / Well

Remarks

SPT Refusal @ 9'

Drill Refusal @ 11'

Logged: MI
Method: Solid Stem Auger
Date: August 20, 2010

Datum: Ground Surface
Figure Number: A.1
Page: 1 of 1

Test Hole Log: TH10-02

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)
0 / 0		Ground Surface	
0 – 3 / 0 – 1		***gravelly, silty CLAY*** silty clay, gravelly (fine to medium grained, sub-angular to sub-rounded), trace sand, stiff to very stiff, dry to damp, grey, becoming tan-brown below 2.5'	0.0
5 – 19 / 2 – 6		***SAND and GRAVEL (TILL)*** sand (fine to medium grained) and gravel (fine to coarse grained, angular to sub-rounded), silty, some clay, compact, damp, dark grey/brown gravelly sand lense noted from 7' to 7.5' dense below 14'	5.0
19 – 23 / 6 – 7		***SILT/CLAY*** silt/clay, hard, dry, dark grey	19.0
23 / 7		***Weathered BEDROCK***	23.0
		End of Borehole	

Moisture Content (%)

SPT (blows per foot) 10 30 50 70 90

10, 10, 24, 22, 18, 24, 14, 24, 24, 20, 24, 40, 46, 46

Groundwater / Well

Remarks

Drill Refusal @ 23' - assume bedrock

Logged: MI
Method: Solid Stem Auger
Date: August 20, 2010

Datum: Ground Surface
Figure Number: A.2
Page: 1 of 1

Test Hole Log: TH10-03

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth/Elev (ft)
0 / 0		Ground Surface	
0 / 0		***SILT and GRAVEL (FILL)*** silt and gravel (angular to rounded, fine to medium grained), sandy (fine grained), very stiff/compact, damp, grey-dark brown wet below 2', saturated between 4' and 5'	0.0
5 / 1			5.0
6 / 2		***silty CLAY (TILL)*** clay, silty, some gravel (angular to sub-angular, fine to coarse grained), trace sand, hard, damp to moist, tan-brown	5.7
10 / 3		***Weathered BEDROCK*** Weathered shale, intermixed with sand and gravel	
12 / 4		End of Borehole	12.0

Moisture Content (%)

SPT (blows per foot) 10 30 50 70 90

16 18 40 40 38 52 40 30 26 80 58 58

Groundwater / Well

Remarks

Perched groundwater observed between 4' and 5'

Logged: MI
Method: Solid Stem Auger
Date: August 20, 2010

Datum: Ground Surface
Figure Number: A.3
Page: 1 of 1

Test Hole Log: TH10-04

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	INFERRED PROFILE: SOIL DESCRIPTION	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 / 0		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
4 / 1		End of Borehole	4.0				Auger Refusal @ 4'
25 / 7							

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.4

Test Hole Log: TH10-05

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	INFERRED PROFILE: SOIL DESCRIPTION	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 – 4 / 0 – 1		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
4 / 1		End of Borehole	4.0				Auger Refusal @ 4'

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.5
Page: 1 of 1

Test Hole Log: TH10-06

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
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Depth (ft / m)	Symbol	SOIL DESCRIPTION (INFERRED PROFILE)	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 – 4 / 0 – 1		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
4 / 1		End of Borehole	4.0				Auger Refusal @ 4'
5 – 25 / 2 – 7							

Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.6
Page: 1 of 1

Test Hole Log: TH10-07

File: 8982
Project: Sikanni Maintenance Yard
Client: Hemmera
Site Location: Sikanni, BC

GeoPacific Consultants Ltd.
410 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION (INFERRED PROFILE)	Depth/Elev (ft)	Moisture Content (%)	SPT (blows per foot) 10 30 50 70 90	Groundwater / Well	Remarks
0 / 0		Ground Surface					
0 – 6 / 0 – 2		***3/4" Minus and SAND*** 3/4" minus crushed gravel mixed with sand, dense, grey	0.0				
6 / 2		End of Borehole	6.0				Auger Refusal @ 6'

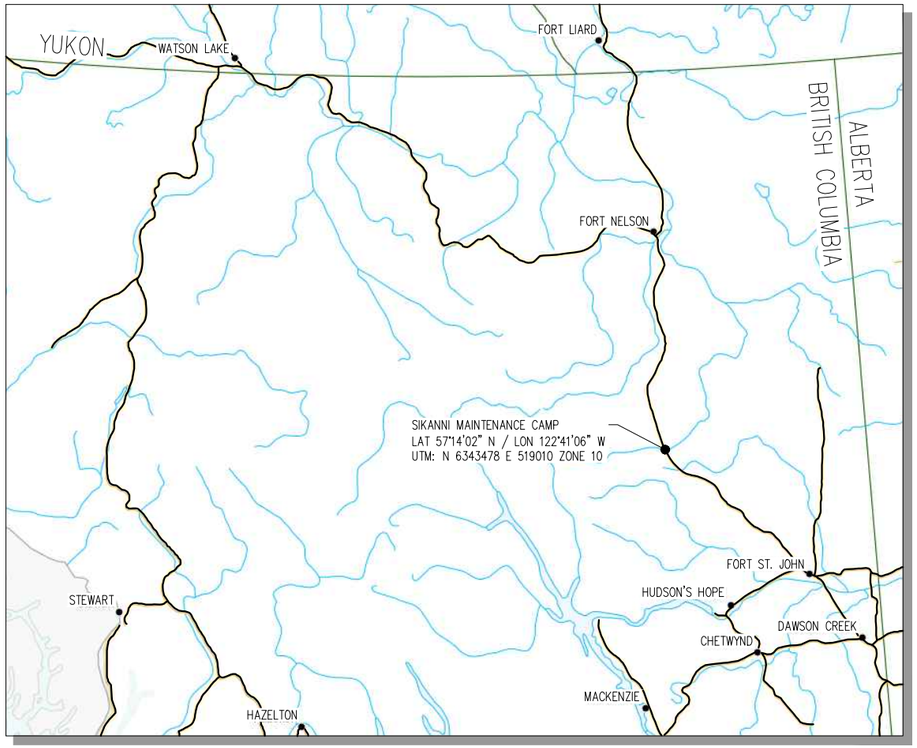
Logged: MA
Method: Solid Stem Auger
Date: August 16, 2010

Datum: Ground Surface
Figure Number: A.7

APPENDIX D
Base - Scouten and Associates Engineering Ltd – Proposed Building Relocation Drawings and NRS NRS Engineering Ltd. Division 16 Section 16010 General Provisions

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000

SIKANNI MAINTENANCE CAMP



KEY MAP – NORTHEAST CORNER OF BRITISH COLUMBIA

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1586 OGILVIE STREET
PRINCE GEORGE, BC
CANADA, V2N 1W9
TEL. (250) 562-4452
FAX: (250) 562-4458

STRUCTURAL NOTES:

1. **GENERAL NOTES:**
   - 1.1 THE EXISTING BUILDING STRUCTURE HAS BEEN ASSESSED AS BEING SUITABLE FOR RELOCATON. SEE SCOUTEN AND ASSOCIATES LETTERS REPORT, DATED NOVEMBER 1ST, 2011 AND DECEMBER 21ST, 2011.
   - 1.2 THE BUILDING STRUCTURE DETAILS AND WEIGHT OF BUILDING HAVE BEEN PROVIDED FOR GUIDANCE ONLY. THE CONTRACTOR CARRYING OUT THE BUILDING RELOCATION SHALL CARRY OUT WHATEVER CHECKS THEY FEEL ARE NECESSARY DURING THE DESIGN OF A BUILDING LIFT/RECLOCATION PROCEDURES.
   - 1.3 NEW FOUNDATIONS FOR THE NEW BUILDING ARE TO BE DESIGNED AND BUILT IN ACCORDANCE WITH: BRITISH COLUMBIA BUILDING CODE 2012
     BUILDING LOADS SUBJECTED ONTO THE PROPOSED FOUNDATIONS ARE TO BE CALCULATED USING CLIMATE DATA FROM ENVIRONMENT CANADA AND ANALYSIS OF THE EXISTING STRUCTURE.
   - 1.4 DESIGN DOCUMENTS INCLUDING DRAWINGS ARE TO BE SUBMITTED TO PWGSC FOR THEIR REVIEW A MINIMUM OF 2 WEEKS PRIOR TO COMMENCEMENT OF WORKS ON SITE.
   - 1.5 SEE THESE DRAWINGS FOR BUILDING IMPROVEMENTS TO BE INCLUDED IN THIS CONTRACT.
   - 1.6 INFORMATION ON THE EXISTING BUILDING STRUCTURE WAS GATHERED DURING A SITE VISIT BY SCOUTEN AND ASSOCIATES ON OCTOBER 20TH, 2012, AND NOVEMBER 4TH, 2015.

2. **SITE CONDITIONS:**
   - 2.1 SEE GEOTECHNICAL REPORT BY GEOPACIFIC CONSULTANTS LTD. FOR SITE GROUND CONDITIONS.

3. **ESTIMATED BUILDING WEIGHT:**
   - 3.1 AN ESTIMATED BUILDING WEIGHT IS NOTED ON THIS DRAWING FOR ESTIMATING/CONTEXT PURPOSES ONLY. THE ENGINEER OF RECORD FOR THE BUILDING RELOCATION WORK IS RESPONSIBLE FOR CONFIRMING THE BUILDING WEIGHT USED IN THEIR DESIGN WORK.
   - 3.2 MATERIAL PROPERTIES ASSUMPTIONS:
     STEEL DENSITY = 78 kN/m^3
     WALL AND ROOF PROFILE STEEL CLADDING THICKNESS = APPROX. 0.5mm
   - 3.3 IT HAS BEEN ASSUMED THAT BUILDING SERVICES (LIGHTING, OVERHEAD DOOR ASSEMBLY, VENTILATION SYSTEMS, ETC.) WILL BE REMOVED PRIOR TO BUILDING BEING RELOCATED. THE WEIGHT OF BUILDING SERVICES SHOULD BE INCLUDED IF THEY ARE NOT TO BE REMOVED PRIOR TO THE BUILDING RELOCATION.
   - 3.4 IT HAS ALSO BEEN ASSUMED INTERIOR FRAMING INCLUDING THE EXISTING OFFICE AND MEZZANINE INTERNAL STRUCTURES, EQUIPMENT AND TOOL RACKS, HAVE BEEN REMOVED AND/OR DEMOLISHED PRIOR TO BUILDING RELOCATION.
   - 3.5 ESTIMATED BUILDING WEIGHT:

PART OF EXISTING BUILDING	ESTIMATED WEIGHT
PRIMARY STRUCTURAL BUILDING ELEMENTS (PORTAL FRAMES, POST AND BEAM FRAMES)	40 kN
SECONDARY STRUCTURAL BUILDING ELEMENTS (GIRTS, PURLINS, BRACING)	45 kN
CLADDING (METAL CLADDING, INSULATION, ETC.)	110 kN
ESTIMATED TOTAL BUILDING WEIGHT	195 kN

   - 3.6 WT. OF PRIMARY AND SECONDARY STRUCTURE INCLUDES A 10% ALLOWANCE FOR MISCELLANEOUS ITEMS SUCH AS BOLTS AND SMALL FRAMING MEMBERS.

EXISTING COLUMN SCHEDULE

REF	MEMBER TYPE	DIMENSIONS
C1	WIDE FLANGE STEEL COLUMN	OVERALL DEPTH = 205mm FLANGE WIDTH = 140mm WEB THICKNESS = 6mm FLANGE THICKNESS = 9.5mm
C2	STEEL CHANNEL SECTION	OVERALL DEPTH = 205mm FLANGE WIDTH = 55mm THICKNESS = 6mm

EXISTING BEAM SCHEDULE

REF	MEMBER TYPE	DIMENSIONS	
B1	STEEL CHANNEL SECTION	OVERALL DEPTH = 205mm FLANGE WIDTH = 55mm THICKNESS = NOT CONFIRMED	
B2	TAPERED STEEL WWF BEAM	EAVES	RIDGE
		OVERALL DEPTH = 222mm FLANGE WIDTH = 156mm WEB THICKNESS = 5mm FLANGE THICKNESS = 9mm	OVERALL DEPTH = APPROX. 745mm FLANGE WIDTH = 156mm WEB THICKNESS = 5mm FLANGE THICKNESS = 9mm
B3	COLD FORMED STEEL Z PURLIN	OVERALL DEPTH = 205mm FLANGE WIDTH = 57mm THICKNESS = 1.6mm	
B4	COLD FORMED STEEL C EAVES STRUT	OVERALL DEPTH = 205mm FLANGE WIDTH = 57mm THICKNESS = NOT CONFIRMED	
B5	COLD FORMED STEEL Z GIRT	OVERALL DEPTH = 205mm FLANGE WIDTH = 57mm THICKNESS = 1.6mm	

PROFESSIONAL ENGINEER
B. A. H. CRIMP
33358
BRITISH COLUMBIA
May 11, 2016

ISSUED FOR TENDER

DRAWING NOTES

REFERENCE DRAWINGS

DWG No.	REV	PROJECT No.	PRODUCED BY
-	-	-	-

DRAWING REVISIONS

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D	16.03.31	JE	BC	BC	ISSUED FOR TENDER
C	16.03.31	JE	BC	BC	ISSUED FOR REVIEW
B	14.03.18	JE	BC	BC	ISSUED FOR REVIEW
A	12.11.20	JE	BC	BC	ISSUED FOR REVIEW

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PROJECT INFORMATION

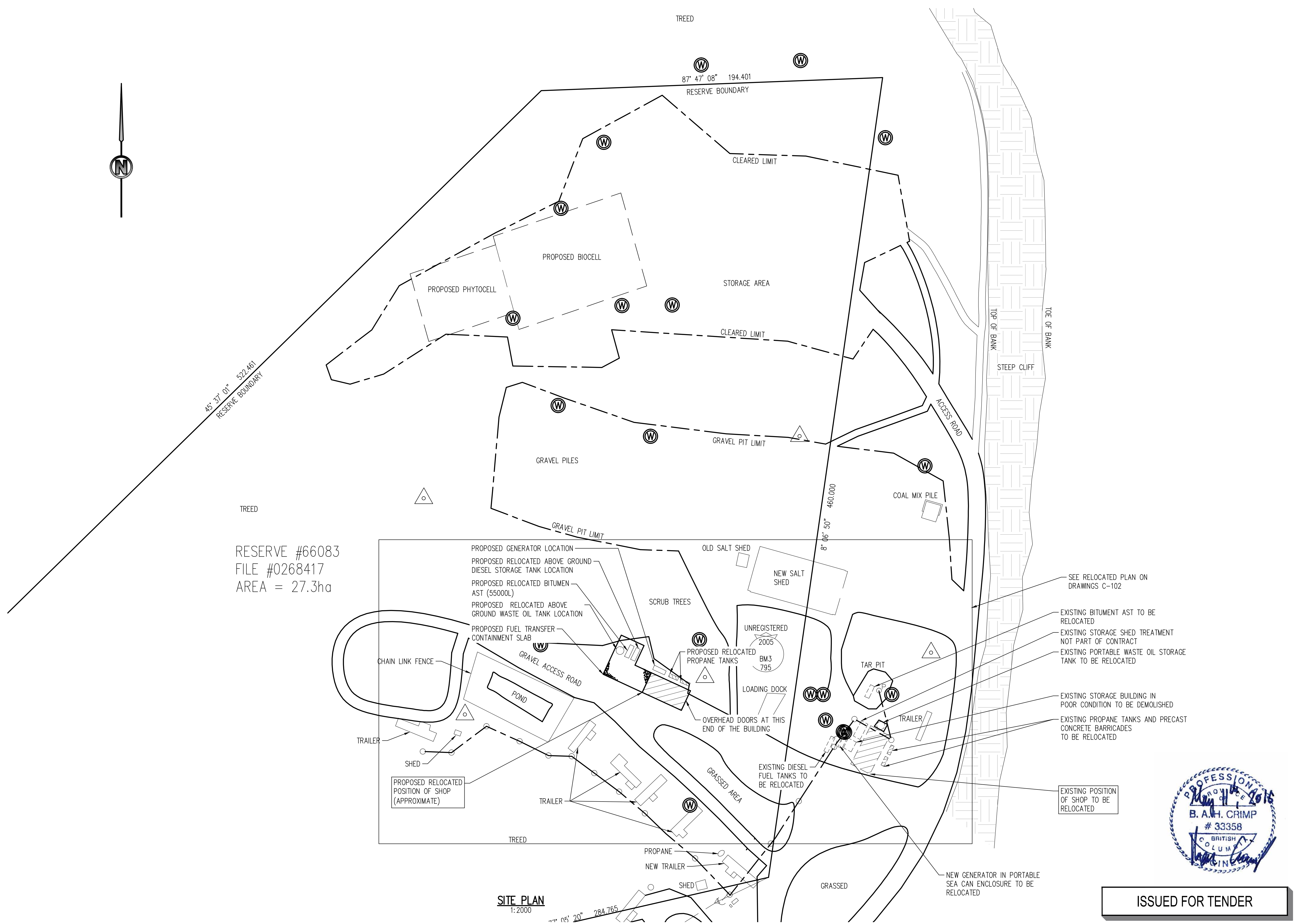
SLR CONSULTING CANADA LTD.

SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

SIKANNI CAMP
BASE WORK
GENERAL NOTES

PROJECT No.	DRAWING No.	REV
1027-02	G-101	D

DISCARD ALL PREVIOUS REVISIONS LAST UPDATED: 11.05.16 FILE NAME: 140318 (B) 1027-02 Notes.dwg



SITE PLAN
1:2000

ISSUED FOR TENDER

DRAWING NOTES

1. LEGEND
   - MONITORING WELLS
   - TRAVERSE HUB
   - POWER POLE
   - POWERLINES
   - RESERVE BOUNDARY
2. SITE PLAN INFORMATION TAKEN FROM PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC) DRAWING SK#5345.00

REFERENCE DRAWINGS

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-	-	-	-

DRAWING REVISIONS

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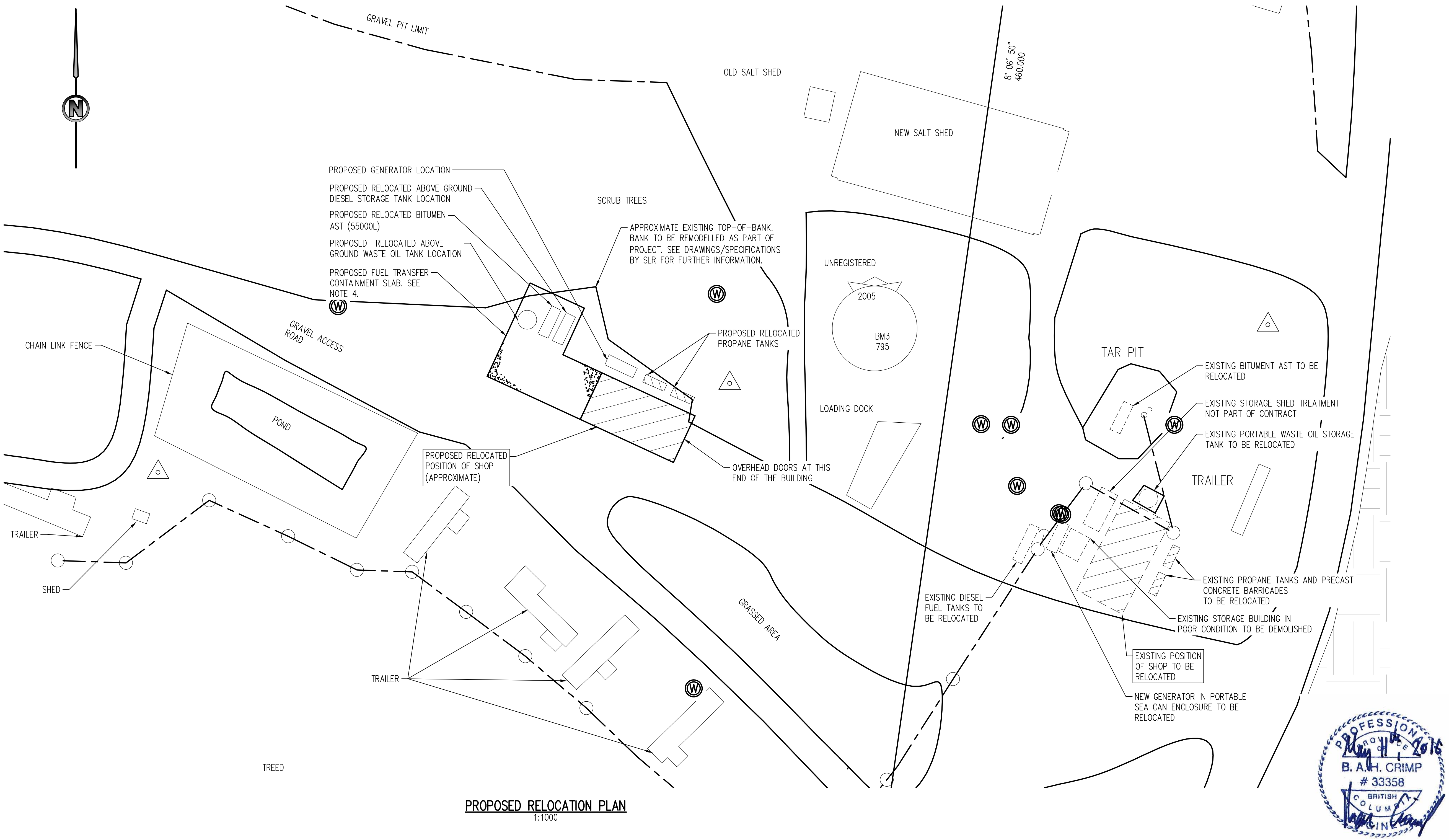
SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

SIKANNI CAMP BASE WORK SITE PLAN

PROJECT No.	DRAWING No.	REV
1027-02	C-101	D



PROPOSED RELOCATION PLAN
1:1000

ISSUED FOR TENDER

DRAWING NOTES

1. LEGEND
   - MONITORING WELLS (W)
   - TRAVERSE HUB
   - POWER POLE
   - POWERLINES
   - RESERVE BOUNDARY
2. SITE PLAN INFORMATION TAKEN FROM PUBLIC WORKS AND GOVERNMENT SERVICES CANADA (PWGSC) DRAWING SK#5345.00 AND A SITE VISIT BY SCOUTEN ENGINEERING IN NOVEMBER 2015.
3. SEE DRAWING C-103 FOR PHOTOGRAPHS OF THE BUILDING AND TANKS TO BE RELOCATED OR DEMOLISHED.
4. EXTENT OF PROPOSED FUEL TRANSFER CONTAINMENT SLAB SHOWN INDICATIVELY ONLY. EXTENT OF SLAB TO BE DESIGNED TO SUIT GUIDANCE GIVEN IN CCME PN1326 AND OTHER RELEVANT STANDARDS. ALSO SEE PERFORMANCE SPECIFICATION PERTAINING TO THIS ITEM OF WORK.

REFERENCE DRAWINGS

DWG No.	REV	PROJECT No.	PRODUCED BY
-	-	-	-

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SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

SIKANNI CAMP
BASE WORK
RELOCATION PLAN

PROJECT No.	DRAWING No.	REV
1027-02	C-102	D

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EXISTING SHOP BUILDING TO BE RELOCATED

EXISTING STORAGE BUILDING IN POOR CONDITION TO BE DEMOLISHED
AND EXISTING GENERATOR IN ENCLOSURE TO BE RELOCATED

EXISTING STORAGE BUILDING
TREATMENT NOT PART OF CONTRACT

EXISTING DIESEL ABOVE GROUND STORAGE TANK TO BE RELOCATED

EXISTING PROPANE TANKS TO BE RELOCATED

EXISTING WASTE OIL TANK TO BE RELOCATED

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PROVINCE OF BRITISH COLUMBIA
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33358

ISSUED FOR TENDER

DRAWING NOTES

REFERENCE DRAWINGS

DWG No.	REV	PROJECT No.	PRODUCED BY
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SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

PHOTOGRAPHS OF ITEMS
TO BE RELOCATED OR DEMOLISHED
BASE WORK

PROJECT No.	DRAWING No.	REV
1027-02	C-103	D

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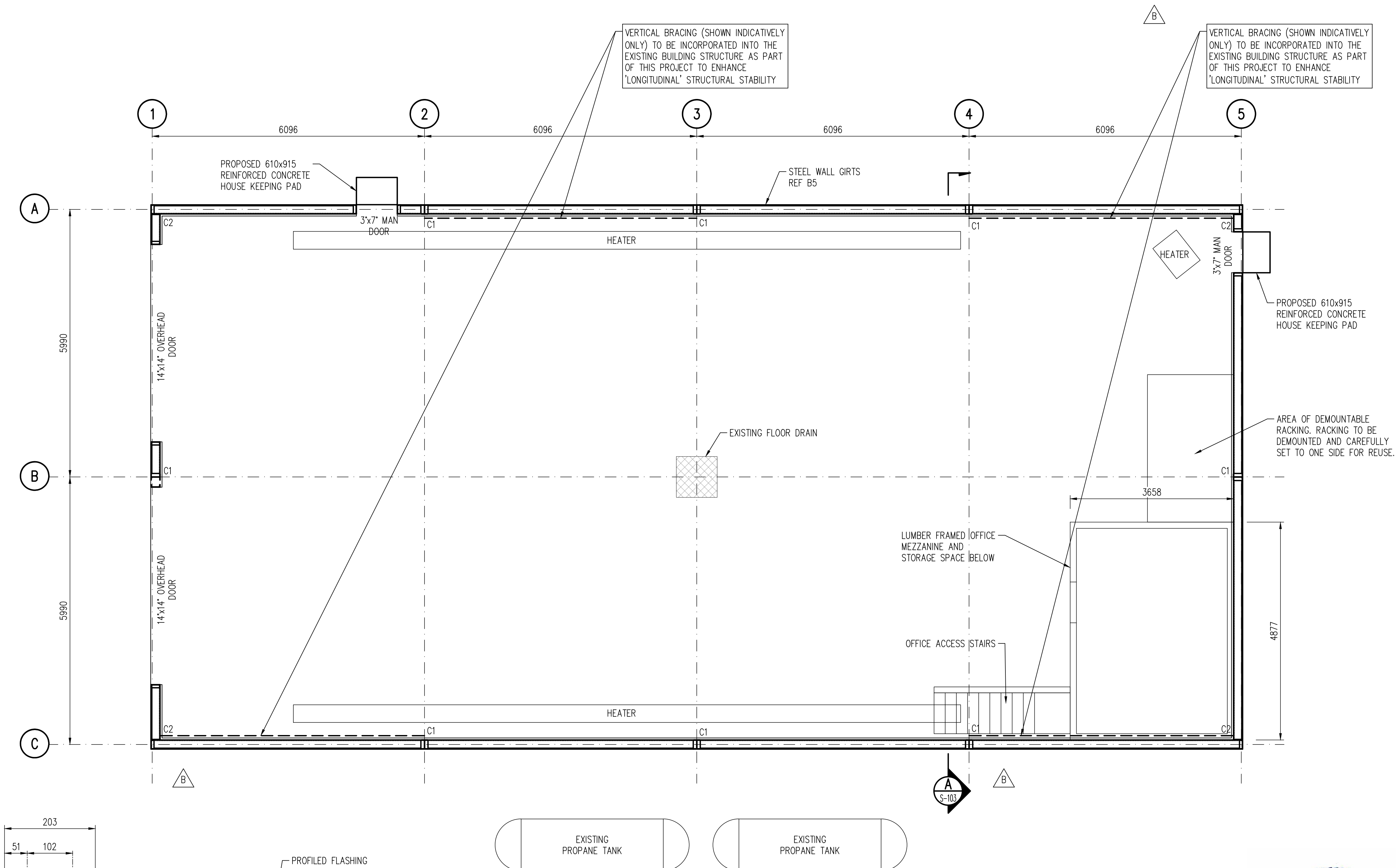
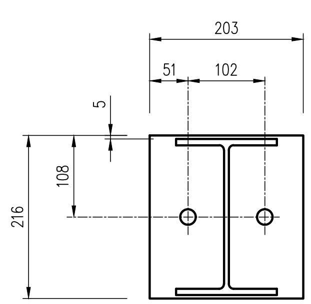
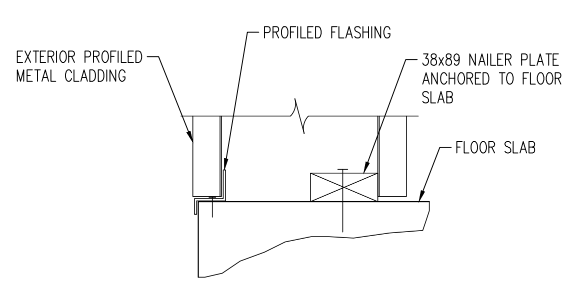


PLAN AT FLOOR LEVEL
1:100



TYPICAL PORTAL FRAME BASE PLATE
1:10



TYPICAL WALL DETAIL AT FLOOR LEVEL
1:10

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-	-	-	-

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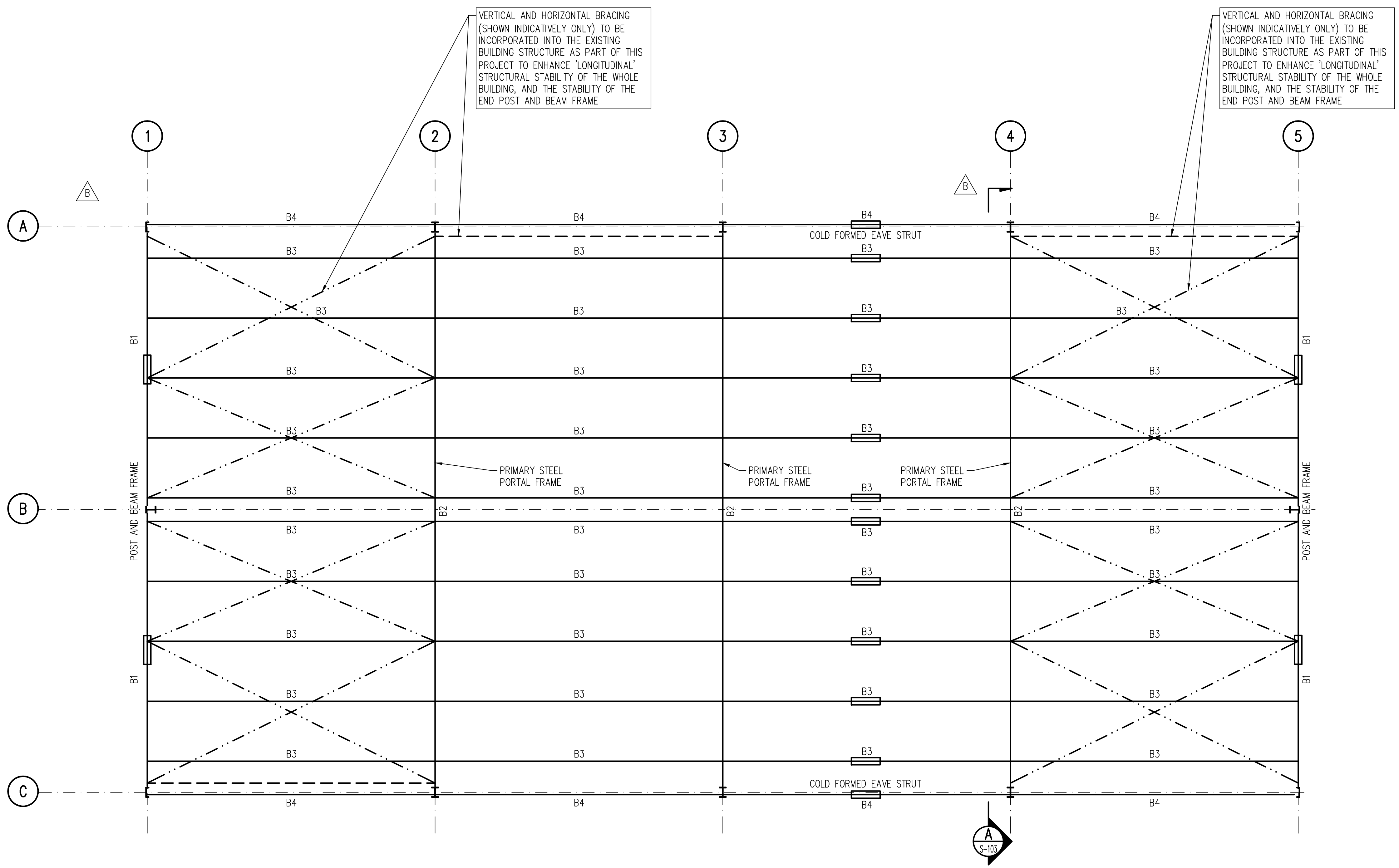
SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

BASE WORK
EXISTING MAINTENANCE BUILDING
PLAN AT FLOOR LEVEL

PROJECT No.	DRAWING No.	REV
1027-02	S-101	D



PLAN AT ROOF LEVEL
1:100

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ISSUED FOR TENDER

DRAWING NOTES

REFERENCE DRAWINGS

DWG No.	REV	PROJECT No.	PRODUCED BY
-	-	-	-

DRAWING REVISIONS

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A	12.11.20	JE	BC	BC	ISSUED FOR REVIEW

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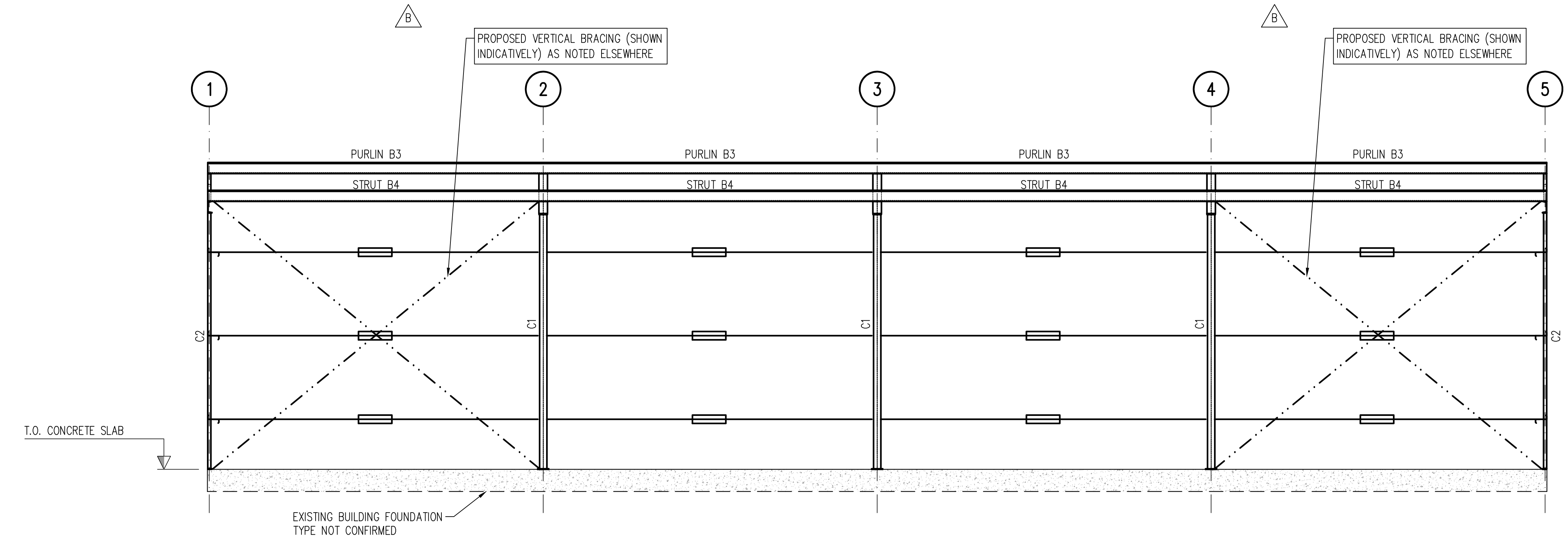
BASE WORK
EXISTING MAINTENANCE BUILDING
PLAN AT ROOF LEVEL

PROJECT No.	DRAWING No.	REV
1027-02	S-102	D



EAST ELEVATION
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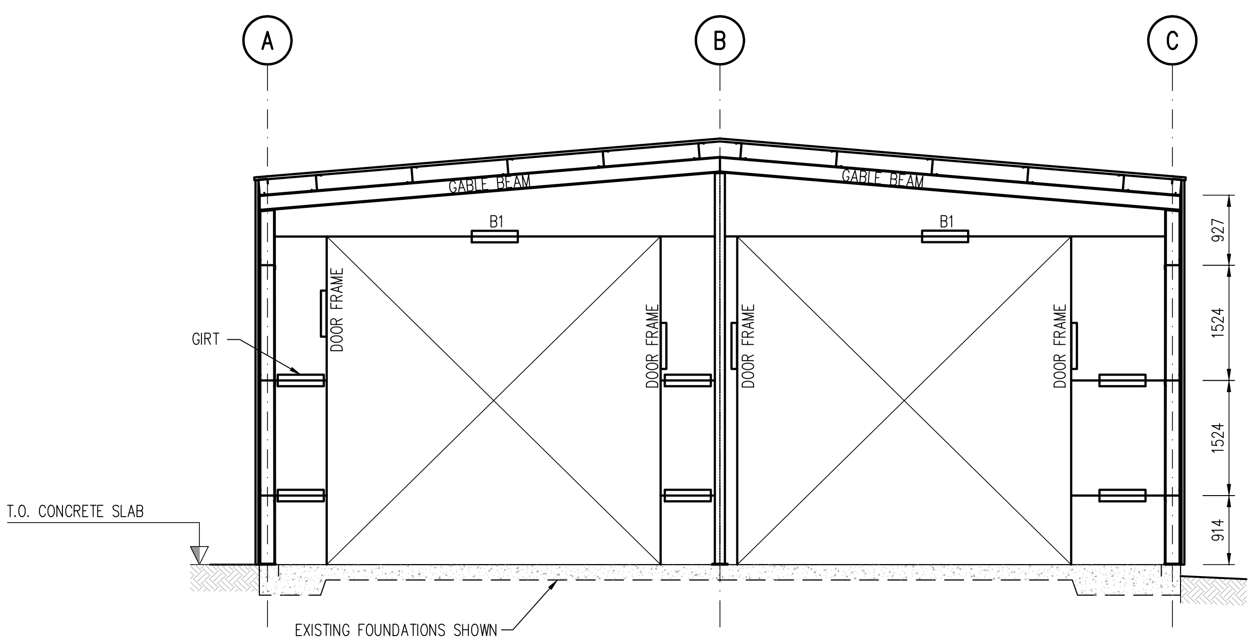
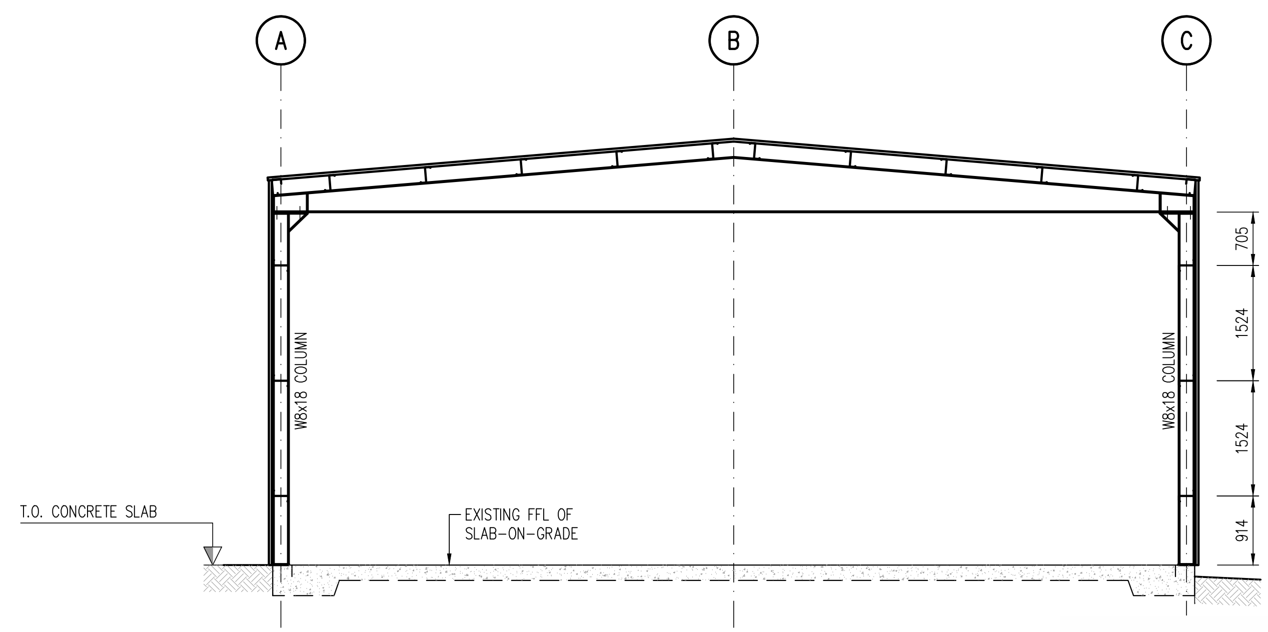


SOUTH ELEVATION
1:100



SECTION A S-101
1:100

PROFESSIONAL ENGINEER
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BRITISH COLUMBIA
May 4, 2016

ISSUED FOR TENDER

DRAWING NOTES

REFERENCE DRAWINGS

DWG No.	REV	PROJECT No.	PRODUCED BY
-	-	-	-

DRAWING REVISIONS

REV	DATE	DRW	DES	APP	REVISION
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B	14.03.18	JE	BC	BC	ISSUED FOR REVIEW
A	12.11.20	JE	BC	BC	ISSUED FOR REVIEW

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PROJECT INFORMATION

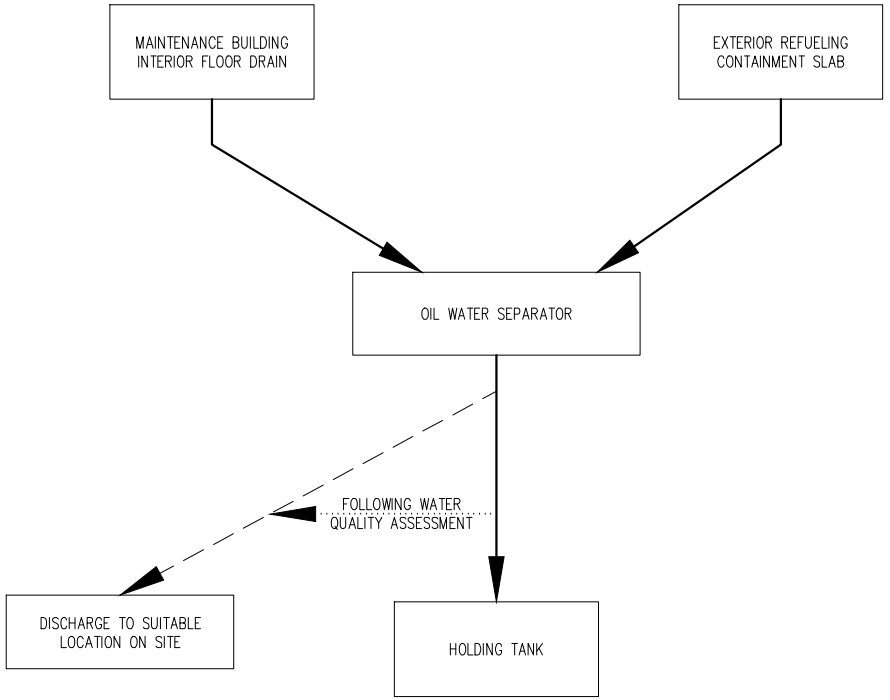
SLR CONSULTING CANADA LTD.

SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

BASE WORK
EXISTING MAINTENANCE BUILDING
ELEVATIONS AND SECTION

PROJECT No.	DRAWING No.	REV
1027-02	S-103	D

DISCARD ALL PREVIOUS REVISIONS LAST UPDATED: 11.05.16 FILE NAME: 140318 (II) 1027-02 Sikanni.dwg



PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
May 11th 2016
B. A.H. CRIMP
33358

ISSUED FOR TENDER

DRAWING REVISIONS

REV	DATE	DRW	DES	APP	REVISION
D	16.03.31	SN	BC	BC	ISSUED FOR TENDER
C	16.03.31	SN	BC	BC	ISSUED FOR REVIEW

CONSULTANT

Scouten
ENGINEERING
201 - 1968 QUEENSWAY
PRINCE GEORGE • BC • V2L 1M2
info@scoutenengineering.com
T 250.562.7050

CLIENT

SLR

PROJECT INFORMATION

SLR CONSULTING CANADA LTD.

SIKANNI MAINTENANCE CAMP RELOCATION OF BUILDING

BASE WORK
SITE DRAINAGE
FLOW CHART

PROJECT No.	DRAWING No.	REV
1027-02	S-104	D

DISCARD ALL PREVIOUS REVISIONS LAST UPDATED: 09.05.16 FILE NAME: FLOW CHART.dwg

1 GENERAL

1.1 GENERAL CONDITIONS

1.1.1 All work shall comply with the current edition of following Codes and Standards:
1.1.1.1 BC Building Code
1.1.1.2 Canadian Electrical Code, as amended for use in BC
1.1.1.3 Local Codes and bylaws that may govern the work of this project.
1.1.1.4 Refer to all other sections describing work of other Divisions as they may contain items that require electrical work.

1.2 SCOPE OF WORK

1.2.1 The general Electrical Scope of Work consists of the relocation of the existing maintenance building, generator building and the extension of electrical services required as a result of the relocation. Refer to the general scope of work for a complete description of the work required. Electrical work to consist of:

1.2.1.1 Maintenance Building Relocation: To prepare the maintenance building to be relocated, disconnect the incoming power feeder and lock out source in the generator building. Disconnect incoming communication feed. Secure or remove existing light fixtures, electric heaters, ceiling fans, welders, air compressors, overhead door motors and similar equipment that may become damaged while the building is relocated.

1.2.1.2 Generator Building Relocation: To prepare the generator seacan building to be relocated, disconnect the existing overhead feed to the powerline feeding the existing residential trailers and the underground feed to the adjacent grey metal storage building and all other loads that are present. Secure any loose equipment that may become damaged while the building is relocated. Coordinate with other contractors to remove fuel lines.

1.2.1.3 Grey Metal Storage Building: This building acts as a distribution centre for the electrical systems for the camp, and will be demolished. Disconnect incoming feed from the generator building and outgoing feeds to the maintenance building and overhead feed to the fuel pumping station and all other loads that are present.

1.2.1.4 Maintenance Building Work: The maintenance building will act as the distribution centre once relocated, and shall have the following electrical works:
1.2.1.4.1 Replace existing 100 amp, 120/208 volt, 30 circuit panel with new 400 Amp 66 circuit panel with 300 Amp main breaker. Provide grounding to Canadian Electrical Code requirements.
1.2.1.4.2 Extend existing communication feeder from existing location to new location and connect to communication equipment in maintenance building. Provide new poles and overhead wiring as required.
1.2.1.4.3 Provide new breakers to refeed all existing circuits in the maintenance building from the new panel. Replace existing tandem breakers with new single pole breakers. In addition, reefed the existing overhead feeder to the fuel pumping station. Provide new power poles and overhead wiring as required to reach from the relocated maintenance building to the fuel pumping station. Reefed all other loads that were powered from the demolished grey metal storage building.

1.2.1.4.4 Provide new LED pictogram Exit signs with integral battery backup over all man doors.
1.2.1.4.5 Provide new LED emergency lighting system to provide emergency light levels as required by BC Building Code.
1.2.1.4.6 Make safe any loose or unterminated wiring.
1.2.1.4.7 Provide new metal surface mount box covers over all existing surface mount light switches and receptacles – remove existing plastic covers.
1.2.1.4.8 Provide new LED lighting in maintenance building to provide minimum of 400 lux.
1.2.1.4.9 Replace existing wallmount workbench lighting with new vapourtight LED fixtures with wall brackets.
1.2.1.4.10 Neatly dress existing AC90 wiring and ensure it is properly secured to Code requirements. Replace all existing unarmoured cable and extension cords with AC90 armoured cable.

1.2.1.5 Generator Building Work: Once relocated, the generator building shall require:
1.2.1.5.1 Extend feeder to overhead line feeding residential trailers from new generator location to nearest existing powerline pole. Provide new poles and overhead wiring as required.
1.2.1.5.2 Refeed all other loads that were powered from the distribution panel in the generator building.

1.2.2 This Section includes the supply and installation of all electrical materials and equipment to provide complete and operative electrical systems.

1.2.3 The Contractor shall provide all labour, materials, tools and equipment required for the work, except such materials and/or equipment that may be specified as supplied by the Owner or by others.

1.2.4 It is the intent of the project to provide a complete and workable installation. Any work, fitting and/or necessary material not specifically mentioned or shown on the plans, but obviously necessary to complete the installation, shall be finished by the Contractor as if specifically mentioned herein and detailed.

1.3 STANDARD OF WORK

1.3.1 All electrical work shall meet or exceed the requirements of the current edition of the Canadian Electrical Code CSA C22.1 together with all applicable amendments and bulletins. All wiring is to be neatly dressed and properly supported and terminated.

1.4 FEES AND INSPECTION

1.4.1 The Contractor shall take out all permits and licenses, pay all fees and costs of inspection and tests.

1.5 DEFINITIONS

1.5.1 The following are definitions of terms and expressions used in this specification:

1.5.1.1 "Engineer" means an authorized representative of NRS Engineering Ltd.

1.5.1.2 "Provide" means that the so noted item is to be supplied and installed and placed in working order.

1.5.1.3 "Install" means all work and material necessary to place the specified item into full operation, securely fastened and to give a presentable finished appearance. "Install" also includes all necessary connections and conductors.

1.5.1.4 "Coordinate" means to make all arrangements directly with agencies and individuals, confirm schedules, be in attendance at the time work is carried out, take full responsibility for having the work carried out correctly and in a timely manner to meet the construction schedule.

1.5.1.5 "Engineer Approved Equal" means that the product, method or practice has been approved in writing by the Engineer, prior to installation.

1.6 EQUIPMENT

1.6.1 All equipment and fixtures are to be of new quality and are to bear evidence of CSA or equivalent approval. Outlets and switches are to be white in colour, type as noted on the drawings.

2 PRODUCTS

2.1 REVIEW OF PRODUCTS

2.1.1 Immediately after notification of award of contract, review with the Engineer, a list of products proposed.

2.1.2 After approval of product list, no subsequent changes will be permitted except as specified hereunder.

2.2 SUBSTITUTION OF PRODUCTS

2.2.1 After approval of the list of products, no substitution of any item will be permitted unless the approved item cannot be delivered to the job site in time to comply with the work schedule.

2.2.2 To receive approval, proposed substitutes must equal or exceed the quality, finish and performance of those specified and/or shown and must not exceed the space requirements allotted on the drawings.

2.2.3 Provide documentary proof of equality, difference in price (if any) and delivery dates in the form of certified quotations from suppliers of both specified items and proposed substitutions to the Engineer.

2.2.4 Include costs for any required revisions to other structures and products to accommodate such substitutions, including work of other Divisions.

2.3 CONDUIT

2.3.1 Provide a complete system of conduit and wire for all new systems indicated on the drawings.

2.3.2 All wiring is to be in conduit except where otherwise specifically noted. Existing AC90 wiring may remain if properly supported and neatly dressed.

2.3.3 Where circuits must be placed or replaced, concealed in existing walls or ceilings, AC90 cable may be used. New visible surface runs of AC90 cable are not permitted and no surface wiring is permitted in office areas.

2.3.4 Surface runs of conduit will be neat in appearance, installed in straight runs following lines of the building and permitted only out of public view.

2.3.5 All empty conduit systems will be left with a 4mm nylon pull cord installed, labelled to indicate points of origin.

2.4 WIRE

2.4.1 Provide a complete system of wiring making all connections necessary for the installation shown on the drawings.

2.4.2 X-Link: Copper conductors sized as indicated with 600 volt insulation of chemically cross-link thermosetting polyethylene material, rated RW90, CSA C22.2 No. 38.

2.4.3 All building wire shall be AWG/MCM gauge, 98% conductivity copper with 600 volt insulation and shall bear CSA or other BC accredited testing and certification organization approval label.

2.4.4 No wire smaller than #12 shall be used for lighting, receptacle, power or motor circuits. Control wiring to be #14 or #12 stranded or as specified on the drawing.

2.4.5 All underground wiring shall be copper Teck90 cable.

2.5 CONTROL WIRING

2.5.1 All control wiring to heating and cooling equipment will be provided by Division 15.

2.5.2 All motors shall be provided with local disconnecting means as described below. Local disconnects for single phase motors up to 2 HP, 240 volt shall be Bryant 4901.

2.5.3 Local disconnects for three phase motors shall be Bryant Tech-Spec, 30000, 40000 or 60000 Series as required, weatherproof (3R) for outdoor use.

2.6 WIRING DEVICES

2.6.1 Wiring devices to be of one manufacturer throughout the project.

2.6.2 Approved manufacturers or wiring devices are: Arrow Hart, Bryant, Hubbell, Leviton, Smith & Stone and Pass & Seymour, provided that device is equal in every respect to the unit specified.

2.6.3 Duplex receptacles, CSA Type 5-15 R 125V, U-ground, with the following features:

2.6.3.1 White, impact resistant, thermoplastic construction.
2.6.3.2 Suitable for No. 10 side wiring.
2.6.3.3 Break-off links for use as split receptacle.
2.6.3.4 Four side wiring screws.
2.6.3.5 Triple wipe contacts and riveted grounding contacts.
2.6.3.6 Specification grade.

2.6.4 Backboxes are to be sheet metal, single gang.

2.6.4.1 Type 1104 for conduit wiring in wood stud construction.
2.6.4.2 Type MBS for masonry construction.
2.6.4.3 Type 3104 for steel stud construction.
2.6.4.4 Type 1110 for surface mounting.

2.6.5 Provide stainless steel cover plates for all new wiring devices.

2.6.6 Use sheet steel utility box cover for wiring devices installed in surface mounted utility boxes. Replace all existing plastic coverplates on surface mount boxes.

2.6.7 Use flush mount cover plates for all wiring devices mounted in flush-mounted outlet boxes.

2.6.8 All devices must be provided with wiring terminal screws and wiring is to be securely wrapped around the screw and the screw tightened. Use of “push-in” or “push-on” terminators is not acceptable.

2.7 GROUNDING

2.7.1 Grounding equipment to CSA C22.2 No. 41-1950.

2.7.2 Grounding equipment and bonding conductors are to be bare, stranded, soft annealed copper, unless they are part of a multi-conductor cable construction or required to be insulated by CBC Rule 10-806(5).

2.7.3 Mechanical protection, where required, shall be rigid PVC conduit.

2.8 LIGHTING FIXTURES

2.8.1 Lighting fixtures shall be as described in the Scope of Work.

2.8.1.1 Approved manufactures of LED lighting fixtures are:
2.8.1.2 Cooper
2.8.1.3 Philips
2.8.1.4 Lithonia
2.8.1.5 LED fixtures to be 4000 DegK, with a published L70 life in excess of 50,000 hours.

2.8.2 All new and relocated light fixtures will be cleaned after installation and left free of dirt, grease, chips, dents and defects.

2.8.3 All fixtures are to be directly supported by hanger wire with a minimum of two hanger wires directly attached to each fixture.

2.8.4 All emergency lighting battery packs to be equipped with self diagnostic option to test unit monthly for battery condition, lamp fail condition and provide visual and audible indication of test results.

2.9 COMMUNICATIONS WIRING

2.9.1 Provide telephone and data cabling to Owner specification standards.

2.9.2 Provide telephone, data and CCTV cabling to match as found conditions in the existing maintenance building.

3 EXECUTION

3.1 SITE EXAMINATION

3.1.1 Examine the site of work and become familiar with all feature and characteristics affecting this work before submitting tender.

3.1.2 No additional compensation will be given for extra work due to existing conditions which such examinations should have disclosed.

3.1.3 Report to the Engineer any unsatisfactory conditions which may adversely affect the proper completion of this work.

3.2 IDENTIFICATION

3.2.1 Provide engraved lamicoid nameplates with 6mm black lettering on white background with approved wording on all new and existing equipment, including motor starters, disconnect switches (other than in panelboards), switchgear, panels and on other electrical equipment where needed to aid servicing and upkeep and to inform maintenance staff.

3.2.2 Clearly mark all exposed conduit, pullboxes, junction boxes, etc., to indicate the nature of service.

3.2.3 Provide neatly typed circuit directories on panelboards utilized on the project to indicate the area or equipment controlled by each branch circuit.

3.3 INSTRUCTIONS TO OWNER'S PERSONNEL

3.3.1 Instruct Owner's personnel in operation and maintenance of electrical equipment and systems and provide the Engineer with satisfactory proof of such instruction.

4 OTHER REQUIREMENTS

4.1 DRAWINGS & SPECIFICATIONS

4.1.1 The intent of the project is to include all labour, products and services necessary for complete work, tested and ready for operation.

4.1.2 The Contractor shall provide complete electrical design drawings and specifications, sealed by a BC registered Professional Engineer. Drawings shall include all work required to relocate and upgrade the buildings described herein and show all existing electrical equipment in the maintenance building.

4.1.3 The drawings and specifications are to be complementary and what is required by any one shall be as binding as if required by all.

4.1.4 Provide all minor items and work not shown or specified but which are necessary to complete the work.

4.1.5 All work shown on the Division 16 drawings and contained in Division 16 specifications is to be performed under the contract. Alert the General Contractor and assist other Divisions to perform all work indicated that cannot be performed by Division 16. Division 16 to coordinate and pay for the work of other Divisions where noted on the drawings.

4.2 SHOP DRAWNGS

4.2.1 After receiving approval of list of products and prior to delivery of any products to job site and sufficiently in advance of requirements to allow adequate time for checking, submit shop drawings to the Engineer for review. If shop drawings are not approved by the Engineer, make the required revisions and re-submit the drawings for review, before ordering or manufacturing the equipment.

4.2.2 All shop drawings must be stamped and signed as approved by the Contractor before submission.

4.2.3 Show details, dimensions, construction, size, arrangement, operating clearances, performance characteristics and capacities of products and parts of the work. Submit shop drawings in the same quantity and format described for approval of alternates in part 2.1.6 of this Section.

4.2.4 Manufacture of products shall conform to approved shop drawings.

4.2.5 Keep one complete set of shop drawings at job site during construction.

4.2.6 Shop drawings for lighting fixtures must clearly show the LED specifications to be supplied.

4.3 AS-BUILT DRAWINGS

4.3.1 This Division shall maintain an up-to-date, clean, clearly marked-up set of “as-built” drawings on the job site which will be submitted to the Engineer for review when requested and which will be turned over to the Engineer prior to Final Completion.

4.3.2 Where a note, fixture schedule or legend on the drawing identifies a product by manufacturer and part number, the as-built drawings shall show the manufacturer and part number of the product supplied.

4.3.3 As-built drawings must reflect final circuiting of all receptacles, lights and other equipment.

4.3.4 As-built drawings must show all telephone and data circuit designations, fire alarm device addresses and other communications circuits.

4.3.5 As-built drawings must show all information on equipment added to or removed from the project by way of Addendum or Change Order and all equipment relocated from location shown on tender drawings.

4.3.6 As-built drawings must show all other project specific requirements as noted on the drawings.

4.3.7 As-built drawings and Operation and Maintenance Manuals must be neatly completed and submitted to the Architect or his representative prior to Substantial Completion. **This project will not be considered substantially complete until all as-built information is received, (including O & M manuals).**

4.3.8 Should the Contractor fail to deliver the as-built information or the information is not complete, the Engineer shall issue a written request for the required information.

4.3.9 Should the Contractor not provide the required information within seven days of written notice described above, the Engineer shall travel to site and obtain the information, including performing any required testing or other analysis required. The Engineer shall charge $150.00 per hour for all time spent obtaining the required information. This cost, including travel time, travel costs, testing and other disbursements, shall be charged to the Contractor and withheld from the final payment.

4.4 MAINTENANCE MANUALS AND GUARANTEES

4.4.1 Prepare manuals covering the operating and maintenance of all electrical equipment installed under the contract.

4.4.2 Provide as a draft copy to the Engineer for approval at least fifteen days before final inspection. Provide four final approved copies in suitably labelled, colour coded, tab indexed, 3-ring, loose-leaf, hard-cover binders.

4.4.3 The manuals shall contain the following information, organized for easy interpretation and reference by operating personnel:

4.4.3.1 A general description of each system stating the function of each item of equipment.
4.4.3.2 Copies of approved shop drawings and “as-built” drawings.
4.4.3.3 Manufacturer’s maintenance brochures for each item, including wiring diagrams and parts lists. The specific model, the option or features and mode of control on the equipment installed shall be clearly indicated in each brochure. All data, except that pertaining to the model installed, shall be neatly “ruled” out.
4.4.3.4 Normal maintenance schedule and trouble shooting information for each major item.
4.4.3.5 Description of automatic control systems, instructions covering the operation and maintenance of the systems and schematic diagrams indicating the final control settings.
4.4.3.6 Letter from the Contractor stating that all labour and equipment installed under the Contract will be warrantied for one year from the date of Substantial Completion. Any piece of equipment or component that fails during this time will be repaired or replaced at no cost to the Owner.
4.4.3.7 Copies of all equipment manufacturer’s guarantees that are in effect longer than the one year period described in item 4.4.3 above.
4.4.3.8 Include in the manual the Contractor’s name, address and telephone number.

4.5 CUTTING & PATCHING

4.5.1 Arrange for and pay all costs associated with all cutting and patching required as a result of work performed by this Division. When painting is required, the entire wall shall be painted to the nearest corner.

4.5.2 Repair any damaged surfaces to the condition of surrounding surfaces at no cost to the Owner.

4.5.3 Where penetrations are made through new or existing fire walls, ensure that the fire barrier is replaced as required to maintain the rated fire separation.

4.6 REMOVED EQUIPMENT

4.6.1 All equipment removed and made surplus by the project shall be reviewed with the Owner to determine if they wish to retain it.

4.6.2 All equipment not identified as being retained by the Owner shall be disposed of by the Contractor. Contractor is responsible for all trash removal and disposal costs.

4.6.3 All equipment identified as being retained by the Owner shall be carefully removed and transported by the Contractor to a location on site determined by the Owner.

4.6.4 All fluorescent lamps removed shall be recycled by the Contractor.

4.6.5 Where ever possible, all equipment removed shall be sent for recycling or salvage. Any salvage value may be retained by the Contractor.

APPENDIX E
Borehole and Test Pit Logs

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000

HEMMERA

Log of Borehole: BH05-2

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC

Date Drilled: 11/15/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
		Ground Surface	894.2					
		SAND AND GRAVEL (FILL) brown to grey, lots of gravel, fine to medium sand, trace silt, frozen, dry	0.0	BH05-2A		0		
			892.9					
		SILTY SAND dark brown, lots of gravel, fine to medium sand, compact, dry	1.2	BH05-2B		0		
			889.3					
		SANDY SILT brown, trace small gravel, fine sand, trace clay, very compact, moist	4.9 889.0	BH05-2C		0		
		End of Borehole	5.2					Native fill

Log of Monitoring Well: MW05-1

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: Public Works
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.6

Date Drilled: 15/11/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: -

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	894.6					
		SAND AND GRAVEL (FILL) brown/grey, lots of angular gravel, some silt, relatively loose, frozen, dry	0.0 894.0					
		SILTY SAND brown, gravel, fine to medium sand, moderately compact, dry	0.6	MW05-1A		0		
			891.9					
		CLAYEY SILT dark grey/brown with orange mottling, some gravel, fine to medium sand, clay like, compact, moist	2.7 891.6 3.0					
		SANDY SILT brown, some gravel, very compact, dry						
				MW05-1B		0		
			888.2					
		WEATHERED BEDROCK light brown-brown, very hard and compact, dry	6.4 887.6					
		End of Log	7.0					

Concrete
Bentonite
Filter sand
Water at 2.92m
2" PVC screen
Native Fill
Bentonite
Native Fill

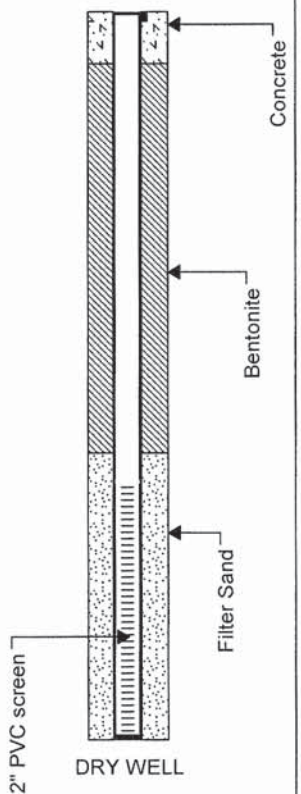
HEMMERA

Log of Monitoring Well: MW05-2

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: Public Works
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.502

Date Drilled: 11/15/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 894.424

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	894.5					
		SAND AND GRAVEL (FILL) brown, lots of gravel, fine to medium sand, some silt, moderately compact, dry, frozen	0.0	MW05-2A		0		
			893.3					
		SILTY SAND (TILL) brown, some gravel, very dense, dry	1.2	MWO5-2B		0		
			890.8					
		WEATHERED BEDROCK orange brown, trace gravel, some silt (possible sandstone), very compact, dense, dry	3.7	MW05-2C		0		
			890.2					
		End of Log	4.3					



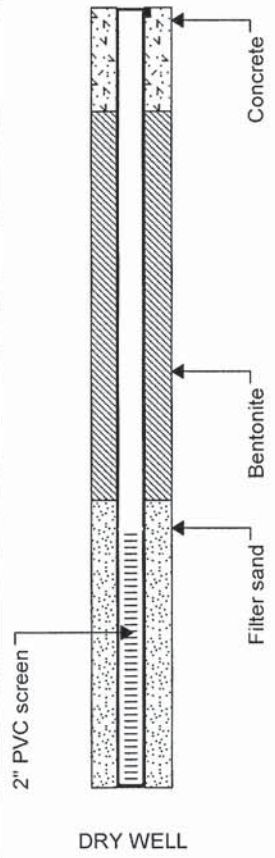
HEMMERA

Log of Monitoring Well: MW05-3

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.164

Date Drilled: 11/15/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 894.014

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	894.2					
0 / 0		***SAND AND GRAVEL (FILL)*** brown to grey, lots of gravel, fine to medim sand, some silt, dry, frozen	0.0	MW05-3A		0	0 / 0	
3 / 1			893.1				3 / 1	
		SILTY SAND brown, lots of gravel, fine to medium sand, compact, dry	1.1	MW05-3B		0		
			890.2					
13 / 4		***WEATHERED BEDROCK/ SILT*** light brown, some gravel, very fine to medium sand, very compact, dry	4.0	MWO5-3C		0	13 / 4	
			889.6					
		End of Log	4.6					
25 / 7							25 / 7	



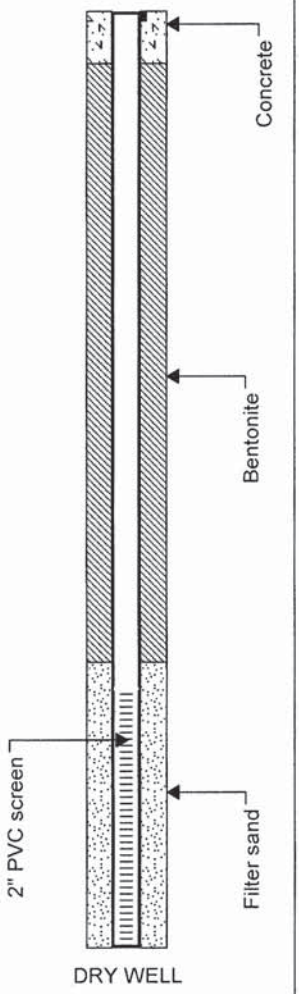
Log of Monitoring Well: MW05-4

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.448

Date Drilled: 11/16/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 894.286

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
0 ft / 0 m		Ground Surface	894.4				0 ft / 0 m	
0 ft / 0 m		***SAND AND GRAVEL (FILL)*** dark brown, lots of gravel, fine to medium sand, some silt, dry	0.0	MW05-4A		75	0 ft / 0 m	
4 ft / 1 m			893.1				4 ft / 1 m	
4 ft / 1 m		***SILTY SAND*** brown, lots of gravel, fine to medium sand, compact, dry	1.4	MW05-4B		25	4 ft / 1 m	
17 ft / 5 m			889.3				17 ft / 5 m	
17 ft / 5 m		***WEATHERED BEDROCK*** light brown/ orange-brown, fine sand, some silt, very hard and compact	5.2 889.0 5.5	MW05-4C			17 ft / 5 m	
		End of Log						



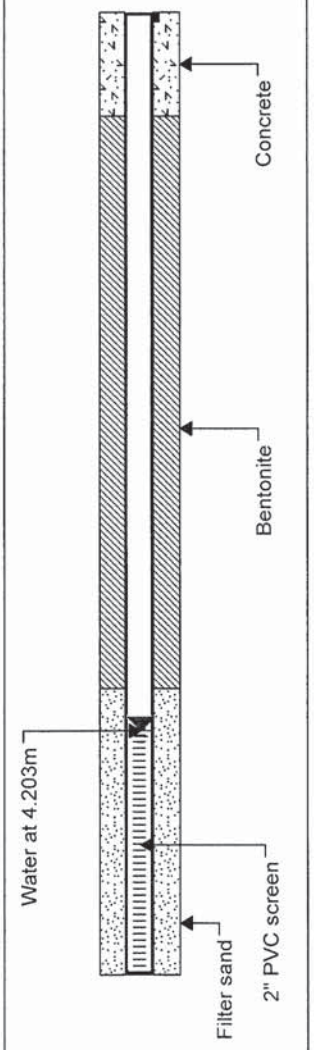
Log of Monitoring Well: MW05-5

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.274

Date Drilled: 11/16/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 894.175

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	894.3					
		SAND AND GRAVEL (FILL) brown, lots of gravel, fine to medium sand, loose, dry, frozen	0.0	MW05-5A		75		
			893.4					
		SANDY SILT greyish,some gravel, fine to medium sand, clayey, moderately compact, dry	0.9					
		greyish brown	892.8					
			1.5	MW05-5B		0		
			889.1					
		WEATHERED BEDROCK/SILT light brown, trace gravel, fine sand, very dense and compact, moist	5.2	MW05-5C		175		
			888.6					
		End of Log	5.6					



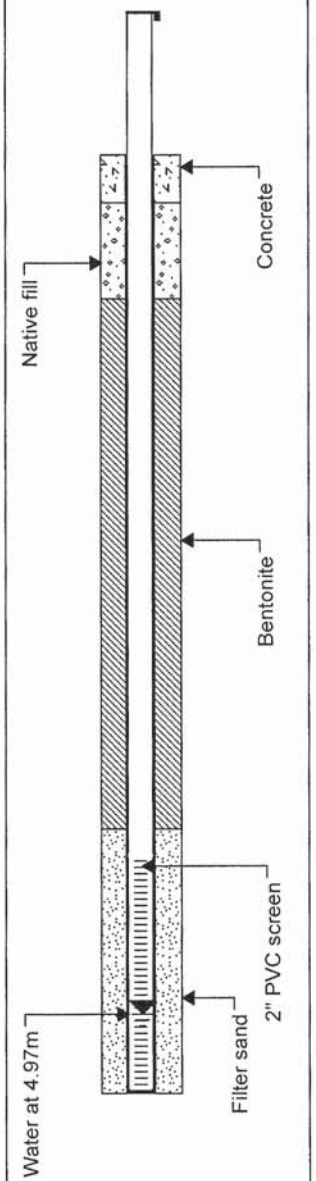
Log of Monitoring Well: MW05-6

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.458

Date Drilled: 11/16/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 895.272

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Well Completion Details
		Ground Surface	894.5					
		SILT (SOIL)	0.0 894.2					
		SAND AND GRAVEL (FILL) brownish, dry	0.2 893.8					
		CLAYEY SILT (TILL) grey, trace gravel, fine sand, very compact/ very dense	0.6	MW05-6A		275		
			892.9					
		SILTY SAND grey, lots of gravel, fine to coarse sand, moderately compact	1.5					
		boulder light brown/ brownish-orange	892.0 2.4 891.7					
		brown, fine to medium sand, very dense, dry	2.7	MW05-6B		175		
			889.3					
		WEATHERED BEDROCK/SILT greyish brown, some gravel, fine sand, very dense	5.2	MW05-6C		0		
			888.7					
		End of Log	5.8					



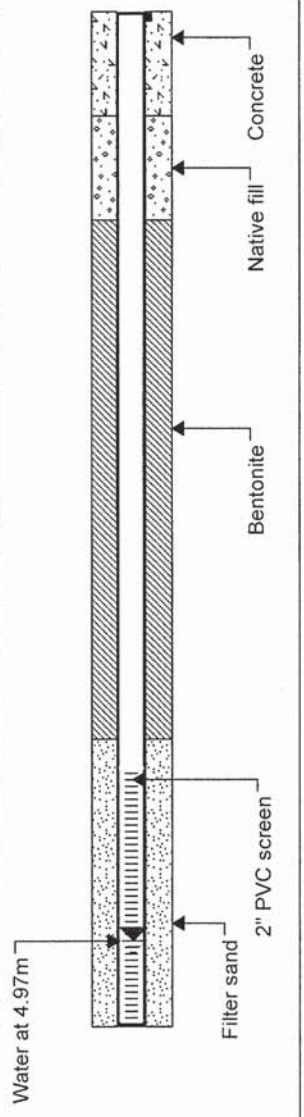
HEMMERA

Log of Monitoring Well: MW05-7

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.195

Date Drilled: 11/16/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 893.997

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	894.2					
		SAND AND GRAVEL (FILL) brown, dry	0.0	MW05-7A		325		
			893.6					
		CLAYEY SILT (TILL) grey with some orange mottling, trace gravel, fine sand, very compact/ very dense	0.6	MW05-7B		125		
			892.7					
		SILTY SAND dark brown, lots of gravel, fine to medium sand, moderately dense, dry	1.5					
			892.1					
		orange-brown	2.1					
		very compact	889.6					
			4.6					
			888.9					
		WEATHERED BEDROCK/ SILT grey, trace fine sand, clayey, very compact, dry	5.3	MW05-7C		0		
			888.3					
		End of Log	5.9					



Log of Monitoring Well: MW05-8

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 894.072

Date Drilled: 11/16/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 895.022

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	894.1					
		SILT (SOIL) light brown, some gravel, dry, frozen, lots of organics (grass, rhizomes)	0.0	MW05-8A		0		
		SAND AND GRAVEL (FILL) brown, lots of gravel (angular and round), fine to medium sand, loose, dry, frozen	892.9					
		SILTY SAND light brown, lots of gravel, fine to medium sand, silty, very dense, dry	1.2					
			890.4					
		SAND grey, lots of gravel, fine to coarse sand, some silt, very dense, dry	3.7	MW05-8B		0		
			889.0					
		SILTY SAND light brown/ orange, some gravel, fine to medium sand, very dense, dry	5.0					
			888.6					
		End of Log	5.5					

Concrete
Bentonite
2" PVC screen
Filter sand
DRY WELL

Log of Monitoring Well: MW05-9

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 893.730

Date Drilled: 11/16/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 894.572

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	893.7					
		SAND AND SILT (SOIL) light brown/brown, fine to medium sand, dry, lots of organics (rhizomes)	0.0 893.5 0.2	MW05-9A		25		
1		***SAND AND SILT*** brownish grey, lots of cobbles, lots of gravel, fine to medium sand, moderately compact, dry					1	
2			891.3				2	
		SILTY SAND brown, lots of gravel, fine to coarse sand, compact, dry	2.4	MW05-9B		0		
3							3	
4							4	
5							5	
6			887.3				6	
		WEATHERED BEDROCK/SILT brown with some orange, fine to medium sand, trace gravel, very compact, dry	6.4	MW05-9C		25		
7			886.7				7	
		End of Log	7.0					

Native fill
Concrete
Bentonite
2" PVC screen
Filter sand
Water at 6.61m

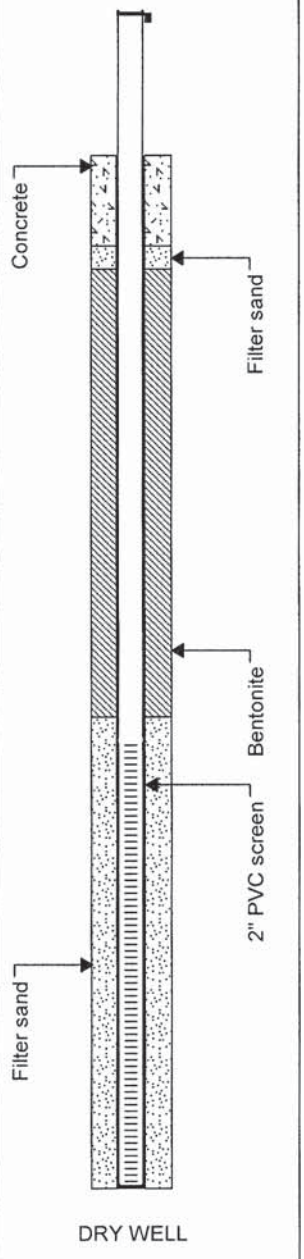
Log of Monitoring Well: MW05-11

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 886.763

Date Drilled: 11/17/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 887.742

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	886.8					
0 / 0		***SAND AND GRAVEL (FILL)*** grey, lots of gravel, dry	0.0	MW05-11A		0	0 / 0	
4 / 1			885.5				4 / 1	
		SILT brown, trace gavel, lots of fine to medium grain sand, some clay, very compact, moist	1.2	MW05-11B		0		
			882.8					
13 / 4		***SANDY CLAY*** grey, trace gravel, fine sand, some silt, very compact, trace organics (rhizomes)	4.0				13 / 4	
15 / 5			882.2				15 / 5	
		SANDY SILT greyish brown, lots of gravel, fine to medium sand, very compact, dry,some organics (woody debris)	4.6	MW05-11C		5		
			881.3					
18 / 5.5		brown with some orange mottling, some gravel, lots of fine sand, very hard, dry	5.5 881.0				18 / 5.5	
19 / 6		***WEATHERED BEDROCK*** light brown, very hard (bedrock), dry	5.8	MW05-11D		0	19 / 6	
23 / 7			879.8				23 / 7	
		End of Log	7.0					



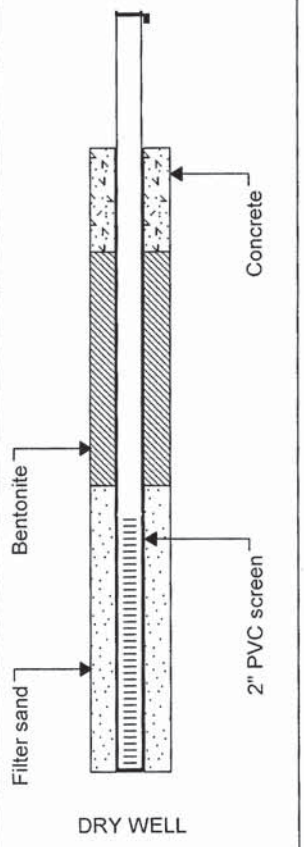
Log of Monitoring Well: MW05-12

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 887.154

Date Drilled: 11/17/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 887.935

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Well Completion Details
		Ground Surface	887.2					
		SAND AND GRAVEL (FILL) greyish brown, lots of gravel	0.0 886.5	MW05-12A		0		
		SANDY SILT brown, lots of gravel, trace clay, compact,	0.6 884.4					
		CLAYEY SILT grey with some orange mottling, some shale pieces, very compact, dry	2.7 883.5	MW05-12B		5		
		End of Log	3.7					



Log of Monitoring Well: MW05-13

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 887.015

Date Drilled: 11/17/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 887.999

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	887.0					
		SAND AND GRAVEL (FILL)	0.0	MW05-13A		0		
			885.8					
		SILTY SAND brown, some gravel, fine to medium sand, compact, moist	1.2					
			883.4					
		SANDY SILT (TILL) greyish brown, some gravel, fine to medium sand, compact, dry	3.7					
			882.4					
		WEATHERED BEDROCK light brown with some orange, some gravel, lots of silt, very hard, dry	4.6	MW05-13B		0		
			881.8					
		End of Log	5.2					

Well Completion Details:
- Concrete
- Bentonite
- 2" PVC screen
- Filter sand
- DRY WELL

Log of Monitoring Well: MW05-14

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 885.098

Date Drilled: 11/17/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 885.994

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	885.1					
		SILT (SOIL)	0.0 884.9	MW05-14A		0		
		SILTY SAND (FILL) brown with some orange mottling, lots of gravel, relatively loose, dry	0.2 883.9					
		SANDY SILT dark brown/ brown, lots of gravel, compact, dry	1.2 881.4					
		SILTY SAND brown, lots sandstone, fine sand, very compact, dry	3.7 880.5					
		WEATHERED BEDROCK greyish brown, lots of fine sand, very hard, dry	4.6 879.9	MW05-14B		0		
		End of Log	5.2					

Concrete
Bentonite
Filter sand
2" PVC screen
DRY WELL

Log of Monitoring Well: MW05-15

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 886.763

Date Drilled: 11/17/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 887.742

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	886.8					
		SAND AND SILT (SOIL) dark brown, some gravel, moist (from frost melting), lots of organics (roots and wood debris)	0.0	MW05-15A		0		
		SAND AND GRAVEL (FILL) brown-grey, lots of gravel, silt, loose, dry	885.7 1.1					
		SANDY SILT brown, some gravel, clayey, compact, dry	885.2					
		greyish brown, lots of gravel, compact, dry	1.5	MW05-15B		0		
		WEATHERED BEDROCK greyish, very hard, powdery, dry	884.3 2.4					
		End of Log	883.0 3.8					

Concrete
Bentonite
2" PVC screen
Filter sand
DRY WELL

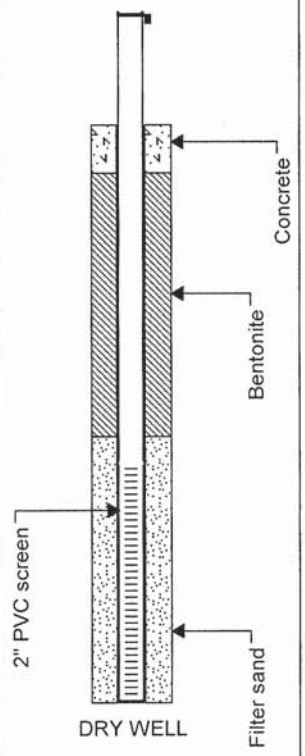
Log of Monitoring Well: MW05-16

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Ground Elevation: 887.869

Date Drilled: 11/18/2005
Drilling Company: Geotech Drillers
Drilling Method: ODEX
Logged By: Azzam
Top of the Pipe Elevation: 888.592

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Well Completion Details
		Ground Surface	887.9					
0 / 0		***SAND AND GRAVEL (FILL)*** brown, lots of gravel, some silt, moist (due to snowmelt)	0.0	MW05-16A		0	0 / 0	
3 / 1		***SILTY SAND*** greyish brown, lots of gravel, fine to medium sand, moderately compact, dry	886.8 1.1				3 / 1	
8 / 2		***COBBLE*** possible weathered bedrock, grey, very compact and hard	885.4 2.4 885.1 2.7 884.8				8 / 2	
10 / 3		***WEATHERED BEDROCK*** brown, compact light brown, very hard	3.0	MW05-16B		0	10 / 3	
12 / 4		End of Log	884.2 3.7				12 / 4	



Log of Test Pit: TP05-1

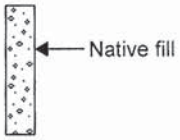
HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 893.535

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
		Ground Surface	893.53					
		SAND AND GRAVEL (FILL) greyish brown, lots of gravel, fine to medium sand, compact, frozen, dry	0.00	TP05-1A	G	0		
		light brown, trace silt	893.24	TP05-1B	G	10		
		WEATHERED BEDROCK horizontal, very hard, frozen	0.30					
		End of Test Pit	893.03 0.50					

ft / m: 0 (0), 1 (1), 2 (2), 3 (1), 4, 5, 6, 7, 8, 9



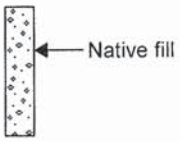
Log of Test Pit: TP05-2

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.602

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
		Ground Surface	894.60					
		SAND AND GRAVEL (FILL) greyish brown, trace gravel, compact, frozen, dry	0.00 894.50	TP05-2A	G	0		
			0.10 894.40	TP05-2B	G	25		
		light brown, lots of gravel, fine to medium sand, trace silt, dry, compact frozen	0.20 894.30					
		WEATHERED BEDROCK horizontal, very hard, frozen	0.30					
		End of Test Pit						



HEMMERA

Log of Test Pit: TP05-3

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.701

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.70				0 / 0	
		SAND AND GRAVEL (FILL) light brown, lots of gravel, fine to medium grain sand, trace silt, dry, compact, frozen	0.00	TP05-3A	G	25		Native fill
			894.50	TP05-3B	G	15		
		WEATHERED BEDROCK horizontal, very hard, frozen	0.20 / 894.40					
1 / 0.3		End of Test Pit	0.30				1 / 0.3	
2 / 0.6							2 / 0.6	
3 / 1							3 / 1	
4 / 1.2							4 / 1.2	
5 / 1.5							5 / 1.5	
6 / 1.8							6 / 1.8	
7 / 2							7 / 2	
8 / 2.4							8 / 2.4	
9 / 2.7							9 / 2.7	

Log of Test Pit: TP05-4

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.621

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
		Ground Surface	894.62					
0 / 0		***SAND AND GRAVEL (FILL)*** light brown, lots of gravel, fine to medium sand, trace silt, dry, compact, frozen, no staining	0.00 894.32	TP05-4A	G	75	0 / 0	Native fill
1		***SANDY SILT (FILL)*** dark brown, some gravel, fine to medium sand, diesel odour	0.30 894.12	TP05-4B	G	25	1	
		GRAVELLY SAND (FILL) dark grey, some cobbles, lots of round gravel, medium sand, slight odour	0.50 894.02 0.60 893.92	TP05-4C TP05-4D	G G	550 100		
2		***SILT*** dark brown, trace small gravel, no odour	0.70 893.82 0.80				2	
3 / 1		***WEATHERED BEDROCK***					3 / 1	
		End of Test Pit						
4							4	
5							5	
6 / 2							6 / 2	
7							7	
8							8	
9							9	

Log of Test Pit: TP05-5

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.602

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 ft / 0 m		Ground Surface	894.60				0 ft / 0 m	
		SAND AND GRAVEL (FILL) light brown, lots of gravel, fine to medium grain sand, trace silt, dry, compact, frozen	0.00	TP05-5A	G	25		Native fill
			894.40	TP05-5B	G	10		
		WEATHERED BEDROCK horizontal, very hard, frozen	0.20					
			894.30 / 0.30					
		End of Test Pit						

Depth scale: ft 0–9; m 0–2.

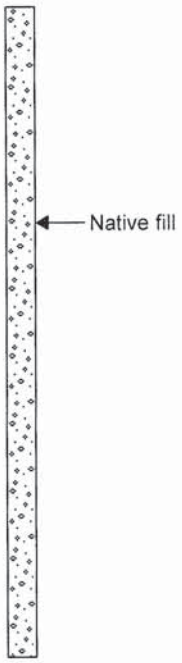
Log of Test Pit: TP05-6

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.441

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.44				0 / 0	
		SAND AND GRAVEL (FILL) brown, lots of gravel, fine to medium sand, dry, compact, frozen, some staining on surface	0.00	TP05-6A	G	0		
1			893.99				1	
		SANDY SILT (ORGANIC LAYER) dark brown/black, some gravel, fine sand, lots of large roots and woody debris, some staining, damp	0.45 893.84					
2		***GRAVELLY SAND (FILL)*** grey, lots of angular and rounded cobbles, lots of angular and rounded gravel, lots of silt, no staining, slight odour, moist	0.60	TP05-6B	G	250	2	
3 / 1							3 / 1	
4		***SILTY SAND (FILL)*** dark grey, fine sand, some organics (rhizomes), no staining, slight odour, damp	1.20 892.94	TP05-6C	G	100	4	
5		End of Test Pit	1.50				5	
6 / 2							6 / 2	
7							7	
8							8	
9							9	



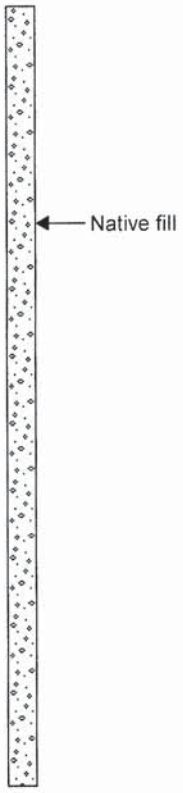
HEMMERA

Log of Test Pit: TP05-7

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.276

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.28				0 / 0	
		SAND AND GRAVEL (FILL) dark brown, lots of gravel, fine to medium sand, compact, frozen, dry	0.00	TP05-7A	G	25		
			893.68					
2		***SILT*** dark brown with some orange mottling, bits of gravel, bits of shale, some fine sand, some clay	0.60	TP05-7B	G	50	2	
			893.38					
3 / 1		***SANDY SILT*** dark grey with some orange mottling, some cobbles, lots of vertical and horizontal shale, some sandstone, trace clay, trace organics	0.90				3 / 1	
			893.08					
4		dark brown with some orange mottling, fine to medium sand, lots of cobbles	1.20				4	
5				TP05-7C	G	25	5	
			892.48					
6 / 2		End of Test Pit	1.80				6 / 2	
7							7	
8							8	
9							9	



HEMMERA

Log of Test Pit: TP05-8

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.515

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
ft / m		Ground Surface	894.51				ft / m	
0 / 0		***SAND AND GRAVEL (FILL)*** light brown, fine to medium sand, compact, frozen, dry, no odour	0.00	TP05-8A	G	25	0 / 0	
			894.22					
1		dark grey, some cobbles, no odour	0.30				1	← Native Fill
			894.01					
2		***SANDY SILT*** dark grey with some orange mottling, some cobbles, fine to medium sand, some clay, some organics, slight odour, some black decomposing organics	0.50				2	
3 / 1							3 / 1	
4				TP05-8B	G	50	4	
			893.01					
5		End of Test Pit	1.50				5	
6							6	
2							2	
7							7	
8							8	
9							9	

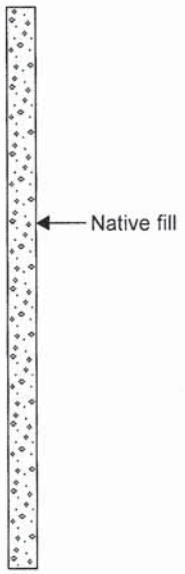
HEMMERA

Log of Test Pit: TP05-9

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.571

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.57				0 / 0	
		SAND AND GRAVEL (FILL) dark brown, lots of gravel, fine to medium sand, compact, frozen, dry, no odour, no staining	0.00	TP05-9A	G	0		
1			894.07				1	
		SANDY SILT dark grey, lots of large cobbles, fine to medium sand, strong odour, saturated with diesel, lots of staining	0.50	TP05-9B	G	200		
2 / 1							2 / 1	
3			893.47				3	
		some cobbles, some gravel, slight odour, some staining	1.10	TP05-9C	G	5%*		
4			893.27				4	
		End of Test Pit	1.30					
5							5	* LEL
6 / 2							6 / 2	
7							7	
8							8	
9							9	



Log of Test Pit: TP05-10

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.502

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.50				0 / 0	
		SAND AND GRAVEL (FILL) light brown, lots of gravel, compact, frozen, dry	0.00	TP05-10A	G	25		
3 / 1		***SILTY SAND*** dark grey, some gravel, some clay, trace organics	893.50 1.00				3 / 1	Native Fill
				TP05-10B	G	25		
6 / 2		End of Test Pit	892.70 1.80				6 / 2	

HEMMERA

Log of Test Pit: TP05-11

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.359

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
		Ground Surface	894.36					
		Sand and Gravel (fill) light brown, lots of gravel, fine to medium sand, compact, frozen, some organics (grass, twigs)	0.00	TP05-11A	G	0		
			893.76					
		SILTY SAND light grey with some orange mottling, some gravel, fine sand, no odour	0.60					
			893.16	TP05-11B	G	50		
		dark brown with some orange mottling, some cobbles, fine to medium sand, slight odour	1.20					
			891.86	TP05-11C	G	25		
		End of Test Pit	2.50					

ft / m: 0 (0), 1 (1), 2 (2), 3 (1), 4, 5, 6, 7, 8, 9

Native fill

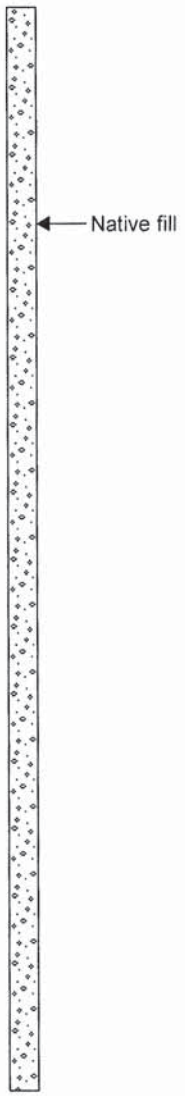
Log of Test Pit: TP05-12

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.396

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.40				0 / 0	
		SAND AND GRAVEL (FILL) dark brown, lots of gravel, compact, frozen, dry, some staining on surface	0.00	TP05-12A	G	10		
			894.10					
1		***SILTY SAND*** dark brown, some gravel, some organics (roots), moist, heavily stained, strong odour	0.30				1	
2							2	
3				TP05-12B	G	25	3	
1			893.40				1	
4		dark grey, some gravel, some clay, some organics (roots), heavily stained, slight odour	1.00				4	
5							5	
6							6	
2							2	
7							7	
8				TP05-12C	G	50	8	
			891.90					
		End of Test Pit	2.50					
9							9	



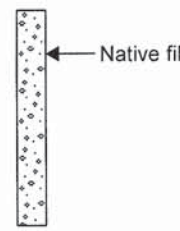
Log of Test Pit: TP05-13

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.313

Date Excavated: 11/14/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 ft / 0 m		Ground Surface	894.31				0 ft / 0 m	
		SAND AND GRAVEL (FILL) dark brown, lots of gravel, compact, frozen, dry, some staining on surface	0.00 894.21	TP05-13A	G	150		Native fill
		dark grey, lots of sand	0.10	TP05-13B	G	0		
		End of Test Pit	893.81 0.50					



Depth scale: 0–9 ft (0–2 m)

Log of Test Pit: TP05-15

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 893.977

Date Excavated: 11/15/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
0 / 0		Ground Surface	893.98				0 / 0	
		SAND AND GRAVEL (FILL) light brown, fine to medium sand, very compact, frozen solid	0.00	TP05-15A	G	0		Native Fill
				TP05-15B	G	0		
		End of Test Pit	893.68 0.30					

Depth scale: ft 0–9; m 0, 1, 2

HEMMERA

Log of Test Pit: TP05-16

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 893.571

Date Excavated: 11/15/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	893.57				0 / 0	
		SAND AND GRAVEL (FILL) light brown with some orange mottling, lots of gravel, fine to medium sand, some organics (roots), compact, frozen	0.00	TP05-16A	G	0		
			893.27					
1		some metal containers (cans, small drums)	0.30				1	Native Fill
			892.97					
2		lots of rounded cobbles	0.60				2	
			892.67					
3 / 1		***SILTY SAND*** dark brown, some cobbles, some gravel, some horizontal shale	0.90				3 / 1	
5				TP05-16B	G	0	5	
			891.77					
6 / 2		End of Test Pit	1.80				6 / 2	
7							7	
8							8	
9							9	

Log of Test Pit: TP05-17

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 893.567

Date Excavated: 11/15/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	893.57				0 / 0	
		SAND AND GRAVEL light brown with some orange mottling, lots of gravel, fine to medium sand, some organics (roots), compact, frozen, dry	0.00 893.27	TP05-17A	G	0		
1		***SANDY SILT*** grey with some orange mottling, lots of cobbles, lots of gravel, compact, frozen, dry	0.30 892.67				1	Native Fill
3 / 1		***SILTY SAND*** brown with some orange mottling, lots of cobbles, some gravel, fine to medium sand	0.90 891.77	TP05-17B	G	0	3 / 1	
6 / 2		End of Test Pit	1.80				6 / 2	
7							7	
8							8	
9							9	

Log of Test Pit: TP05-18

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 893.742
Date Excavated: 11/15/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

Depth (ft / m)	Symbol	Description (Subsurface Profile)	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Backfill Details
0 / 0		Ground Surface	893.74				
0–3 ft (0–0.90 m)		*SAND AND GRAVEL (FILL)* brown, fine to medium sand, trace organics; some orange mottling, lots of gravel, some shale, some clay, moist	0.00	TP05-18A	G	0	Native Fill
3–8.4 ft (0.90–2.55 m)		*SILTY SAND* dark brown, some gravel, some shale, some cobbles, medium to coarse sand	892.84 / 0.90	TP05-18B	G	25	Native Fill
8.4 ft (2.55 m)		End of Test Pit	891.19 / 2.55				

Log of Test Pit: TP05-19

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.090

Date Excavated: 11/15/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	894.09				0 / 0	
		SAND AND GRAVEL (FILL) brown, fine to medium sand, compact, frozen, trace organics, slight odour, some staining on surface	0.00	TP05-19A	G	0		
			893.79					
1		***SANDY SILT*** light brown with some orange mottling, some clay, no staining, no odour	0.30				1	Native Fill
			893.19					
3 / 1		***SILTY SAND*** dark brown, some cobbles, some gravel, some shale, slight odour, no staining	0.90				3 / 1	
				TP05-19B	G	15		
			891.24					
		End of Test Pit	2.85					
9							9	

HEMMERA

Log of Test Pit: TP05-20

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.572

Date Excavated: 11/15/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
ft / m		Ground Surface	894.57				ft / m	
0 / 0		***SAND AND GRAVEL (FILL)*** brown, fine to medium sand, lots of gravel, some organics (roots), compact, frozen, dry	0.00 / 894.47	TP05-20A	G	0	0 / 0	
			0.10					
1		some orange mottling, some cobbles					1	Native Fill
			893.97					
2		lots of cobbles (most up to 30 cm. in diameter, some up to 90 cm. in diameter), some shale	0.60				2	
3 / 1							3 / 1	
4							4	
5							5	
6				TP05-20B	G	0	6	
2			892.57				2	
7		End of Test Pit	2.00				7	
8							8	
9							9	

HEMMERA

Log of Test Pit: TP05-21

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.060

Date Excavated: 11/16/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
ft / m		Ground Surface	894.06				ft / m	
0 / 0		***SAND AND GRAVEL (FILL)*** brown, fine to medium sand, some organics (roots), compact, frozen, moist some orange mottling, lots of gravel	0.00	TP05-21A	G	0	0 / 0	Native Fill
2		***SILTY SAND*** dark brown with some orange mottling, lots of cobbles, some gravel, some shale, some organics	893.46 0.60				2	
7				TP05-21B	G	0	7	
8		End of Test Pit	891.66 2.40				8	

HEMMERA

Log of Test Pit: TP05-22

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.051

Date Excavated: 11/16/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
ft m		Ground Surface	894.05				ft m	
0 0		***SAND AND GRAVEL (FILL)*** brown with some yellow mottling, lots of gravel, fine to medium sand	0.00	TP05-22A	G	0	0 0	
1							1	Native Fill
2			893.45				2	
		SILTY SAND dark brown with some orange mottling, lots of cobbles, some gravel, some shale, some organics	0.60					
3							3	
1							1	
4							4	
5							5	
6							6	
2							2	
7				TP05-22B	G	15	7	
8		End of Test Pit	891.65 2.40				8	
9							9	

Log of Test Pit: TP05-23

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 893.830

Date Excavated: 11/16/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	893.83				0 / 0	
		SAND AND GRAVEL (FILL) brown, lots of gravel, some cobbles, fine to medium sand, some organics, compact, frozen, dry	0.00 893.53	TP05-23A	G	25		
1		***SANDY SILT*** light brown, some cobbles, fine to medium sand	0.30 893.23				1	Native Fill
2		***SILTY SAND*** brown, lots of cobbles, some gravel, medium to coarse sand	0.60				2	
7				TP05-23B	G	0	7	
			891.43					
8		End of Test Pit	2.40				8	
9							9	

Log of Test Pit: TP05-24

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 894.572

Date Excavated: 11/16/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
		Ground Surface	894.57					
0 / 0		***SAND AND GRAVEL (FILL)*** brown, some cobbles, lots of gravel, fine to medium sand, some organics	0.00	TP05-24A	G	25	0 / 0	
			893.97					← Native Fill
2		***SILTY SAND*** brown, lots of cobbles, some gravel, some shale, fine to medium sand, some organics	0.60				2	
1							1	
8				TP05-24B	G	0	8	
			891.87					
9		End of Test Pit	2.70				9	
2							2	

Log of Test Pit: TP05-25

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 892.710

Date Excavated: 11/16/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
0 / 0		Ground Surface	892.71				0 / 0	
0		***SAND AND GRAVEL (FILL)*** dark brown, fine to medium sand, some organics, compact, frozen, dry, no odour	0.00	TP05-25A	G	25		Native Fill
2		***SANDY SILT*** brown, lots of cobbles, some gravel, some shale, medium to coarse sand, slight odour	892.11 / 0.60					
7				TP05-25B	G	0		
8		End of Test Pit	890.31 / 2.40					

Depth scale: ft 0–9; m 0–2.

Log of Test Pit: TP05-26

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 889.279

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
0 ft / 0 m		Ground Surface	889.28				0 ft / 0 m	
		SAND AND GRAVEL (FILL) dark brown, fine to medium sand, some organics, compact, dry	0.00	TP05-26A	G	20		Native Fill
4 ft		*SILTY SAND* brown, some cobbles, some shale, medium to coarse sand, some clay	888.08 / 1.20					
7 ft		damp	887.18 / 2.10	TP05-26B	G	0		
8 ft		End of Test Pit	886.88 / 2.40					

HEMMERA

Log of Test Pit: TP05-27

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 889.377

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
ft / m		Ground Surface	889.38				ft / m	
0 / 0		***SAND AND GRAVEL (FILL)*** brown, lots of cobbles, fine to medium sand, some organics	0.00	TP05-27A	G	25	0 / 0	
			889.08					
1		dark brown, lots of gravel, some shale	0.30				1	← Native Fill
2							2	
3 / 1							3 / 1	
			888.18					
4		***SILTY SAND*** dark brown, some cobbles, some gravel	1.20				4	
5							5	
6							6	
7 / 2							7 / 2	
8				TP05-27B	G	30	8	
			886.68					
9		End of Test Pit	2.70				9	

Log of Test Pit: TP05-100

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 888.091

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	888.09				0 / 0	
		SAND AND GRAVEL (FILL) dark brown, medium to coarse sand, compact	0.00 887.99 0.10	TP05-100A	G	0		
1		some cobbles, lots of gravel					1	← Native Fill
2							2	
			887.19					
3 / 1		***SANDY SILT*** brown with some orange mottling, some gravel, lots of shale	0.90				3 / 1	
4							4	
5							5	
6							6	
7 / 2							7 / 2	
			885.69					
8		some cobbles, some shale	2.40	TP05-100B	G	0	8	
			885.39					
9		End of Test Pit	2.70				9	

HEMMERA

Log of Test Pit: TP05-101

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 888.334

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	888.33				0 / 0	
0		*SAND AND GRAVEL (FILL)* brown, lots of gravel, medium to coarse sand, compact	0.00	TP05-101A	G	0	0	
1							1	Native Fill
2							2	
3 / 1		dark brown, some cobbles	887.43 0.90				3 / 1	
4							4	
5							5	
6 / 2							6 / 2	
7							7	
8		*SILTY SAND* brown with some orange mottling, some cobbles, some gravel, trace clay	885.93 2.40	TP05-101E	G	25	8	
9		*WEATHERED BEDROCK*	885.63 2.70				9	
		End of Test Pit	885.43 2.90					

HEMMERA

Log of Test Pit: TP05-102

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 888.135

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	888.13				0 / 0	
0		***SAND AND GRAVEL (FILL)*** greyish brown, lots of gravel, medium to coarse sand, compact, no odour, no staining	0.00	TP05-102A	G	0	0	
1							1	Native Fill
2							2	
			887.24					
3 / 1		***SILTY SAND*** dark brown, some cobbles, some gravel, fine to medium sand, moist	0.90				3 / 1	
4							4	
5							5	
6							6	
7 / 2							7 / 2	
8				TP05-102B	G	15	8	
			885.43					
9		End of Test Pit	2.70				9	

HEMMERA

Log of Test Pit: TP05-103

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.489

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	887.49				0 / 0	
		SAND AND GRAVEL (FILL) brown, lots of gravel, medium to coarse sand, compact	0.00	TP05-103A	G	5		Native Fill
1		lots of shale, some organics	887.19 / 0.30				1	
3 / 1		*SILTY SAND* brown with some orange mottling, lots of cobbles, some gravel, some organics	886.59 / 0.90				3 / 1	
5				TP05-103B	G	0	5	
6		*WEATHERED BEDROCK*	885.69 / 1.80				6	
2		End of Test Pit	885.49 / 2.00				2	

HEMMERA

Log of Test Pit: TP05-104

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.214

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	887.21				0 / 0	
		SAND AND GRAVEL (FILL) brown, some cobbles, fine to medium sand	0.00	TP05-104A	G	0		
4 / 1			886.01				4 / 1	← Native Fill
		SILTY SAND (FILL) dark brown with some orange mottling, some cobbles, some gravel, some light brown clay	1.20					
7 / 2			885.11				7 / 2	
		SANDY SILT (ORGANIC LAYER) dark brown/black with some orange mottling, some cobbles, some gravel, fine to medium sand, some clay, lots of organics (roots, branches)	2.10	TP05-104B	G	55		
			884.51					
9		End of Test Pit	2.70				9	

HEMMERA

Log of Test Pit: TP05-105

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.776

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 ft / 0 m		Ground Surface	887.78				0 ft / 0 m	
0–4 ft (0–1.20 m)		*SAND AND GRAVEL (FILL)* dark brown, some cobbles, medium to coarse sand, compact	0.00	TP05-105A	G	0		Native Fill
4–9 ft (1.20–2.70 m)		*SILTY SAND* dark brown, lots of cobbles, medium to coarse sand, some clay	886.58 / 1.20	TP05-105B	G	25		
9 ft		End of Test Pit	885.08 / 2.70					

Log of Test Pit: TP05-106

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.952

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 ft / 0 m		Ground Surface	887.95				0 ft / 0 m	
0		***SAND AND GRAVEL (FILL)*** dark brown, some cobbles, medium to coarse sand, compact	0.00	TP05-106A	G	5	0	Native Fill
1 ft		some orange mottling	887.65 / 0.30				1 ft	
4 ft		***SILTY SAND*** dark brown, lots of cobbles, medium to coarse sand, some clay	886.75 / 1.20				4 ft	
8 ft				TP05-106B	G	0	8 ft	
9 ft		End of Test Pit	885.25 / 2.70				9 ft	

HEMMERA

Log of Test Pit: TP05-107

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.765

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
		Ground Surface	887.76					
0 / 0		***SAND AND GRAVEL (FILL)*** dark brown, some cobbles, medium to coarse sand, compact	0.00	TP05-107A	G	5	0 / 0	
			887.47					
1		some orange mottling	0.30				1	Native Fill
2							2	
3 / 1							3 / 1	
			886.56					
4		***SILTY SAND*** dark brown, lots of cobbles, medium to coarse sand, some clay	1.20				4	
5							5	
6 / 2							6 / 2	
7							7	
8				TP05-107B	G	0	8	
			885.06					
9		End of Test Pit	2.70				9	

Log of Test Pit: TP05-108

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 885.953

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	885.95				0 / 0	
		SAND AND GRAVEL (FILL) brown, fine to medium sand, compact, some organics	0.00	TP05-108A	G	10		
3 / 1		***SANDY SILT*** brown with some orange mottling, some shale, fine to medium sand, trace clay	885.05 0.90				3 / 1	Native Fill
				TP05-108B	G	15		
9 / 2.7		End of Test Pit	883.25 2.70				9 / 2.7	

Log of Test Pit: TP05-109

HEMMERA

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.015

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth (ft / m)	Backfill Details
0 / 0		Ground Surface	887.01				0 / 0	
		SAND AND GRAVEL (FILL) brown, fine to medium sand, compact, some organics	0.00	TP05-109A	G	0		
			886.12					Native Fill
3 / 1		***SILTY SAND*** brown, lots of cobbles, medium to coarse sand	0.90				3 / 1	
			885.81					
4		some cobbles, some gravel, some shale, some organics	1.20				4	
5							5	
6 / 2							6 / 2	
7							7	
8				TP05-109B	G	0	8	
			884.31					
9		End of Test Pit	2.70				9	

HEMMERA

Log of Test Pit: TP05-110

Project: Current Sikanni Maintenance Camp
Project No.: 376-118.02
Client: PWGSC
Location: Km 254 Alaska Highway, BC
Elevation of Ground Surface: 887.968

Date Excavated: 11/18/2005
Contractor: LaPrairie
Equipment: Excavator
Logged By: LZ

SUBSURFACE PROFILE				SAMPLE				
Depth	Symbol	Description	Depth/Elev.	Sample ID	Type	Vapour (ppm)	Depth	Backfill Details
ft m		Ground Surface	887.97				ft m	
0 0		***SAND AND GRAVEL (FILL)*** brown, some cobbles, fine to medium sand	0.00	TP05-110A	G	0	0 0	
1							1	← Native Fill
2							2	
			887.07					
3 1		***SILTY SAND*** dark brown with some orange mottling, lots of cobbles, some gravel, some light brown clay	0.90				3 1	
4							4	
5							5	
6							6	
2							2	
7							7	
8				TP05-110B	G	0	8	
			885.27					
9		End of Test Pit	2.70				9	

Log of Test Pit: TP06-201

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

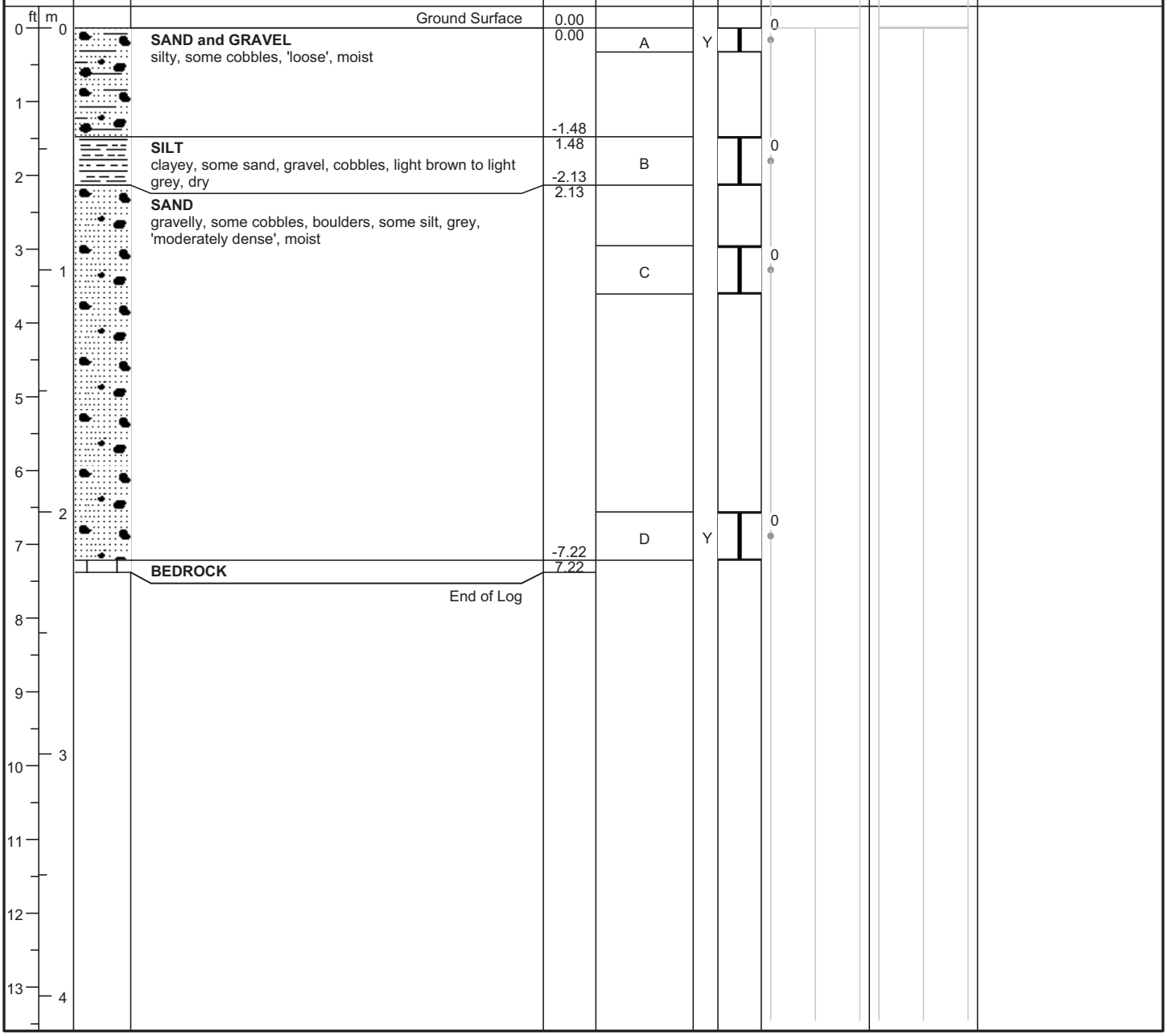
Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1



Test Pit location: N 6343426.330, E 519003.714

Test Pit depth: 2.2 m

Test Pit ground elevation: 894.034 masl

Log of Test Pit: TP06-202

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SAND silty, some gravel, cobbles, boulders, brown, 'moderately, dense', dry roots and metal debris present	0.00	A	Y		0		
				B			0		
			-2.62						
		SILT clayey, some gravel, cobbles, boulders, grey, dry	2.62	C			0		
1 /			-3.94						
		SAND silty, some gravel, cobbles, boulders, grey, 'loose', dry	3.94	D			0		
2 /									
				E			0		
3 /			-9.84						
		End of Log	9.84						
4 /									

Test Pit location: N 6343427.117, E 519010.712

Test Pit depth: 3 m

Test Pit ground elevation: 893.889 masl

Log of Test Pit: TP06-203

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT sandy, some gravel, cobbles,grey to dark brown, 'firm', moist roots present 0-0.3m	0.00	A	Y		0		
1				B			0		
2									
3 / 1				C			0		
4			-4.59						
5		**SAND** gravelly, some cobbles, trace silt, grey, moist	4.59						
6									
7 / 2				D/E	Y		0		
		BEDROCK	-7.22						
		End of Log	7.22						
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343423.632, E 519007.776

Test Pit depth: 2.2 m

Test Pit ground elevation: 894.018 masl

Log of Test Pit: TP06-204

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
0 / 0		**SAND and GRAVEL (FILL)** grey to brown, 'loose', moist	0.00	A	Y		0		
1									
2				B			0		
3 / 1									
				C			0		
			-3.94						
4		**SAND** gravelly, some silt, grey, moist to wet, native material	3.94						
5									
6				D			0		
7 / 2									
8									
9									
10 / 3				E			0		
			-10.50						
		End of Log	10.50						
11									
12									
13 / 4									

Test Pit location: N 6343579.691, E 518765.041

Test Pit depth: 3.2 m

Test Pit ground elevation: 887.534 masl

Log of Test Pit: TP06-205

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
0 / 0		**SAND and GRAVEL (FILL)** silty, some cobbles, boulders, grey, 'moderately dense', moist	0.00	A/B	Y		0		
2				C			0		
			-2.62						
3 / 1		**SILT** clayey, some sand, gravel, cobbles, brown with orange mottling, moist	2.62	D			0		
6 / 2		Organic material (decomposing tree roots) from 2-3.0m		E			0		
9 / 3				F	Y		0		
			-9.84						
10 / 3		End of Log	9.84						
13 / 4									

Test Pit location: N 6343621.186, E 518775.165

Test Pit depth: 3 m

Test Pit ground elevation: 886.148 masl

Log of Test Pit: TP06-206

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/3/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
0		**SAND and GRAVEL (FILL)** some cobbles, dark brown, moist, abundant roots	0.00	A	Y		0		
1			-1.64						
1.64		**SILT** clayey, some silt and gravel, trace cobbles, trace sand, dark brownish grey with orange mottling, 'very dense', moist		B/C	Y		0		
3 / 1		less gravel with depth							
6 / 2		dry from 2.0m down		D			0		
9 / 3				E			0		
-9.84		End of Log	9.84						
10									
13 / 4									

Test Pit location: N 6343689.170, E 518774.087

Test Pit depth: 3.0 m

Test Pit ground elevation: 879.144 masl

Log of Test Pit: TP06-207

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
0 / 0		**SILT** clayey, some gravel, cobbles, boulders, trace fine grained sand, grey,'dense', dry	0.00	A	Y		0		
1		moister near surface (0-1.0m)							
2				B			0		
3		orange mottling observed from 1.0m down							
1				C			0		
4									
5									
6									
2				D			0		
7									
8									
9									
3				E	Y		0		
10		End of Log	-9.84 9.84						
11									
12									
4 / 13									

Test Pit location: N 6343773.536, E 518857.738

Test Pit depth: 3 m

Test Pit ground elevation: 877.193 masl

Log of Test Pit: TP06-208

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
0 / 0		**SILT** clayey, some sand, gravel, cobbles, boulders, grey, 'moderately stiff', moist, roots present	0.00	A	Y		0		
2				B			0		
			-2.62						
3 / 1		**SAND and GRAVEL** some silt, cobbles, brownish-grey, 'dense', moist	2.62	C			0		
			-3.94						
4 / 1		**SILT** clayey, some sand, gravel, cobbles, boulders, grey, 'stiff', moist	3.94						
6 / 2				D			0		
10 / 3				E			0		
			-10.50						
		End of Log	10.50						
13 / 4									

Test Pit location: N 6343790.110, E 518922.648

Test Pit depth: 3.2 m

Test Pit ground elevation: 887.276 masl

Log of Test Pit: TP06-209

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		CLAY gravelly, some cobbles, trace sand, greyish-brown, wet, abundant roots	0.00	A	Y		0		
1									
			-1.64	B			0		
2		**SILT** clayey, some gravel and cobbles, trace sand, dark brown to grey, moist	1.64						
				C			0		
3 / 1			-3.28						
4		**BEDROCK** shale	3.28						
		End of Log							
5									
6 / 2									
7									
8									
9 / 3									
10									
11									
12									
13 / 4									

Test Pit location: N 6343779.791, E 518985.654

Test Pit depth: 1.0 m

Test Pit ground elevation: 876.768 masl

Log of Test Pit: TP06-210

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SAND and GRAVEL some silt, some cobbles, dark brown, moist, abundant roots	0.00	A	Y		0		
1				B			0		
			-1.97						
2		**SILT and GRAVEL (Till)** some cobbles, some coarse-medium grained sand, 'dense', dry	1.97						
3 / 1		clasts oriented in one direction		C			0		
4									
			-4.92						
5		**SILT** clayey, some cobbles, trace sand, dark brown, moist	4.92						
6									
7 / 2				D			0		
			-7.22				0		
		BEDROCK shale	7.22 -7.54 7.54	E/F					
		End of Log							
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343737.693, E 518891.461

Test Pit depth: 2.3 m

Test Pit ground elevation: 877.868 masl

Log of Test Pit: TP06-211

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SAND and GRAVEL (Fill) some silt, dry, roots present, asphalt clasts	0.00	A	Y		0		
1			-1.64						
2		**SILT** clayey, some gravel, cobbles, fine grained sand, dark brown, dry	1.64	B			0		
		wet from 0.5-0.7m							
3 / 1				C	Y		0		
4				D			0		
5			-4.92						
		End of Log	4.92						
6									
7 / 2									
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343751.970, E 518971.204

Test Pit depth: 1.5 m

Test Pit ground elevation: 877.334 masl

Log of Test Pit: TP06-212

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

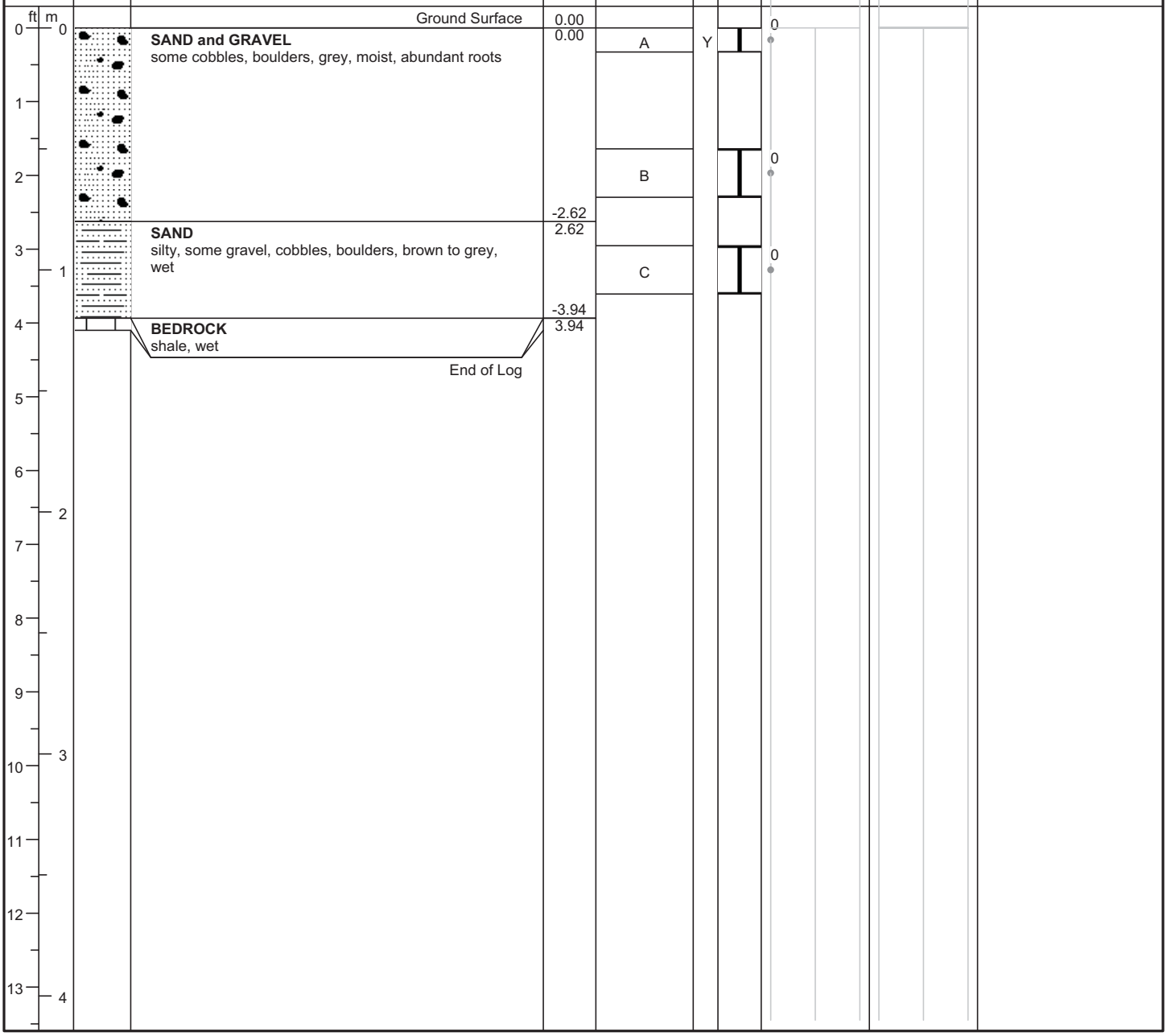
Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1



Test Pit location: N 6343738.601, E 518990.319

Test Pit depth: 1.2 m

Test Pit ground elevation: 876.901 masl

Log of Test Pit: TP06-213

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT clayey, some sand, gravel, cobbles, grey, moist, roots present	0.00	A	Y		0		
1			-1.64						
2		**SAND** gravelly, some cobbles, 'dense', brown to grey, moist	1.64	B			0		
			-2.95						
3 / 1		**SILT** clayey, some gravel, cobbles, trace sand, 'dense', grey, moist	2.95	C			0		
			-3.61						
4		**BEDROCK** shale, wet	3.61						
		End of Log							
5									
6									
7 / 2									
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343743.428, E 518978.279

Test Pit depth: 1.1 m

Test Pit ground elevation: 877.030 masl

Log of Test Pit: TP06-214

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

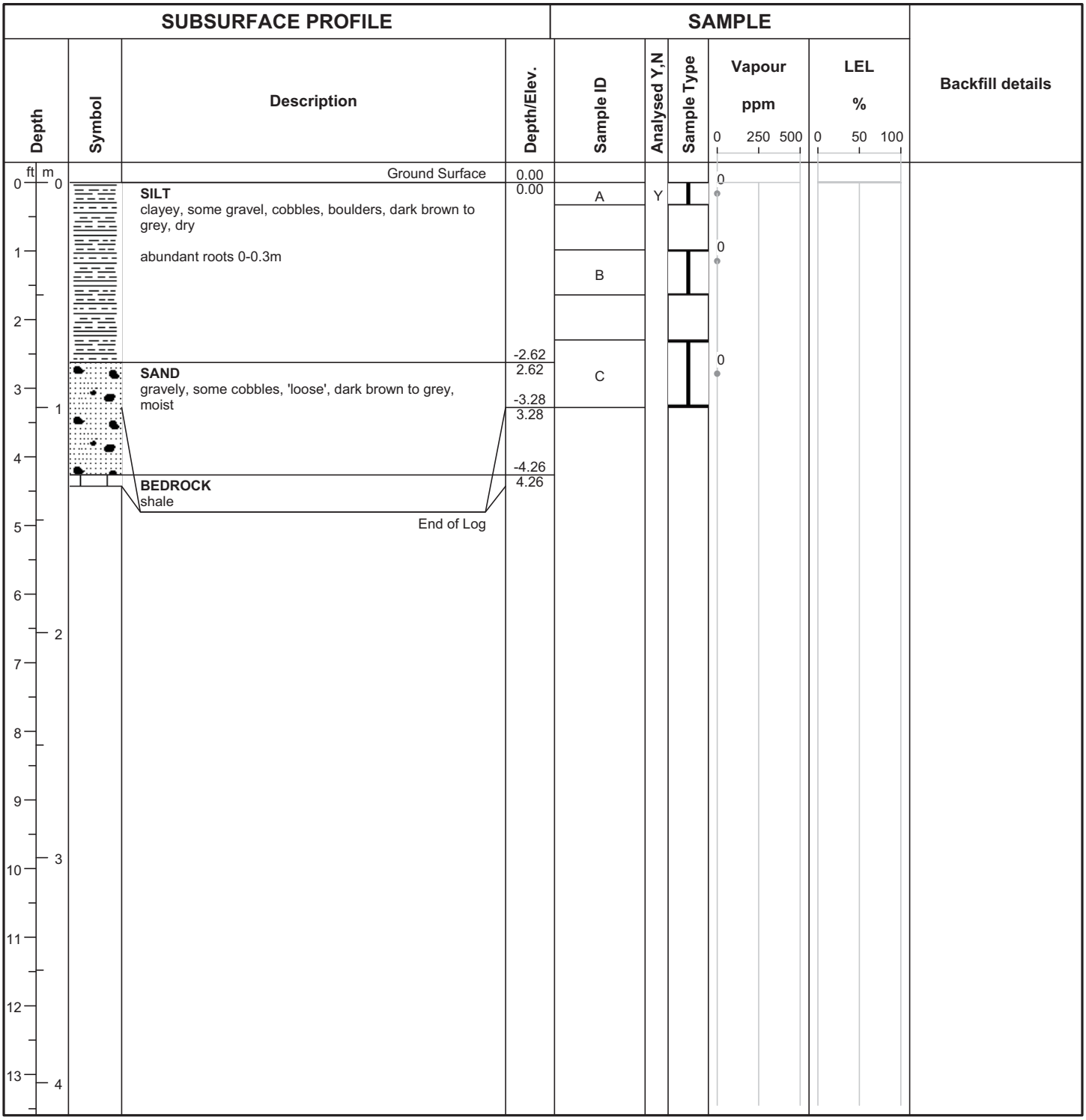
Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1



Test Pit location: N 6343708.940, E 518992.070

Test Pit depth: 1.0 m

Test Pit ground elevation: 877.629 masl

Log of Test Pit: TP06-215

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT clayey, some gravel, sand, dark grey, moist, roots present	0.00	A	Y		0		
			-0.66						
1 /		**SAND** gravelly, some cobbles, boulders, dark grey to brown, moist	0.66	B			0		
			-1.97						
2 /		**SILT** clayey, some cobbles, gravel, dark grey to brown, moist	1.97	C			0		
3 / 1									
			-3.94						
4 /		End of Log	3.94						
5 /									
6 /									
7 / 2									
8 /									
9 /									
10 / 3									
11 /									
12 /									
13 / 4									

Test Pit location: N 6343705.295, E 518940.755

Test Pit depth: 1.2 m

Test Pit ground elevation: 878.236 masl

Log of Test Pit: TP06-217

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		GRAVEL (FILL)	0.00	A	Y		0		
			-0.66						
1 /		**BEDROCK** shale	0.66						
		End of Log							
2 /									
3 / 1									
4 /									
5 /									
6 / 2									
7 /									
8 /									
9 /									
10 / 3									
11 /									
12 /									
13 / 4									

Test Pit location: N 6343674.485, E 518957.139

Test Pit depth: 0.2 m

Test Pit ground elevation: 878.329 masl

Log of Test Pit: TP06-218

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/3/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT trace sand, gravel, grey, moist, abundant roots	0.00 / -0.49	A	Y		0		
1 /		**BEDROCK** shale	0.49						
3 / 1			-3.28						
		End of Log	3.28						
2 /									
3 /									
4 /									
5 /									
6 /									
7 / 2									
8 /									
9 /									
10 / 3									
11 /									
12 /									
13 / 4									

Test Pit location: N 6343674.069, E 518927.697

Test Pit depth: 1.0 m

Test Pit ground elevation: 878.625 masl

Log of Test Pit: TP06-219

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/3/2006

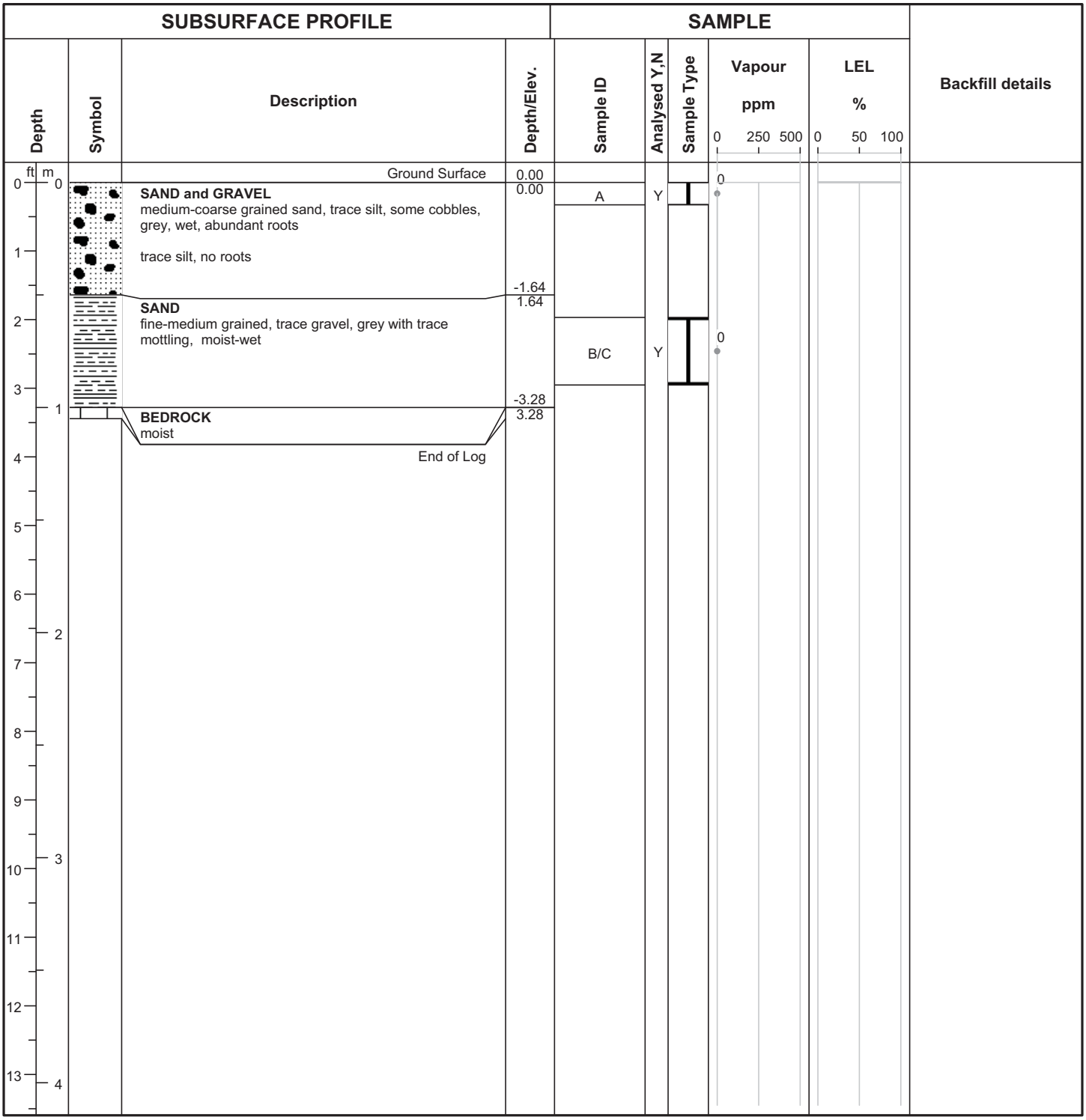
Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA



Test Pit location: N 6343679.307, E 518907.906

Test Pit depth: 1.0 m

Test Pit ground elevation: 878.853 masl

Log of Test Pit: TP06-220

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/3/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SAND and GRAVEL fine-coarse grained sand, trace silt, some cobbles, grey, wet, abundant roots	0.00	A	Y		0		
1		roots absent 0.3-0.5m, rust staining		B			0		
2									
3			-3.28	C			0		
1		**SILT** clayey, some cobbles and gravel, some fine-coarse grained sand, grey with orange mottling, 'dense', moist	3.28						
4									
5									
6									
2									
7									
8		bedrock or boulder below		D			0		
			-8.86				25		
9		**BEDROCK** dry	8.86						
		End of Log							
3									
10									
11									
12									
13 / 4									

Test Pit location: N 6343672.205, E 518862.456

Test Pit depth: 2.7 m

Test Pit ground elevation: 878.607 masl

Log of Test Pit: TP06-221

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT sandy, some gravel, cobbles, boulders, grey	0.00	A	Y		0		
		metal debris and roots present	-0.98						
1		**SAND** gravelly, some cobbles, boulders, grey, moist	0.98	B			0		
2									
3 / 1				C			0		
4									
5									
6									
2				D	Y		0		
7			-7.22						
		BEDROCK	7.22						
		End of Log							
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343484.184, E 519012.543

Test Pit depth: 2.2 m

Test Pit ground elevation: 891.728 masl

Log of Test Pit: TP06-222

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT clayey, some gravel, cobbles, dark greyish-brown, 'firm', moist roots present 0-0.3m	0.00	A	Y		0		
1				B/C	Y		0		
3 / 1				D			0		
4		**SAND** gravelly, some cobbles, boulders, grey, moist	-3.94 3.94						
6 / 2				E			0		
7		**BEDROCK**	-7.22 7.22						
		End of Log							
10 / 3									
13 / 4									

Test Pit location: N 6343444.215, E 519019.001

Test Pit depth: 2.2 m

Test Pit ground elevation: 892.992 masl

Log of Test Pit: TP06-223

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

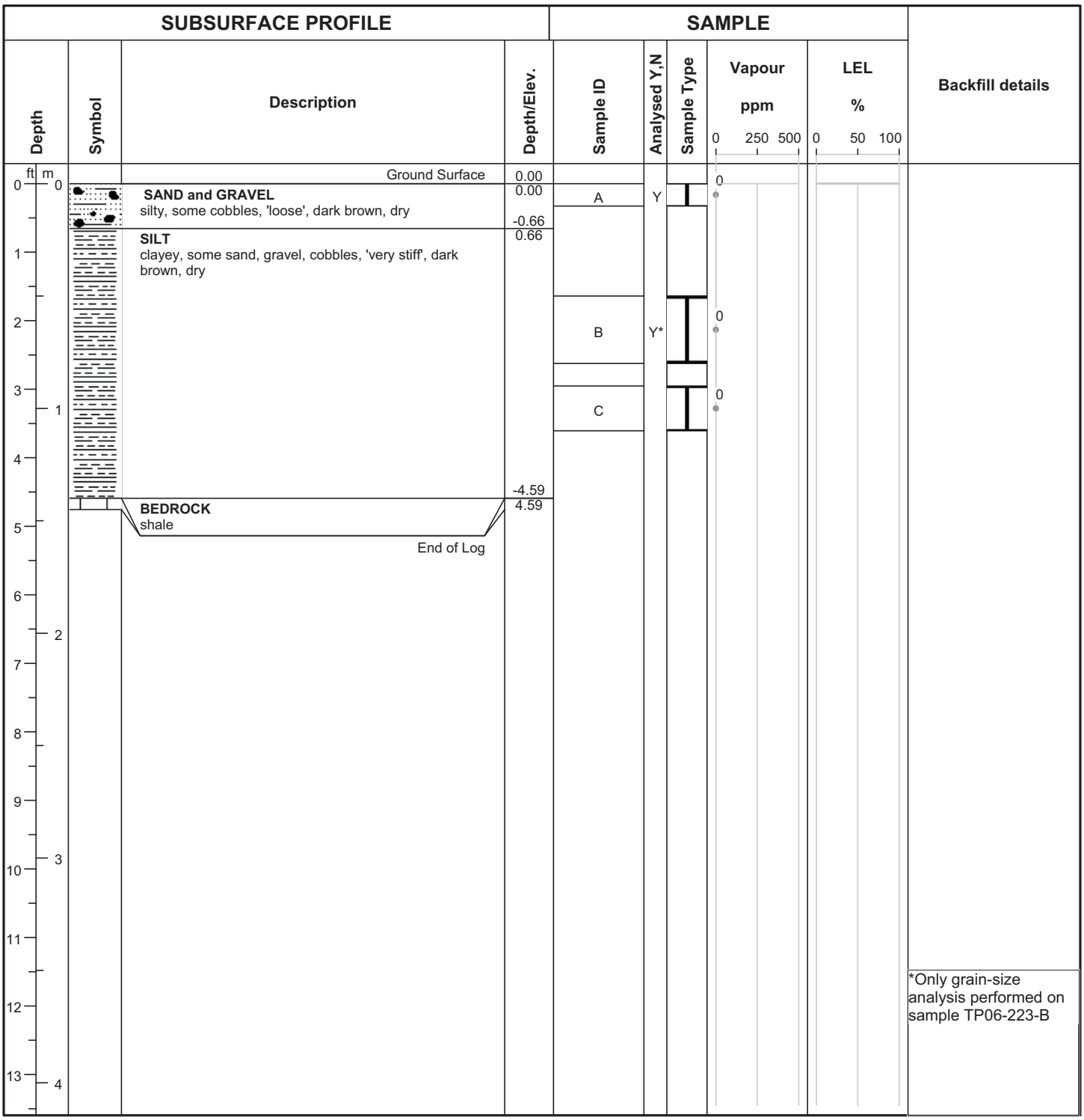
Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1



Test Pit location: N 6343710.257, E 518902.305

Test Pit depth: 1.4 m

Test Pit ground elevation: 878.715 masl

Log of Test Pit: TP06-224

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00				0		
0 / 0		**SILT** clayey, some sand, gravel, cobbles, grey, 'very stiff', dry	0.00	A/F	Y				
1		roots present 0.4-0.7m colour change to brown at 0.2-0.7m		B			0		
2									
3 / 1				C			0		
4									
5									
6 / 2				D			0		
7									
8									
9				E	Y		0		
10 / 3		End of Log	-9.84 9.84						
11									
12									
13 / 4									

Test Pit location: N 6343714.857, E 518861.865

Test Pit depth: 3 m

Test Pit ground elevation: 878.465 masl

Log of Test Pit: TP06-225

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT clayey, some gravel, sand, grey, moist, roots present	0.00	A	Y		0		
1			-0.98						
		SAND gravelly, some cobbles, boulders, grey, 'dense', moist	0.98	B			0		
2									
3 / 1				C			0		
			-3.61						
4		**SILT** clayey, some gravel, trace fine to medium grained sand, grey, moist	3.61						
5									
		wet at 2.0m							
6				D/E			0		
			-6.56						
2		**BEDROCK**	6.56						
7		End of Log							
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343707.865, E 518819.155

Test Pit depth: 2 m

Test Pit ground elevation: 878.458 masl

Log of Test Pit: TP06-226

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/4/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
0 / 0		**SILT** clayey, some sand, gravel, cobbles, grey, moist	0.00	A	Y		0		
1									
2				B			0		
3 / 1				C			0		
4									
5									
6				D			0		
7 / 2									
8									
9				E			0		
10 / 3		End of Log	-9.84 9.84						
11									
12									
13 / 4									

Test Pit location: N 6343744.613, E 518804.543

Test Pit depth: 3 m

Test Pit ground elevation: 877.435 masl

Log of Test Pit: TP06-227

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
		Ground Surface	0.00						
0 – 0		**SILT** clayey, some gravel, cobbles, boulders, trace sand, grey with some orange mottling, 'dense', dry roots present in 0-0.4m	0.00	A/B	Y		0		
3 – 1				C			0		
7 – 2				D			0		
10 – 3				E			0		
		End of Log	-10.50 10.50						
13 – 4									

Test Pit location: N 6343671.924, E 518715.092

Test Pit depth: 3.2 m

Test Pit ground elevation: 879.235 masl

Log of Test Pit: TP06-228

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Excavated: 08/5/2006

Site Location: Sikanni BC

Logged by: Azzam

Excavation Method: Backhoe

Contractor: La Prairie

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE					
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0.00						
		SILT clayey, some sand, gravel, cobbles, 'firm', grey, moist	0.00	A	Y		0		
1		abundant wood debris (intact tree roots), organics throughout							
2		orange and black mottling in 0.2-1.8m		B			0		
3 / 1									
4				C			0		
5		decreasing organic content with depth							
6				D			0		
7 / 2			-6.89						
		BEDROCK	6.89						
		End of Log							
8									
9									
10 / 3									
11									
12									
13 / 4									

Test Pit location: N 6343606.280, E 518729.434

Test Pit depth: 2.1 m

Test Pit ground elevation: 886.367 masl

Log of Borehole: BH06-17

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Logged by: STR

Drilling Method: Odex

Drilling Company: Uniwide

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE						
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0							
0 / 0		**SILT and CLAY** some coarse gravel, some coarse sand, slightly moist, 'soft'	0	S	Y			0		
3 / 1		boulder at 1.2m		1	Y			0		
6 / 2		Rig refusal due to boulders at 2.16m	-7							
7		End of Log	7							

ft: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

m: 0 1 2 3 4 5 6

Borehole location: MW06-17

Borehole ground elevation: 0

Borehole diameter: MW06-17

Borehole depth: MW06-17

Log of Monitoring Well: MW06-18

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0	0		Ground Surface	0							
			Very poor recovery, cobbles	0	S/1	Y			0		
				-5							
			SILT clayey, some gravel rounded, trace rounded cobbles, trace coarse sand, brown, 'very stiff', dry	5							
					2				0		
					3	Y			0		
					4				0		
					1518	Y*					
			BEDROCK Shale	-18 18							
				-19 19							
			End of Log								

* Only grain-size analysis peformed on sample 1518

Well location: N 6343484.266, E 518951.172

Depth to water level (TOC): -

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 5.949 m

Well Elevation (TOC): 891.712 masl

Ground Elevation: 890.749 masl

Log of Monitoring Well: MW06-19

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

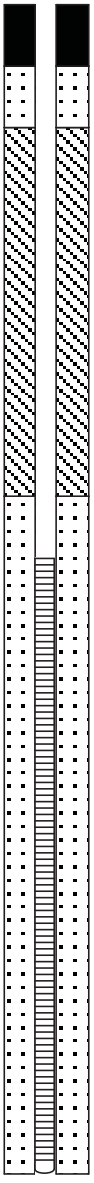
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm	LEL %
		Ground Surface	0						
0	0	**SILT and CLAY (FILL)** some coarse gravel, some cobbles, 'loose', dry	0	S/1	Y				
3	1		-4	2				5	
4		**CLAY** silty, some fine gravel, coarse sand, 'firm', moist	4						
6	2			3	Y			50	
9	3			4				35	
12				5				20	
16	5								
17				6	Y			10	
18		**BEDROCK**	-18 18						
19			-19 19						
		End of Log							
20	6								

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details



Well location: N 6343482.315, E 518788.001

Depth to water level (TOC): 6.812 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.833 m

Well Elevation (TOC): 896.728 masl

Ground Elevation: 895.798 masl

Log of Monitoring Well: MW06-20

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

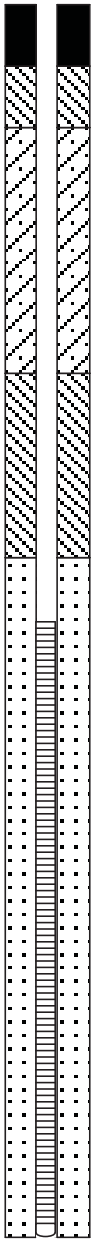
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev.
		Ground Surface	0
0 – 1 / 0 – 0.3		**SILT and CLAY (FILL)** some coarse gravel, some cobbles, 'loose', dry	0
4 – 7 / 1.2 – 2.1		**CLAY** some silt, 'soft', moist to wet	-4 4
7 – 20 / 2.1 – 6.0		**CLAY** silty, trace coarse gravel,trace sand, 'stiff', moist Bedrock at 6.5m	-7 7

SAMPLE

Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
S					
1/2				0	
3					
4				120	
5				45	
6/7				220	
8	Y			25	

Backfill details



Well location: N 6343472.563, E 518756.435

Depth to water level (TOC): 3.634 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.982 m

Well Elevation (TOC): 897.273 masl

Ground Elevation: 896.368 masl

Log of Monitoring Well: MW06-20

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

SUBSURFACE PROFILE			SAMPLE								Backfill details
Depth	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)		
21											
22											
23	7										
24											
25		End of Log	-25								
26	8		25								
27											
28											
29											
30	9										
31											
32											
33	10										
34											
35											
36	11										
37											
38											
39	12										
40											

Well location: N 6343472.563, E 518756.435

Depth to water level (TOC): 3.634 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.982 m

Well Elevation (TOC): 897.273 masl

Ground Elevation: 896.368 masl

Log of Monitoring Well: MW06-21

Project Name/No: Sikanni 376-118.04

Client: PWGSC

Date Drilled: 08/05/2006

Site Location: 3rd Bench

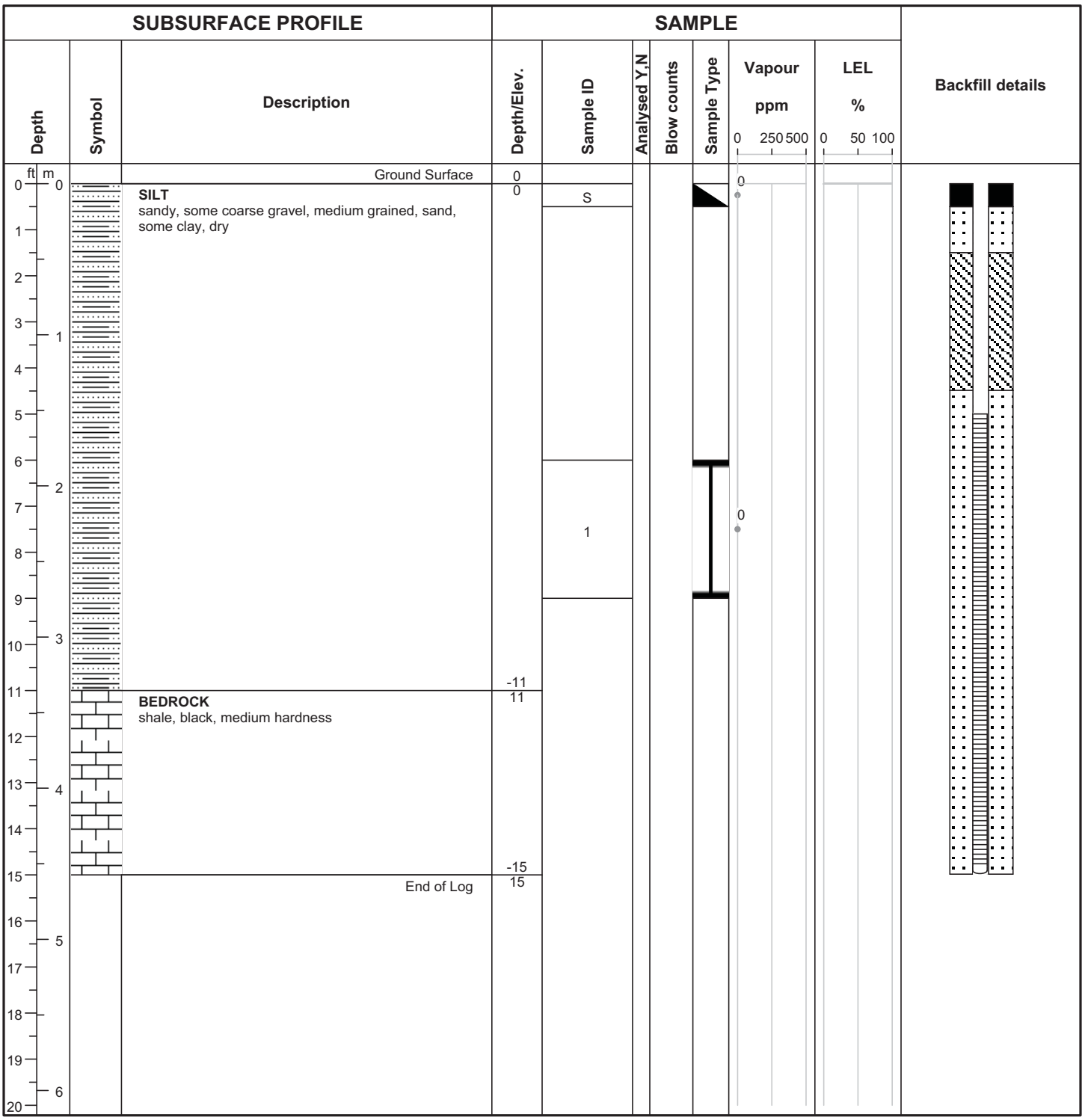
Drilling Company: Uniwide

Drilling Method: Odex

Logged by: STR

HEMMERA

Sheet: 1 of 1



Well location: N 6343572.246, E 518889.115

Depth to water level (TOC): -

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 4.480 m

Well Elevation (TOC): 887.753 masl

Ground Elevation: 887.824 masl

Log of Monitoring Well: MW06-22

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/04/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

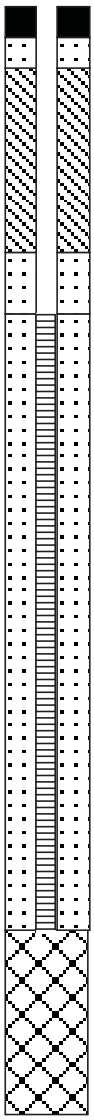
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description
0	0		Ground Surface
0–12	0–3.7		**SILT and CLAY** some gravel, trace cobbles, light brown, 'firm', dry
12–18	3.7–5.5		**BEDROCK** shale, black, dry, brittle
18	5.5		End of Log

SAMPLE

Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0						
0	S				0	
	1				0	
	2				0	
	3				0	
	4				0	
-12						
12						
-18						
18						

Backfill details



Well location: N 6343675.505, E 518834.186

Depth to water level (TOC):

Date of water level:

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 5.643 m

Well Elevation (TOC): 879.688 masl

Ground Elevation: 878.731 masl

Log of Monitoring Well: MW06-23

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/03/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0	0		Ground Surface	0							
			SILT sandy, fine grained, some coarse gravel, some clay, brown,'stiff', dry	0							
					1				15		
					2				0		
					3				15		
					4				5		
			SILT clayey, some gravel, trace cobbles, dark brown,'stiff', dry	-11 11	5				10		
					6				0		
					7/8				5		
20	6										

Well location: N 6343730.740., E 518799.614

Depth to water level (TOC):

Date of water level:

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.376 m

Well Elevation (TOC): 878.480 masl

Ground Elevation: 877.590 masl

Log of Monitoring Well: MW06-23

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/03/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

SUBSURFACE PROFILE			SAMPLE							Backfill details
Depth	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	
21										
22				9				15		
23	7									
24										
25										
26	8									
27										
28										
29										
30	9									
31										
32										
33	10									
34								35		
35				10						
36	11									
37			-38							
38		End of Log	38							
39										
40	12									

Well location: N 6343730.740., E 518799.614

Depth to water level (TOC):

Date of water level:

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.376 m

Well Elevation (TOC): 878.480 masl

Ground Elevation: 877.590 masl

Log of Monitoring Well: MW06-24

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/05/2006

Site Location: 4th Bench

Drilling Company: Uniwide

Drilling Method: Odex

Logged by: STR

HEMMERA

Sheet: 1 of 2

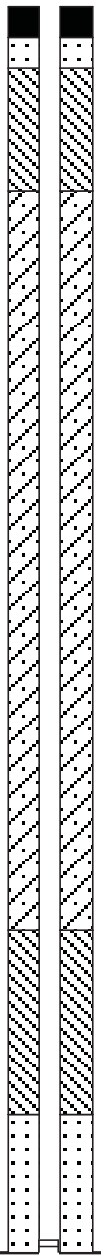
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description
0	0		Ground Surface
			SILT clayey, trace gravel/rock fragments (shale), moist

SAMPLE

Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0 / 0						
	1				0	
	2				0	
	3/4				0	
	5				15	
	6				0	

Backfill details



Well location: N 6343768.385, E 518823.831

Depth to water level (TOC): 7.190 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 9.146 m

Well Elevation (TOC): 878.260 masl

Ground Elevation: 877.310 masl

Log of Monitoring Well: MW06-24

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/05/2006

Site Location: 4th Bench

Drilling Company: Uniwide

Drilling Method: Odex

Logged by: STR

HEMMERA

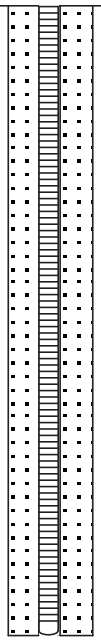
SUBSURFACE PROFILE

Depth	Symbol	Description
7		
8		
9		
10		
11		
12		
-24 / 24		**BEDROCK** shale, black, medium hardness
-30 / 30		End of Log

SAMPLE

Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
	7				0	

Backfill details



Well location: N 6343768.385, E 518823.831

Depth to water level (TOC): 7.190 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 9.146 m

Well Elevation (TOC): 878.260 masl

Ground Elevation: 877.310 masl

Log of Monitoring Well: MW06-25

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/05/2006

Site Location: 4th Bench

Drilling Company: Uniwide

Drilling Method: Odex

Logged by: STR

HEMMERA

Sheet: 1 of 1

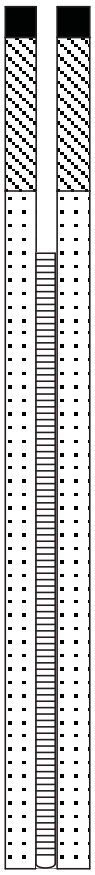
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description
0	0		Ground Surface
			boulders, (rock fragments),
			poor recovery
5	1		**SILT** clayey, some rock fragments (shale), some gravel, dry
13	4		**BEDROCK** shale fragments
14			End of Log
20	6		

SAMPLE

Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0 / 0						
-5 / 5	1/2				0	
-13 / 13	3				0	
-14 / 14						

Backfill details



Well location: N 6343812.428, E 518879.205

Depth to water level (TOC): -

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 5.370 m

Well Elevation (TOC): 876.696 masl

Ground Elevation: 875.728 masl

Log of Monitoring Well: MW06-26

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/03/2006

Site Location: Sikanni, BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

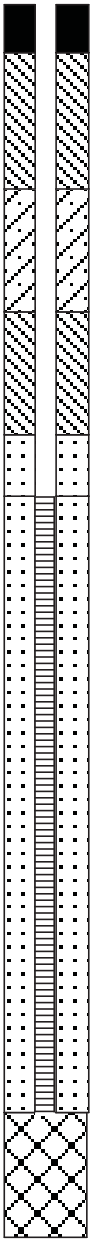
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Depth/Elev.
		Ground Surface	0
0	0	**SILT** clayey, some fine gravel,some sand, trace cobbles, light brown, dry	0
			-6
6	2	**CLAY** some gravel, light brown,'very stiff', moist 'sof't, moist clay from 1.8-2.1m	6
			-7
7	3	**SILT** clayey, trace gravel, light brown,'very stiff', dry	7
			-11
11	4	dry, shale, medium hardness	11
	6		-20
20			20

SAMPLE

Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
1				0	
2				5	
3				5	

Backfill details



Well location: N 6343814.999, E 518935.783

Depth to water level (TOC): -

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.552 m

Well Elevation (TOC): 877.937 masl

Ground Elevation: 876.941 masl

Log of Monitoring Well: MW06-27

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/04/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

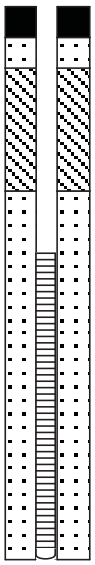
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description
0	0		Ground Surface
0–4	0–1		**SILT** clayey, some coarse sand, light brown,'loose', dry
4–7	1–2		No Recovery, Boulder
7–9	2–3		
9	3		End of Log

SAMPLE

Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0						
0	1	Y			0	
-4						
4						
-7						
7						
-9						
9						

Backfill details



Well location: N 6343771.163, E 518984.170

Depth to water level (TOC): 2.176 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 3.577 m

Well Elevation (TOC): 877.844 masl

Ground Elevation: 876.864 masl

Log of Borehole: BH06-28

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/04/2006

Site Location: Sikanni BC

Logged by: STR

Drilling Method: Solid Stem Auger

Drilling Company: Uniwide

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE				SAMPLE						
Depth (ft / m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)	Backfill details
0 / 0		Ground Surface	0							
0 – 3 / 0 – 1		**SILT and CLAY (FILL)** some gravel, trace cobbles, light brown, dry bedrock at 1.0m	0 -3							
3 – 4 / 1 – 1		Shale	3 -4							
4 / 1		End of Log	4							

Borehole location: MW06-28

Borehole ground elevation: 0

Borehole diameter: MW06-28

Borehole depth: MW06-28

Log of Monitoring Well: MW06-29

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/04/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm	LEL %	Backfill details
0	0		Ground Surface	0							
			SILT and CLAY some gravel, trace cobbles, light brown,'loose',matrix firm, dry	0							
					1				25		
	1										
					2				45		
	2										
					3				5		
			BEDROCK	-9							
	3			9 -10							
10			End of Log	10							
	4										
	5										
	6										
20											

Vapour ppm: 0 250 500

LEL %: 0 50 100

Well location: N 6343675.782, E 518862.882

Depth to water level (TOC): 2.948 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 3.696 m

Well Elevation (TOC): 879.411 masl

Ground Elevation: 878.641 masl

Log of Monitoring Well: MW06-30

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/05/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Description	Depth/Elev.	Sample ID
		Ground Surface	0	
0	0	**SILT** sandy, some gravel, some cobbles, light brown,'medium dense', dry	0	
7	2	**SILT** clayey, trace coarse gravel and cobbles, dark brown,'very stiff', dry	-7 / 7	
14	4	**BEDROCK**	-14 / 14	
18	5	End of Log	-18 / 18	

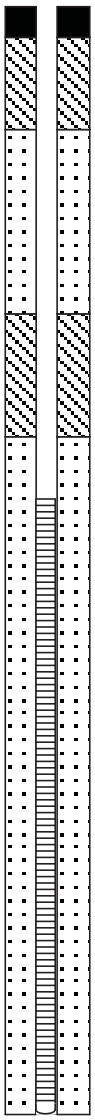
SAMPLE

Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm	LEL %
1				5	
2				5	
3				5	
4				5	
5				5	
6				30	

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details



Well location: N 6343668.183, E 518772.095

Depth to water level (TOC): 4.688 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 6.522 m

Well Elevation (TOC): 879.789 masl

Ground Elevation: 878.786 masl

Log of Monitoring Well: MW06-31

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

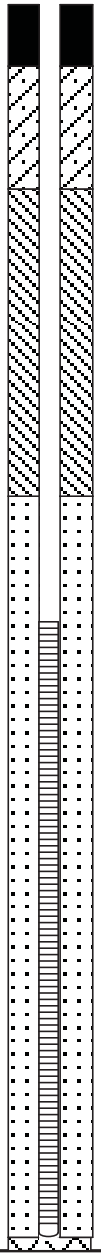
SUBSURFACE PROFILE

Depth (ft)	Depth (m)	Symbol	Description
0	0		Ground Surface
0	0		**SILT and CLAY and GRAVEL (FILL)** subrounded gravel, some cobbles, dry, 'loose'
5	1.5		**SILT and CLAY** some coarse gravel, some sand, 'stiff', dry
13	4		**CLAY** some silt, trace fine gravel, 'very stiff', dry

SAMPLE

Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
0						
0	S	Y			15	
	1				5	
-5						
5	2				5	
	3	Y			90	
-13						
13	4	Y			20	

Backfill details



Well location: N 6343288.392, E 518904.734

Depth to water level (TOC): 4.414 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 5.912 m

Well Elevation (TOC): 899.470 masl

Ground Elevation: 899.574 masl

Log of Monitoring Well: MW06-31

Project Name/No: Sikanni 376-118.03

Client: PWGSC

Date Drilled: 08/06/2006

Site Location: Sikanni BC

Drilling Company: Uniwide

Drilling Method: Solid Stem Auger

Logged by: STR

HEMMERA

SUBSURFACE PROFILE			SAMPLE								Backfill details
Depth	Symbol	Description	Depth/Elev.	Sample ID	Analysed Y,N	Blow counts	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)		
21			-21								
		BEDROCK	21								
22											
23	7										
24											
25			-25								
		End of Log	25								
26	8										
27											
28											
29											
30	9										
31											
32											
33	10										
34											
35											
36	11										
37											
38											
39											
40	12										

Well location: N 6343288.392, E 518904.734

Depth to water level (TOC): 4.414 m

Date of water level: 08/08/2006

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Depth of well (TOC): 5.912 m

Well Elevation (TOC): 899.470 masl

Ground Elevation: 899.574 masl

Log of Monitoring Well: MW07-32

Project Name/No: Sikanni/376-118.07

Client: PWGSC

Date Drilled: 9/12/2007

Site Location: Sikanni, BC

Drilling Company: Carbon Mountain & Peace Drilling

Drilling Method: Air Rotary

Logged by: SK

HEMMERA

Sheet: 1 of 1

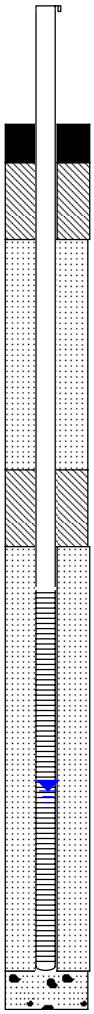
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	894.23
0 / 0		**SAND and GRAVEL** sand (fine to coarse grained) and gravel (fine to coarse, subrounded), trace silt, grey to olive-grey, boulders and cobbles encountered, loose, dry, well graded, no odour, no staining	0.00
4 / 1			893.01
		SAND sand (fine to coarse grained), some gravel (fine, subrounded), some silt, grey, loose, dry, medium graded, boulders and cobbles encountered, no odour, no staining	1.22
20 / 6			888.13
		BEDROCK shale, grey	6.10
23 / 7			887.22
		End of Log	7.01

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
1	Y		10	
2	N		0	
3	N		0	
4	Y		0	

Backfill details



Well location: N 6343454.07, E 518941.63

Depth to water level (TOC): 6.175 m

Date of water level: 9/14/2007

Borehole diameter: 0.23 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 3.65 to 6.65 m

Depth of well (TOC): 7.62 m

Well Elevation (TOC): 895.25 masl

Ground Elevation: 894.23 masl

Log of Monitoring Well: MW07-33

Project Name/No: Sikanni/376-118.07

Client: PWGSC

Date Drilled: 9/13/2007

Site Location: Sikanni, BC

Drilling Company: Carbon Mountain & Peace Drilling

Drilling Method: Air Rotary

Logged by: SK

HEMMERA

Sheet: 1 of 1

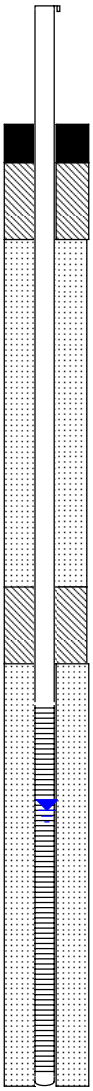
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	893.87
0 / 0		**SAND and GRAVEL** sand (fine to coarse grained) and gravel (fine to coarse, subrounded), trace silt, grey to olive-grey, boulders and cobbles encountered, loose, dry, well graded, weak hydrocarbon odour, no staining	0.00
3 / 1		**SAND** sand (fine to medium grained), some gravel (fine, subrounded), some silt, grey to olive-grey, loose, dry, medium graded, boulders and cobbles encountered, no odour, no staining	892.96 0.91
23 / 7		**BEDROCK** shale, grey	886.86 7.01
25 / 8		End of Log	886.25 7.62

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
1	Y		200	
2	N		0	
3	N			
4	N		0	
5	N		0	
6	Y		0	

Backfill details



Well location: N 6343454.09, E 518948.84

Depth to water level (TOC): 6.345 m

Date of water level: 9/14/2007

Borehole diameter: 0.23 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 4.6 to 7.6 m

Depth of well (TOC): 8.53 m

Well Elevation (TOC): 894.83 masl

Ground Elevation: 893.87 masl

Log of Monitoring Well: MW07-34

Project Name/No: Sikanni 376-118.07

Client: PWGSC

Date Drilled: 9/11/2007

Site Location: Sikanni BC

Drilling Company: Peace Drilling

Drilling Method: Air Rotary

Logged by: SK

HEMMERA

Sheet: 1 of 1

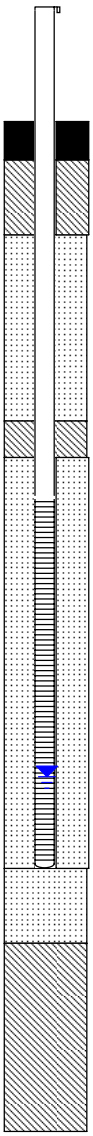
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
		Ground Surface	888.65
0 / 0		**SAND and GRAVEL** sand (fine to coarse grained) and gravel (fine to coarse, subrounded), trace silt, olive-grey, cobbles encountered, loose, dry, well graded, no odour, no staining	0.00
7 / 2			886.52
		SAND sand (fine to medium grained), some silt, trace gravel (fine, subrounded),brown to olive-brown, loose, dry, medium graded, no odour, no staining	2.13
17 / 5			883.47
		BEDROCK bedrock (shale), grey	5.18
27 / 8			880.42
		End of Log	8.23

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
1	Y		25	
2	N		5	
3	N		5	
4	Y		10	

Backfill details



Well location: N 6343514.67, E 518979.16

Depth to water level (TOC): 6.280 m

Date of water level: 9/14/2007

Borehole diameter: 0.15 m

Well casing diameter: 0.05 m

Well casing material: PVC

Well screen slot size: 0.025 cm

Well screen interval (bgs): 3.05 to 6.096 m

Depth of well (TOC): 7.01 m

Well Elevation (TOC): 889.61 masl

Ground Elevation: 888.65 masl

Log of Test Pit: TP07-229

Project Name/No: Sikanni/376-118.07

Client: PWGSC

Date Excavated: 9/13/2007

Site Location: Sikanni, BC

Logged by: SK

Excavation Method: Excavator

Contractor: La Prairie Group Contractors

HEMMERA

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	889.52						
0 / 0		**SAND and GRAVEL** sand (fine to coarse grained) and gravel (fine to coarse, subrounded), trace silt, grey to olive-grey, boulders and cobbles encountered, loose, well graded, no odour, no staining	0.00	1	Y	G	0		
2									
3 / 1				2	N	G	0		
5				3	N	G	0		
6 / 2									
7				4	Y	G	5		
8									
		BEDROCK bedrock (shale), grey	886.82 2.70						
9		End of Log							
10 / 3									
11									
12									
13 / 4									
14									
15									
16 / 5									

Test Pit location: N 6343507.87, E 518962.90

Test Pit depth: 2.7 m

Test Pit ground elevation: 889.520 masl

Log of Test Pit: TP07-230

Project Name/No: Sikanni/376-118.07

Client: PWGSC

Date Excavated: 9/13/2007

Site Location: Sikanni, BC

Logged by: SK

Excavation Method: Excavator

Contractor: La Prairie Group Contractors

HEMMERA

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	888.97						
0 / 0		**SAND** sand (fine to coarse grained), trace to some gravel (fine, subrounded), trace silt, brown to olive-grey, loose, dry to wet (water encountered at 2.4 m), medium to poorly graded, cobbles encountered, no odour, no staining, asphalt debris encountered at 1.0 m	0.00	1	Y	G	10		
2									
3 / 1				2	N	G	5		
5				3	N	G	0		
6 / 2									
7				4	Y	G	0		
8		**BEDROCK** bedrock (shale), grey	886.57 2.40						
		End of Log							
10 / 3									
11									
12									
13 / 4									
14									
15									
16 / 5									

Test Pit location: N 6343505.29, E 518987.57

Test Pit depth: 2.4 m

Test Pit ground elevation: 888.970 masl

Log of Test Pit: TP07-231

Project Name/No: Sikanni/376-118.07

Client: PWGSC

Date Excavated: 9/13/2007

Site Location: Sikanni, BC

Logged by: SK

Excavation Method: Excavator

Contractor: La Prairie Group Contractors

HEMMERA

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	891.23						
0 / 0		**SAND** sand (fine to medium grained), trace gravel (fine, subrounded), trace silt, brown to dark brown, loose, dry to moist, poorly graded, cobbles encountered, no odour, no staining	0.00	1	Y	GJ	0		
			890.63						
2		**BEDROCK** bedrock (shale), grey	0.60						
		End of Log							

1 / 2 / 3 / 4 / 5

Test Pit location: N 6343475.32, E 518952.43

Test Pit depth: 0.6 m

Test Pit ground elevation: 891.230 masl

Log of Borehole: BH10-41

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

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
0 / 0		Ground Surface	0.00						
		CONCRETE	0.00 -0.17						CONCRETE
		SILT AND GRAVEL Silt sandy and fine to coarse, subangular to subrounded gravel, dark grey, soft, moist to wet, strong hydrocarbon odour	0.17	1	Y		200		SOIL CUTTINGS
3 / 1				2	Y		150		
4		**SHALE**	-1.22 1.22						BENTONITE
5 / 2		End of Log	-1.52 1.52						
10 / 3									

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: BH10-42

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

Sheet: 1 of 1

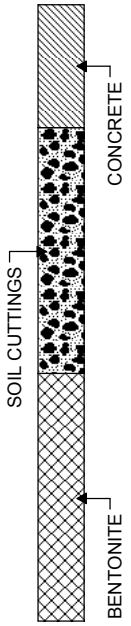
SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
0 / 0		Ground Surface	0.00
		CONCRETE	0.00 -0.17
1 /		**GRAVEL AND SAND** Gravel fine, subangular to subrounded and fine to coarse grained sand, some silt, dark grey to brownish grey, loose, homogeneous, dry to moist Dense below 1.0 m	0.17
3 / 1			-1.22
4		**SHALE**	1.22
5 /			-1.52
		End of Log	1.52
6 / 2			
7			
8			
9 / 3			
10			

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
1	Y		5	
2	Y		0	

Backfill details



Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: BH10-43

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
0 / 0		Ground Surface	0.00
		CONCRETE	0.00 / -0.17
		GRAVEL AND SAND Gravel fine, subangular to subrounded and fine to coarse grained sand, some silt, dark grey, loose, well graded, dry to moist, hydrocarbon odour	0.17 / -1.22
		SHALE	1.22 / -1.52
		End of Log	1.52

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm	LEL %
1	Y		100	
2	Y		210	

Vapour ppm: 0 250 500

LEL %: 0 50 100

Backfill details

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: BH10-44

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

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						
0 / 0		**CONCRETE**	0.00 -0.17						
		GRAVEL AND SAND Gravel fine, subangular to subrounded and fine to coarse grained sand, some silt, dark grey, loose, well graded, dry to moist, hydrocarbon odour	0.17						
4 / 1		**SHALE**	-1.22 1.22						
5		End of Log	-1.52 1.52						

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: BH10-45

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

Sheet: 1 of 1

SUBSURFACE PROFILE

Depth (ft / m)	Symbol	Description	Depth/Elev (m)
0 / 0		Ground Surface	0.00
		CONCRETE	0.00 -0.17
		GRAVEL AND SAND Gravel fine, subangular to subrounded and fine to coarse grained sand, some silt, dark grey, loose, well graded, dry to moist, hydrocarbon odour	0.17
4 / 1			-1.22
		SHALE	1.22
5			-1.52
		End of Log	1.52

SAMPLE

Sample ID	Analysed Y,N	Sample Type	Vapour ppm (0 250 500)	LEL % (0 50 100)
1	Y		75	
2	Y		60	

Backfill details: CONCRETE; SOIL CUTTINGS; BENTONITE

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: BH10-46

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

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
0 / 0		Ground Surface	0.00						
		CONCRETE	0.00 -0.17						CONCRETE
		GRAVEL AND SAND Gravel fine, subangular to subrounded and fine to coarse grained sand, some silt, dark grey, loose, well graded, dry to moist	0.17	1	Y		25		SOIL CUTTINGS
1 / 2				2	Y		35		
3 / 1			-1.22						BENTONITE
4		**SHALE**	1.22						
5 / 2			-1.52						
		End of Log	1.52						
6									
7									
8 / 3									
9									
10									

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: BH10-47

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

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						
0 / 0		**CONCRETE**	0.00 -0.17						
		GRAVEL AND SAND Gravel fine, subangular to subrounded and fine to coarse grained sand, some silt, dark grey, loose, well graded, dry to moist	0.17	1	Y		15		
4 / 1			-1.22						
		SHALE	1.22						
5			-1.52						
		End of Log	1.52						
10 / 3									

Backfill details: CONCRETE; SOIL CUTTINGS; BENTONITE

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.5 m

Log of Borehole: SV10-1

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

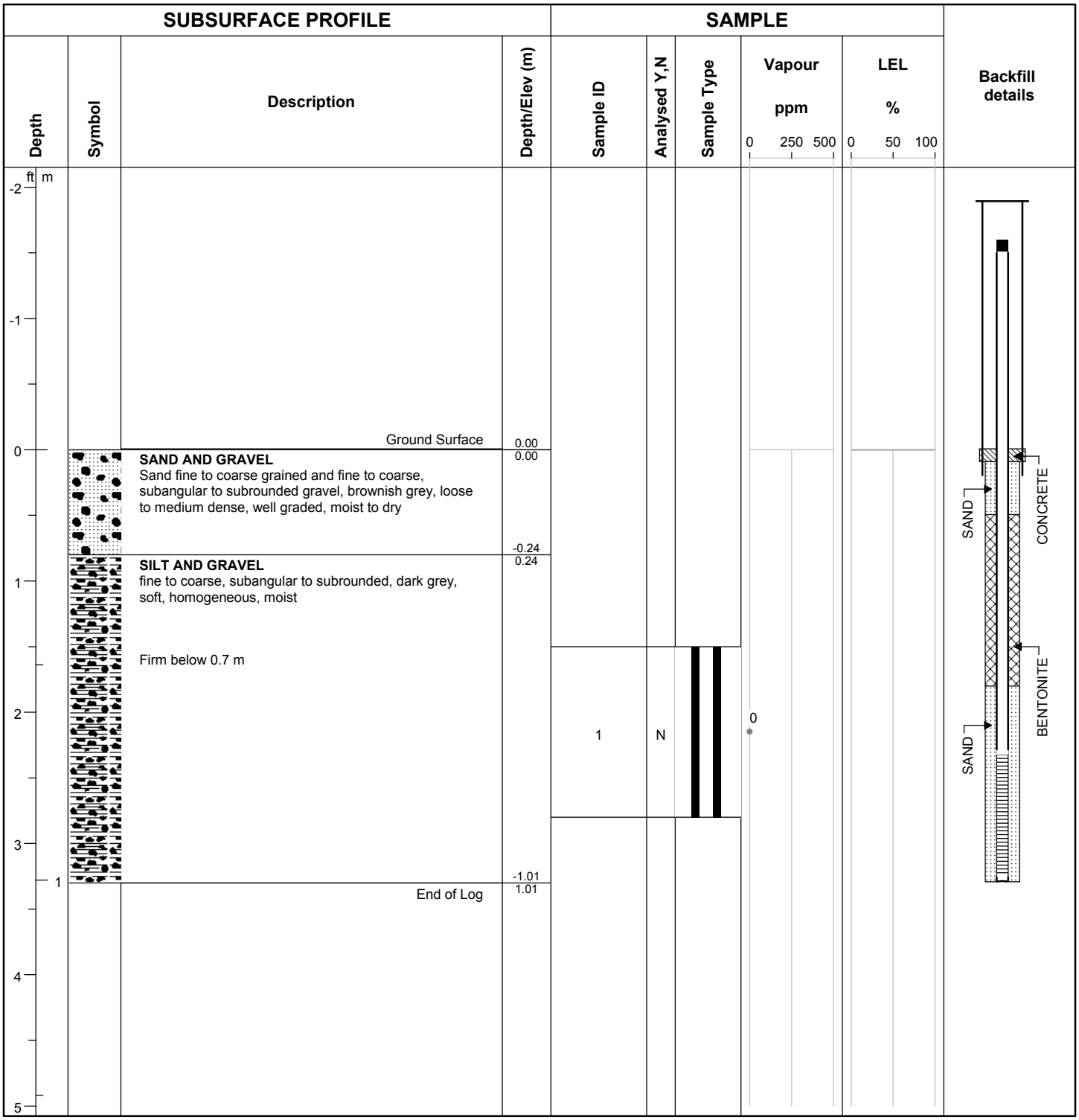
Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

Sheet: 1 of 1



Borehole location: West of the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.0 m

Log of Borehole: SV10-11

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: October 27, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

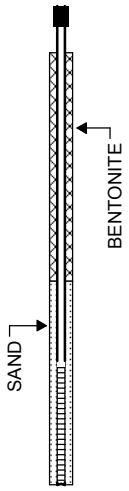
Drilling Method: Hitachi Demolition Hammer Drill

Drilling Company: N/A

HEMMERA

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
0 / 0		Ground Surface	0.00						
		CONCRETE	0.00						
			-0.15						
		GRAVEL AND SAND	0.15						
1 /									
			-0.53						
		End of Log	0.53						
2 /									
3 / 1									
4 /									



Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 2.5 cm

Borehole depth: 0.5 m

Log of Borehole: SV10-12

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: October 27, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

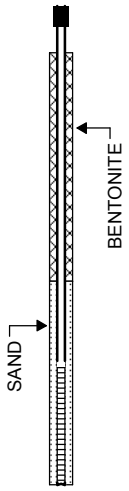
Drilling Method: Hitachi Demolition Hammer Drill

Drilling Company: N/A

HEMMERA

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
0 / 0		Ground Surface	0.00						
		CONCRETE	0.00						
			-0.15						
		GRAVEL AND SAND	0.15						
1 /									
			-0.53						
		End of Log	0.53						
2 /									
3 / 1									
4 /									



Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 2.5 cm

Borehole depth: 0.5 m

Log of Borehole: SV10-2

Project Name/No: 376-118.12

Client: Public Work and Government Services Canada

Date Drilled: August 16, 2010

Site Location: Alaska Highway, Km 254

Logged by: Andrei Novikov

Drilling Method: Solid Stem Auger

Drilling Company: Sharp Environmental

HEMMERA

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						
		GRAVEL AND SAND Gravel fine, subangular to subrounded and sand silty, grey to brownish grey, loose, moist to dry	0.00	1	N		25		
		End of Log	-1.01 1.01						

Backfill details: SAND; CONCRETE; BENTONITE; SAND

Borehole location: Inside the Maintenance Garage

Borehole ground elevation: n/a

Borehole diameter: 10.2 cm

Borehole depth: 1.0 m

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling	
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator	
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket	
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-01**				**LOGGED BY:**	Andrei Novikov	
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**		
	0.0	**SAND AND GRAVEL**						Backfilled after sampling		
	0.1							GS = grab sample		
	0.2									
	0.3									
	0.4									
	0.5	**SAND AND GRAVEL AND COBBLES**								
	0.6	Sand fine to coarse grained, and fine to coarse,								
	0.7	subrounded and subangular gravel, and cobbles,								
	0.8	some silt, greyish-brown, loose, poorly graded, dry to								
	0.9	moist, wood debris present.								
	1.0									
	1.1									
	1.2									
	1.3									
	1.4									
0	1.5					TP11-01.1	GS	TP11-01.1 collected @ 1.40 - 1.50 m bgs		
		End of Test Pit @ 1.5 m bgs								
CLIENT:		PWGSC								

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-02**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**TOP SOIL**						Backfilled after sampling	
	0.1							GS = grab sample	
	0.2	**SAND AND GRAVEL AND COBBLES**							
	0.3	Sand fine to coarse grained, and fine to coarse,							
	0.4	subrounded to subangular gravel, and cobbles, greyish-							
	0.5	brown, loose, poorly graded, mottled, pockets of different							
	0.6	colours, dry to moist, rootlets.							
	0.7								
	0.8								
	0.9								
0	1.0					TP11-02.1	GS	TP11-02.1 collected @ 0.90 - 1.00 m bgs	
		End of Test Pit @ 1.0 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-03**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**GRAVEL AND COBBLES**						Backfilled after sampling	
	0.1	Gravel fine to coarse, subrounded to subangular, some						GS = grab sample	
	0.2	sand, some silt, greyish-brown, loose, poorly graded,							
	0.3	blocky, dry to moist, rusty pockets.							
	0.4								
0	0.5					TP11-03.1	GS	TP11-03.1 collected @ 0.50 - 0.60 m bgs	
	0.6								
	0.7								
	0.8								
	0.9								
	1.0								
	1.1								
	1.2								
	1.3								
	1.4	Water seepage at 1.4 m bgs, visible sheen on water.							
	1.5								
	1.6								
	1.7								
	1.8								
	1.9								
	2.0								
	2.1								
	2.2								
	2.3								
	2.4								
	2.5								
	2.6								
	2.7								
	2.8								
	2.9								
	3.0								
	3.1	**SHALE**							
	3.2								
	3.3								
	3.4								
	3.5								
	3.6								
	3.7								
	3.8								
	3.9	**SHALE AND CLAY**							
	4.0	Dark grey, stiff homogeneous							
10	4.1					TP11-03.2	GS	TP11-03.2 collected @ 4.00 - 4.10 m bgs	
		End of Test Pit @ 4.1 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-04**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL**						Backfilled after sampling	
	0.1							GS = grab sample	
	0.2	**SAND AND GRAVEL AND COBBLES**							
	0.3	Sand-silty, and fine to coarse, subrounded to subangular							
	0.4	gravel, and cobbles, greyish-brown, loose, poorly graded,							
	0.5	mottled, moist, waste debris (likely fill).							
	0.6								
	0.7								
	0.8								
	0.9								
0	1.0					TP11-04.1	GS	TP11-04.1 collected @ 0.90 - 1.00 m bgs	
		End of Test Pit @ 1.0 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-05**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL**						Backfilled after sampling	
	0.1							GS = grab sample	
	0.2								
	0.3								
	0.4								
	0.5	**SAND AND GRAVEL AND COBBLES**							
	0.6	Sand fine to coarse grained, and fine to coarse,							
	0.7	subrounded and subangular gravel, and cobbles,							
	0.8	trace silt, dark grey, loose, poorly graded,							
	0.9	homogeneous, moist.							
	1.0								
	1.1								
	1.2								
	1.3								
	1.4								
0	1.5					TP11-05.1	GS	TP11-05.1 collected @ 1.40 - 1.50 m bgs	
		End of Test Pit @ 1.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-06**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL AND COBBLES**						Backfilled after sampling	
	0.1	Sand fine to coarse grained, and fine to coarse,						GS = grab sample	
	0.2	subrounded to subangular gravel, and cobbles, some							
	0.3	silt, greyish-brown, loose, poorly graded, dry to moist.							
	0.4								
0	0.5					TP11-06.1	GS	TP11-06.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		Transport Canada							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-07**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**TOP SOIL**						Backfilled after sampling	
	0.1							GS = grab sample	
	0.2	**SAND AND GRAVEL AND COBBLES**							
	0.3	Sand fine to coarse grained, and fine to coarse, subrounded to subangular gravel, and cobbles, greyish-brown, loose, poorly graded, dry.							
	0.4								
0	0.5					TP11-07.1	GS	TP11-07.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-08**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SILT**						Backfilled after sampling	
	0.1	Clayey, some fine sand, brownish-grey, soft,						GS = grab sample	
	0.2	homogeneous, moist.							
	0.3								
	0.4								
0	0.5					TP11-08.1	GS	TP11-08.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-09**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SILT**						Backfilled after sampling	
	0.1	Clayey, some fine sand, some fine to coarse,						GS = grab sample	
	0.2	subrounded to subangular gravel, some cobbles,							
	0.3	brownish-grey, soft, homogeneous, moist.							
	0.4								
0	0.5					TP11-09.1	GS	TP11-09.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-10**					Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SILT AND GRAVEL**						Backfilled after sampling	
	0.1	Silt sandy and fine to coarse, subrounded to subangular						GS = grab sample	
	0.2	gravel, some cobbles, brownish-grey, soft to firm,							
	0.3	blocky, mottled, dry to moist.							
	0.4								
0	0.5					TP11-10.1	GS	TP11-10.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 26, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-11**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL**						Backfilled after sampling	
	0.1	Road mix						GS = grab sample	
	0.2								
	0.3								
	0.4								
	0.5	**SILT**							
	0.6	Sandy and fine to coarse, subrounded to subangular							
	0.7	gravel, some cobbles, brownish-grey, loose, poorly							
	0.8	graded, moist.							
	0.9								
0	1.0					TP11-11.1	GS	TP11-11.1 collected @ 1.00 - 1.10 m bgs	
	1.1								
	1.2								
	1.3								
	1.4								
	1.5								
	1.6								
	1.7								
	1.8								
	1.9								
	2.0								
	2.1								
	2.2								
	2.3								
	2.4								
	2.5	Blocky, mottled							
0	2.6					TP11-11.2	GS	TP11-11.2 collected @ 2.50 - 2.60 m bgs	
		End of Test Pit @ 2.6 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 26, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-12**				**LOGGED BY:**	Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL**						Backfilled after sampling	
	0.1	Road mix						GS = grab sample	
	0.2								
	0.3								
	0.4								
	0.5	**SILT**							
	0.6	Sandy and fine to coarse, subrounded to subangular							
	0.7	gravel, some cobbles, brownish-grey, firm, blocky,							
	0.8	mottled, dry to moist.							
	0.9								
0	1.0					TP11-12.1	GS	TP11-12.1 collected @ 1.00 - 1.10 m bgs	
	1.1								
	1.2								
	1.3								
	1.4								
	1.5	Increasing cobbles content below 1.5 m bgs.							
	1.6								
	1.7								
	1.8								
	1.9								
0	2.0					TP11-12.2	GS	TP11-12.2 collected @ 1.90 - 2.00 m bgs	
		End of Test Pit @ 2.0 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintenance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-13**					Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL**						Backfilled after sampling	
	0.1	Sand medium to coarse grained, and fine to coarse,						GS = grab sample	
	0.2	subrounded to subangular gravel, some cobbles, grey,							
	0.3	loose, mottled, moist, voids between large (>0.5 cm). soil							
	0.4	particles going downward							
0	0.5					TP11-13.1	GS	TP11-13.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	Envirowest Drilling
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator
EXCAVATION DATE:		September 27, 2011						**SAMPLING METHOD:**	Grab/ From bucket
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-14**					Andrei Novikov
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**	
	0.0	**SAND AND GRAVEL AND COBBLES**						Backfilled after sampling	
	0.1	Sand medium to coarse grained, and fine to coarse,						GS = grab sample	
	0.2	subrounded to subangular gravel, and cobbles, grey, loose,							
	0.3	mottled, moist, voids between large (>0.5 cm).soil particles							
	0.4	going downward							
0	0.5					TP11-14.1	GS	TP11-14.1 collected @ 0.40 - 0.50 m bgs	
		End of Test Pit @ 0.5 m bgs							
CLIENT:		PWGSC							

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.			
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator			
EXCAVATION DATE:		December 19, 2011						**SAMPLING METHOD:**	Grab/ From bucket			
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-15**					Andrew Bannon			
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**				
	0.0	**ROAD BASE**						Backfilled after sampling				
	0.1	Sand and gravel, grey, dry, very compact, frozen						GS = grab sample				
	0.2	**GRAVEL**										
0	0.3	Crushed gravel, some sand and silt, grey, dry,				TP11-15-1	GS	TP11-15-1 collected @ 0.30 - 0.40 m bgs				
	0.4	frozen										
	0.5											
	0.6	**SAND AND GRAVEL AND COBBLES**										
5	0.7	Sand and gravel (subrounded to subangular) and				TP11-15-2	GS	TP11-15-2 collected @ 0.70 - 0.80 m bgs				
	0.8	cobbles, some silt, grey to brown, dry, frozen										
	0.9											
0	1.0					TP11-15-3	GS	TP11-15-3 collected @ 1.0 - 1.1 m bgs				
	1.1											
	1.2											
		End of Test Pit @ 1.2 m bgs										
CLIENT:		PWGSC										

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 19, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-16**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel, grey, dry, very compact, frozen						GS = grab sample			
	0.2							Frost to approximated 1 m bgs.			
	0.3										
0	0.4					TP11-16-1	GS	TP11-16-1 collected @ 0.40 - 0.50 m bgs			
	0.5	**GRAVEL**									
	0.6	Crushed gravel, trace to some sand (medium grained) and silt, grey, dry, poorly graded									
	0.7										
10	0.8	**SILT**				TP11-16-2	GS	TP11-16-2 collected @ 0.80 - 0.90 m bgs			
	0.9	Silt, brown to dark brown, sandy, trace to some cobbles and gravel, poorly graded									
	1.0										
	1.1										
	1.2										
	1.3										
5	1.4					TP11-16-3	GS	TP11-16-3 collected @ 1.4 - 1.5 m bgs			
	1.5										
	1.6										
		End of Test Pit @ 1.6 m bgs									
CLIENT:		PWGSC									

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-17**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel, grey, dry, very compact, well graded, frozen						GS = grab sample			
	0.2										
5	0.3					TP11-17-1	GS	TP11-17-1 collected @ 0.30 - 0.40 m bgs			
	0.4										
	0.5										
	0.6										
	0.7										
5	0.8	**SAND AND GRAVEL AND COBBLES**				TP11-17-2	GS	TP11-17-2 collected @ 0.80 - 0.90 m bgs			
	0.9	Sand and gravel and cobbles, some silt, brown-grey, poorly graded, trace wood chips, frozen									
		End of Test Pit @ 0.95 m bgs									
CLIENT:		PWGSC									

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-18**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel, some boulders, grey,						GS = grab sample			
	0.2	dry, very compact, frozen						Frost to approximated 1 m bgs.			
	0.3										
0	0.4										
	0.5					TP11-18-1	GS	TP11-18-1 collected @ 0.50 - 0.60 m bgs			
	0.6										
	0.7										
	0.8	**SILT**									
	0.9	Silt, brown, some gravel and cobbles									
10	1.0	(subrounded to subangular), moist				TP11-18-2	GS	TP11-18-2 collected @ 1.0 - 1.1 m bgs			
	1.1										
	1.2										
	1.3										
15	1.4					TP11-18-3	GS	TP11-18-3 collected @ 1.4 - 1.5 m bgs			
	1.5										
	1.6										
		End of Test Pit @ 1.6 m bgs									
CLIENT:		PWGSC									

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-19**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel, some boulders, grey, dry, very compact, frozen						GS = grab sample			
	0.2										
5	0.3	**SAND AND GRAVEL AND COBBLES**									
	0.4	Sand and gravel and cobbles, some boulders, (up to 0.5 m), trace to some silt				TP11-19-1	GS	TP11-19-1 collected @ 0.40 - 0.50 m bgs			
	0.5										
	0.6										
	0.7										
	0.8	**SILT**									
	0.9	Silt, brown, some gravel and cobbles (subrounded to subangular), moist, some boulders (orange shale)									
5	1.0					TP11-19-2	GS	TP11-19-2 collected @ 1.0 - 1.1 m bgs			
	1.1										
	1.2										
	1.3										
0	1.4					TP11-19-3	GS	TP11-19-3 collected @ 1.4 - 1.5 m bgs			
	1.5										
		End of Test Pit @ 1.5 m bgs									
CLIENT:		PWGSC									

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-20**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel (fill), trace silt, well graded						GS = grab sample			
	0.2										
5	0.3										
	0.4					TP11-20-1	GS	TP11-20-1 collected @ 0.40 - 0.50 m bgs			
	0.5										
	0.6										
	0.7										
	0.8										
	0.9										
10	1.0					TP11-20-2	GS	TP11-20-2 collected @ 1.0 - 1.1 m bgs			
	1.1										
	1.2	**SILT**									
15	1.3	Silt, brown, some sand and gravel, trace cobbles, moist				TP11-20-3	GS	TP11-20-3 collected @ 1.3 - 1.4 m bgs			
	1.4										
	1.5										
		End of Test Pit @ 1.5 m bgs									
CLIENT:		PWGSC									

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-21**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel (fill), trace silt, well graded, very compact, frozen, refusal at 0.4 m						GS = grab sample			
	0.2										
5	0.3					TP11-21-1	GS	TP11-21-1 collected @ 0.30 - 0.40 m bgs			
	0.4										
		End of Test Pit @ 0.4 m bgs									
CLIENT:		PWGSC									

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.			
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator			
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket			
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-22**					Andrew Bannon			
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**				
	0.0	**SAND AND GRAVEL AND COBBLES**						Backfilled after sampling				
	0.1	Sand and gravel and cobbles, fine to coarse,						GS = grab sample				
	0.2	grey to brown, trace silt, trace wood, trace										
0	0.3	pieces of slate				TP11-22-1	GS	TP11-22-1 collected @ 0.30 - 0.40 m bgs				
	0.4											
	0.5											
	0.6											
	0.7											
10	0.8					TP11-22-2	GS	TP11-22-2 collected @ 0.80 - 0.90 m bgs				
	0.9											
	1.0											
		End of Test Pit @ 1.0 m bgs										
CLIENT:		PWGSC										

PROJECT:		Alaska Hwy Maintanance Sites	**TEST PIT FIELD LOG**					**CONTRACTOR:**	La Prairie Group Contracting Ltd.		
PROJECT NO.:		376-118.16						**EXCAVATION METHOD:**	Track Excavator		
EXCAVATION DATE:		December 20, 2011						**SAMPLING METHOD:**	Grab/ From bucket		
LOCATION:		Sikanni	**TEST PIT ID:**	**TP11-23**					Andrew Bannon		
VAPOUR LEVEL (PPM)	**Depth (m)**	**SOIL DESCRIPTION**				**SAMPLE #**	**TYPE**	**REMARKS**			
	0.0	**ROAD BASE**						Backfilled after sampling			
	0.1	Sand and gravel (fill), well graded						GS = grab sample			
	0.2										
	0.3										
10	0.4					TP11-23-1	GS	TP11-23-1 collected @ 0.40 - 0.50 m bgs			
	0.5										
		End of Test Pit @ 0.5 m bgs									
CLIENT:		PWGSC									

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-01**
SURFACE ELEVATION: **888.82 m**
UTM COORDINATES: **6343493.656 N** **518952.272 E**

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface	1 10 100 1000 10000			steel casing, stickup, jplug	889
0				**GRAVEL** sandy, some silt, occasional cobbles, loose, firm, non-plastic, no staining, brown/grey, moist				cement silica sand	
1		S1			220				888
		S2		**SILT** clayey, trace gravel, compact, firm to hard, low plastic, no staining, dry to moist (till)	1950			bentonite seal	
2		S3		**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, dry to moist	185				887
3		S4			200			50 mm 010 slot PVC pipe GW = 3.43 mbg (Nov 3, 2013)	886
4		S5			165			endcap	885
				End of borehole at 4.1 m Well Completion Details: Screened interval from 2.6 m to 4.1 m below surface Elevation at top of casing (TOC) = 889.665 m Groundwater Information: Depth to groundwater from TOC = 4.27 m (Nov 3, 2013) Drilled by Mud Bay				

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: MW13-02S
SURFACE ELEVATION: 894.36 m
UTM COORDINATES 6343403.18 N 518955.424 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
								steel casing, stickup, jplug	895
0				Ground Surface					
				GRAVEL sandy, some silt, occasional cobbles, loose, non-plastic, no staining, grey/brown, moist				cement	894
								silica sand	
1				**SILT** clayey, trace to some gravel, compact, firm, low plastic, iron oxidation, moist (till)					893
2								bentonite seal	892
3							▼	GW = 2.97 mbg (Nov 3, 2013)	891
4								50 mm 010 slot PVC pipe	890
5				**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry				endcap	

End of borehole at 5.2 m

Well Completion Details:
Screened interval from 3.4 m to 4.9 m below surface
Elevation at top of casing (TOC) = 895.339 m

Groundwater Information:
Depth to groundwater from TOC = 3.95 m (Nov 3, 2013)

Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes:

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-02D**
UTM COORDINATES 6343403.991 N 518955.927 E
SURFACE ELEVATION: 894.39 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface	1 10 100 1000 10000			steel casing, stickup, jplug	895
0				**GRAVEL** sandy, some silt, occasional cobbles, loose, non-plastic, no staining, grey/brown, moist				silica sand	894
1		S1		**SILT** clayey, trace to some gravel, compact, firm, low plastic, iron oxidation, moist (till)	230				893
2		S2			220				892
3		S3			270			bentonite seal	891
4									890
5		S4		**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry	180			GW = 4.86 mbg (Nov 3, 2013)	889
6		S5			165			50 mm 010 slot PVC pipe	888
7								endcap	

End of borehole at 7.3 m

Well Completion Details:
Screened interval from 5.8 m to 7.3 m below surface
Elevation at top of casing (TOC) = 895.306 m

Groundwater Information:
Depth to groundwater from TOC = 5.78 m (Nov 3, 2013)

Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-03S**
SURFACE ELEVATION: **888.09 m**
UTM COORDINATES: 6343528.335 N, 518985.348 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
								steel casing, stickup, jplug	
0				Ground Surface					
0				**GRAVEL** sandy, some silt, occasional cobbles, loose, firm, non-plastic, no staining, grey/brown, moist to dry				cement silica sand	888
1				**SILT** clayey, some gravel, compact, firm, low plastic, no staining, iron oxidation, moist (till)				bentonite seal	887
2								50 mm 010 slot PVC pipe	886
3				**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry				endcap	885

End of borehole at 3.4 m

Well Completion Details:
Screened interval from 1.8 m to 3.1 m below surface
Elevation at top of casing (TOC) = 888.992 m

Well was dry on November 3, 2013.
Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes:

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-03D**
UTM COORDINATES 6343528.894 N 518984.643 E
SURFACE ELEVATION: 888.06 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface				steel casing, stickup, jplug	
0				**GRAVEL** sandy, some silt, occasional cobbles, loose, firm, non-plastic, no staining, grey/brown, moist to dry				cement silica sand	888
1		S1		**SILT** clayey, some gravel, compact, firm, low plastic, no staining, moist (till)	290				887
2								bentonite seal	886
3		S2		**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry	280				885
4		S3			240				884
5				becomes more competent (very hard) @ 5.15m - solid discs less competent below 5.3m				50 mm 010 slot PVC pipe	883
		S4			210			endcap	
				End of borehole at 5.8 m Well Completion Details: Screened interval from 4.3 m to 5.8 m below surface Elevation at top of casing (TOC) = 888.925 m Well was dry on November 3, 2013. Drilled by Mud Bay					

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-04**
SURFACE ELEVATION: **894.56 m**
UTM COORDINATES: **6343430.404 N** **518920.232 E**

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
					1 10 100 1000 10000			steel casing, stickup, jplug	895
				Ground Surface					
0				**GRAVEL and COBBLES** sandy, some silt, loose, non-plastic, no staining, brown, dry				cement	
								silica sand	894
1		S1		**SILT** clayey, some sand, trace gravel, compact, firm, low plasticity, no staining, iron oxidation, brown, moist to dry (till)	210				
								bentonite seal	893
2		S2			400		▼	GW = 2.19 mbg (Nov 3, 2013)	
									892
3									
		S3			230				891
4								50 mm 010 slot PVC pipe	
		S4		wet to moist at 4.1 - 4.3m, dark grey, moist to dry	170				890
				MUDSTONE weathered, silty, some clay, dense, hard, low plasticity, no staining, dark grey, moist to dry				endcap	
5		S5			125			bentonite seal	

End of borehole at 5.2 m

Well Completion Details:
Screened interval from 3.2 m to 4.7 m below surface
Elevation at top of casing (TOC) = 895.419 m

Groundwater Information:
Depth to groundwater from TOC = 3.06 m (Nov 3, 2013)

Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 9, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: MW13-05S
SURFACE ELEVATION: 894.21 m
UTM COORDINATES 6343467.845 N 518936.637 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
								steel casing, stickup, jplug	
0				Ground Surface					
				SILT clayey, trace gravel, compact, firm, low plasticity, no staining, iron oxidation, organic debris (roots), brown, moist (fill)				cement silica sand	894
1									893
				GRAVEL sandy, some silt, occasional cobbles, loose to compact, firm, non-plastic, grey/brown, moist to dry					
2									892
								bentonite seal	
3									891
4				greater silt content (~15%) at 4.3 to 5.2 mbg					890
5									889
								50 mm 010 slot PVC pipe	
6							▼	GW = 6.17 mbg (Nov 3, 2013)	888
				MUDSTONE weathered, silty, some clay, dense, hard, low plastic, no staining, dark grey, moist to dry					
				End of borehole at 6.3 m					

Well Completion Details:
Screened interval from 4.4 m to 6.3 m below surface
Elevation at top of casing (TOC) = 895.000 m

Groundwater Information:
Depth to groundwater from TOC = 6.96 m (Nov 3, 2013)

Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 9, 2013 LOGGED BY: DM

Notes:

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-05D**
SURFACE ELEVATION: **894.24 m**
UTM COORDINATES: 6343469.049 N, 518937.278 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface				steel casing, stickup, jplug	
0				**SILT** clayey, trace gravel, compact, firm, low plastic, no staining, iron oxidation, organic debris (roots), brown, moist (fill)				cement	894
1		S1			150			silica sand	893
2		S2		**GRAVEL** sandy, some silt, occasional cobbles, loose to compact, firm, non-plastic, no staining, grey/brown, moist to dry	110				892
3		S3			135				891
4		S4		silt content increased from 5% to 15% at 4.3 - 5.5 mbg, silt turned dark brown to black at 4.4 - 4.6 mbg	95			bentonite seal	890
5		S5			100				889
6				**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, dark grey, moist to dry					888
7		S6			85			50 mm 010 slot PVC pipe	887
8		S7			85		▼	GW = 8.17 mbg (Nov 3, 2013)	886
								endcap	

End of borehole at 8.6 m

Well Completion Details:
Screened interval from 7.1 m to 8.6 m below surface
Elevation at top of casing (TOC) = 895.036 m

Groundwater Information:
Depth to groundwater from TOC = 8.97 m (Nov 3, 2013)

Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 9, 2013 LOGGED BY: DM

Notes: ■ SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-06S**
UTM COORDINATES 6343409.1 N 519001.734 E
SURFACE ELEVATION: 894.29 m

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
								steel casing, stickup, jplug	895
0				Ground Surface					
				SILT clayey, trace gravel, compact, firm, low plastic, iron oxidation, no staining, brown, moist (fill)				cement	894
								silica sand	
1									
				GRAVEL sandy, some silt, occasional cobbles, loose, non-plastic, no staining, grey brown, moist to dry					893
2				silty, some sand, grey, dry					
				some sand and silt, occasional cobbles					892
3								bentonite seal	
									891
4				**SILT** clayey, trace to some gravel, occasional cobbles, compact, firm, low plastic, iron oxidation (till)					890
							▼	GW = 4.74 mbg (Nov 3, 2013)	
5				brown					889
				wet to moist					
6								50 mm 010 slot PVC pipe	888
								endcap	
				End of borehole at 6.9 m Well Completion Details: Screened interval from 5.3 m to 6.9 m below surface Elevation at top of casing (TOC) = 895.164 m Groundwater Information: Depth to groundwater from TOC = 5.61 m (Nov 3, 2013) Drilled by Mud Bay				

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 11, 2013 LOGGED BY: DM

Notes:

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-06D**
SURFACE ELEVATION: **894.30 m**
UTM COORDINATES: 6343410.4 N, 519001.604 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface	1 10 100 1000 10000			steel casing, stickup, jplug	895
0				**SILT** clayey, trace gravel, compact, firm, low plastic, iron oxidization, no staining, brown, moist				cement; silica sand	894
1		S1			150				893
2		S2		**GRAVEL** sandy, some silt, occasional cobbles, loose, non-plastic, no staining, grey brown, moist to dry; silty, some sand (2.1 - 2.75 mbg), grey, dry	125				892
3				some sand, trace silt, occasional cobbles					891
4		S3		**SILT** clayey, trace to some gravel, occasional cobble, compact, firm, low plastic, iron oxidation, no staining, reddish brown, becoming more brown, moist (till)	75			bentonite seal	890
5									889
6		S4 / DUP2		wet to moist (5.8 - 6.7mbg)	300				888
7				**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry	0				887
8		S5							886
9								50 mm 010 slot PVC pipe	885
		S6			0		▼	GW = 9.55 mbg (Nov 3, 2013)	
				End of borehole at 9.8 m Well Completion Details: Screened interval from 8.2 m to 9.8 m below surface Elevation at top of casing (TOC) = 895.167 m Groundwater Information: Depth to groundwater from TOC = 10.42 m (Nov 3, 2013) Drilled by Mud Bay				

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 11, 2013 LOGGED BY: DM

Notes: ◧ SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-07**
SURFACE ELEVATION: **894.50 m**
UTM COORDINATES 6343432.234 N 518953.667 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface				steel casing, stickup, jplug	895
0				**GRAVEL** sandy, some silt, occasional cobbles, loose, firm, non-plastic, no staining, grey/brown, moist				cement	
								silica sand	894
1		S1			330				
		S2		**SILT** clayey, trace gravel, compact, firm, low plastic, staining and odours, moist (till)	590				893
2								bentonite seal	
									892
3		S3		no staining or odours below 2.89 m	320				
									891
4		S4			370				
								50 mm 010 slot PVC pipe	890
5		S5			1000				
								endcap	
				MUDSTONE weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry					889
6		S6			340				
				dry				bentonite seal	888
7									
				End of borehole at 7.2 m Well Completion Details: Screened interval from 3.8 m to 5.3 m below surface Elevation at top of casing (TOC) = 895.362 m Well was dry on November 3, 2013. Drilled by Mud Bay					

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **BH13-08**
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	BOREHOLE COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	DEPTH (m)
0				**GRAVEL** sandy, some silt, occasional cobbles, loose, firm, non-plastic, no staining, grey/brown, moist				silica sand	0
1		S1		**SILT** clayey, some gravel, compact, firm, low plastic, no staining, moist (till)	330				1.0
2		S2			360			bentonite seal	2.0
3				**MUDSTONE** weathered, silty, some clay, dense, hard, low plastic, no staining, moist to dry					3.0
4		S3			230				4.0
				End of borehole at 4.3 m Drilled by Mud Bay					

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE LOG

BOREHOLE NO: MW13-09
SURFACE ELEVATION: 891.65 m
UTM COORDINATES 6343466.607 N 518952.766 E

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv) 1 10 100 1000 10000	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
								steel casing, stickup, jplug	892
0				Ground Surface					
				SILT clayey, trace gravel, compact, firm, low plastic, no staining, iron oxidation, brown, moist (fill)				cement	
				GRAVEL sandy, some silt, occasional cobbles, loose to compact, firm, non-plastic, no staining, grey/brown, moist to dry				silica sand	891
1		S1			300			bentonite seal	
2									890
								50 mm 010 slot PVC pipe	889
3		S2		moist to wet	670		▼	GW = 3.28 mbg (Nov 3, 2013)	
		S3		**SILT** clayey, trace gravel, compact, firm, low plastic, no staining, brown/grey, moist (till)	330				888
4		S4		**MUDSTONE** weathered, silty, come clay, dense, hard, low plasticity, no staining, dry to moist	210			endcap slough	

End of borehole at 4.1 m

Well Completion Details:
Screened interval from 2.4 m to 4.0 m below surface
Elevation at top of casing (TOC) = 892.597 m

Groundwater Information:
Depth to groundwater from TOC = 4.22 m (Nov 3, 2013)

Drilled by Mud Bay

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 10, 2013 LOGGED BY: DM

Notes: ■□ SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **MW13-10**
SURFACE ELEVATION: **894.41 m**
UTM COORDINATES: **6343454.446 N** **518930.719 E**

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION	FIELD TEST DATA: ORGANIC VAPOUR LEVEL (ppmv)	WELL COMPLETION	WATER LEVEL	WELL COMPLETION NOTES	ELEVATION (m)
				Ground Surface				steel casing, stickup, jplug	895
0				**SILT** clayey, trace gravel, loose/compact, soft, low plasticity, no staining, woody debris/roots present, iron oxidation, dark brown, (fill)				cement silica sand	894
1		S1		increased iron oxidation from 1.5 to 2.3 mbg, reddish colour	320				893
2		S2		**GRAVEL** sandy, some silt, loose, firm, non-plastic, light brown to grey, moist	210			bentonite seal	892
3									891
4		S3		**SILT** clayey, some sand, trace gravel, occasional cobbles, compact, firm, iron oxidation, brown, moist (till)	145				890
5		S4			115			GW = 4.98 mbg (Nov 3, 2013) 50 mm 010 slot PVC pipe	889
6				**MUDSTONE** weathered, silty, some clay, dense, hard, low plasticity, no staining, dark grey, moist-dry				endcap	
		S5			220			bentonite	888
7								slough	
				End of borehole at 7.3 m Well Completion Details: Screened interval from 4.7 m to 5.9 m below surface Elevation at top of casing (TOC) = 895.202 m Groundwater Information: Depth to groundwater from TOC = 5.77 m (Nov 3, 2013) Drilled by Mud Bay				

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 9, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

BOREHOLE LOG

SLR CONSULTING (CANADA) LTD.

CLIENT: **PWGSC**
PROJECT: **Supplemental Site Investigation**
ADDRESS: **Sikanni Maintenance Camp BC**
SLR JOB NO: **205.03641.00001**

BOREHOLE NO: **BH13-11**
SURFACE ELEVATION:

DEPTH (m)	SAMPLE TYPE	SAMPLE ID	SOIL TYPE	SOIL DESCRIPTION
1		S1		**GRAVEL** sandy, some silt, occasional cobbles, loose, non-plastic, light brown, dry
2		S2		**SILT** clayey, some sand, trace gravel, compact, firm, low plasticity, no staining, brown, moist (till)
3		S3		
4				
5		S4		**MUDSTONE** weathered, silty, some clay, dense, hard, low plasticity, no staining, dark grey, moist
6		S5		
7		S5		End of borehole at 7.3 m Drilled by Mud Bay

FIELD TEST DATA

ORGANIC VAPOUR LEVEL (ppmv)

1 10 100 1000 10000

10000

0

BOREHOLE COMPLETION

WATER LEVEL

WELL COMPLETION NOTES

silica sand

bentonite seal

DEPTH (m)

1.0 2.0 3.0 4.0 5.0 6.0 7.0

BOREHOLE METHOD: Sonic

BOREHOLE DATE: October 9, 2013 LOGGED BY: DM

Notes: SONIC CORE SAMPLE

APPENDIX F
Thurber Engineering Ltd. Backfill Memorandum

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000

THURBER ENGINEERING LTD.

MEMORANDUM NO.1

To: David Pugh, P.Ag.
SLR Consulting (Canada) Ltd.

Date: December 2, 2015

From: Chris Weech, M.A.Sc., P.Eng

File: 10049

Review: Kevin Sterne, M.Sc., P.Eng.

Cc:

SIKANNI REMEDIAL SPECIFICATION (SLR # 205.03768.00000) GRAIN SIZE ANALYSES AND MAXIMUM DENSITY TESTING

It is a condition of this memorandum that Thurber's performance of its professional services is subject to the attached Statement of Limitations and Conditions.

As requested by SLR Consulting (Canada) Ltd. (SLR), Thurber Engineering Ltd. (Thurber) carried out natural water content measurements, grain size analyses, and laboratory maximum dry density determinations using samples of granular soils that were collected by SLR, which are being considered as potential backfill for a remedial excavation. This memorandum presents the results of testing conducted on three samples of pit run gravelly sand to sandy gravel from the Man & Beast Pit (at Km 258), and one sample of sand and gravel from a potential borrow source at Km 262.

NATURAL WATER CONTENTS AND GRAIN SIZE ANALYSES

The complete grain size distributions for the four samples that were tested by Thurber are provided in Appendix A. A summary of the natural water contents, and proportions of cobbles (coarser than 75 mm), gravel (particle sizes between 4.75 mm and 75 mm), sand (particles between 4.75 mm and 0.075 mm), and fines (finer than 0.075 mm), is provided in the table below. The "oversize" fraction (% coarser than 19 mm) is also provided for each sample.

Sample Source	Water Content	Fines Content	Sand Content	Gravel Content	Cobble Content	Oversize Fraction
Man & Beast Pit, Northwest	4.8%	3%	21%	73%	3%	36%
Man & Beast Pit, Far East	6.3%	3%	34%	63%	0%	22%
Man & Beast Pit, Northeast	5.9%	9%	60%	32%	0%	8%
Km 262	6.4%	13%	45%	42%	0%	1%

THURBER

MODIFIED PROCTOR MAXIMUM DRY DENSITY TESTING

It is understood that the compaction specification for the backfill material is to be 95% of Modified Proctor Maximum Dry Density (MPMDD). Accordingly, the maximum dry density and moisture-density relationship of the samples from the Northwest and Far East of the Man & Beast Pit were determined using ASTM D 1557, Method C. The test results are provided in the attached Appendix B.

In that test method, the laboratory density testing is conducted on a specimen of the material which has the oversize fraction screened out. Consequently, the maximum dry density and optimum moisture contents determined from this testing are only applicable to the modified material without the oversize particles.

The sample of well-graded gravelly sand from the Northeast of Man & Beast Pit had only 8% oversize material screened out, and the 19 mm minus material has a MPMDD of about 2120 kg/m^3 at an optimum water content of about 8%.

The sample of sandy gravel from the Far East of Man & Beast Pit needed to have 22% oversize particles removed, and the 19 mm minus sand and gravel material that was produced has a MPMDD of about 2270 kg/m^3 at an optimum water content around 6%.

This testing was not conducted on the sample from the Northwest of Man & Beast Pit as the standard methods in ASTM D 1557 are not applicable to materials with greater than 30% oversize particles.

OVERSIZE CORRECTION FACTORS

To apply the results of the testing to soils in the field that contain some proportion of particles coarser than 19 mm, oversize correction factors are typically applied. These are usually calculated using ASTM D 4718, which allows for correction for materials with up to 30% oversize particles. However, ASTM D 4718 states that the correction method is only applicable to soils with up to 40% of the material coarser than 4.75 mm. In such materials, the gravel particles are generally supported by a porous matrix of sand and fines.

Using ASTM D 4718, the corrected MPMDD of the as-sampled material from the Northeast of Man & Beast Pit (with 8% oversize material) increases to about 2160 kg/m^3.

Two out of three samples from the Man & Beast Pit have greater than 60% coarser than 4.75 mm and so the oversize correction factors in ASTM D 4718 are not applicable, even though the sample from the Far East of Man & Beast Pit has less than 30% oversize fraction and an oversize correction would be expected for that material. But when the standard oversize correction factor for 22% oversize fraction is applied to the MPMDD determined on the 19 mm minus portion of that sample, the corrected MPMDD is calculated to be about 2360 kg/m^3, which is considered to be an unreasonably high value for this material.

As the proportion of gravel-sized particles increases above 40%, the material transitions from a sandy matrix with gravel inclusions to a gravel matrix where the finer material occupies the voids between the gravel particles. Further increasing the gravel content reduces the volume of finer particles to fill the increasing void space between the coarser gravel particles. This results in a reduction in density whereas the oversize correction factors in ASTM D 4718 assume that the density will continue to increase with up to 30% oversize particles.

VIBRATORY TABLE TEST PROGRAM

To investigate the effects of increasing oversize fraction on the sandy gravel materials, a series of maximum density tests were conducted using the vibratory table densification procedure (Wet Method) described in ASTM D 4253. The standard procedure involves loose placement of 19 mm minus material in a 150 mm diameter mould, addition of water to fill the voids between the particles, addition of a surcharge load on top of the soil, and then densification through vibration.

In this testing program, one test was conducted on the 19 mm minus portion of the sample from the Northwest of Man & Beast Pit, in accordance with the ASTM standard method, which required removing 36% of the material from the sample. Three additional tests were conducted on specimens creating by adding back 10%, 20%, and 30% particle sizes between 19 mm and 37.5 mm. The gradations of all four test specimens are plotted on the grain size distribution plot at the front of Appendix C, and compared to the gradation of the original sample without any oversize removed.

The measured maximum dry density (MDD) of each test specimen is listed in the table and plotted as a function of the oversize fraction on the lower graph in Appendix C. The measured MDD of the specimens with varying oversize fractions were normalized by the MDD of the 19 mm minus specimen to calculate oversize correction factors that are listed in the table and plotted on the accompanying graph in Appendix C.

The calculated oversize correction factors are less than 1.02, with a maximum that appears to occur between about 10% and 15% oversize fraction. At higher oversize fractions, the oversize correction decreases again and is less than unity at oversize fractions above 25%. The results for oversize fractions greater than 10% are very different than what is calculated by ASTM D 4718, which highlights that that method is not appropriate for materials with greater than about 40% to 50% gravel content.

RECOMMENDATIONS ON USE OF SAMPLED MATERIALS AS EXCAVATION BACKFILL

The sample of sand and gravel with some fines from the Km 262 source is not considered to be a good material for backfill since the measured fines content of 13% is significantly higher than what would be considered suitable as a free-draining aggregate material. Consequently, that material is likely to be sensitive to water-induced softening, and possibly to frost lensing, which would limit its practical use to ideal placement conditions and to restrict its use to below the depth of expected frost penetration.

THURBER

The samples of sandy gravel from the Far East and Northwest of Man & Beast Pit have a very low fines content (only 3%) but have gravel contents in excess of 60% and high gravel-to-sand ratio which makes them prone to segregation during handling and placement. This creates variability in the composition of the compacted backfill which can pose significant challenges for quality control (QC) testing of the degree of compaction achieved. The relatively high oversize fractions in the sampled material (22% and 36%) increases the challenges further because the oversize fraction at every field density test location needs to be estimated in order to assign a representative target density.

The oversize correction factors determined from the vibratory table testing of the sample from the Northwest of Man & Beast Pit were combined with the MPMDD of the 19 mm minus proportion of the sample from the Far East of Man & Beast Pit, to calculate target dry densities corresponding to 95% of the MPMDD. The 95% of MPMDD densities at different oversize fractions up to 30%, as indicated by the red curve on the lower graph in Appendix C, are recommended for use with sand and gravel and sandy gravel materials having greater than 40% gravel fraction and up to 30% material coarser than 19 mm. The use of materials with greater than 30% oversize fraction are not recommended unless additional laboratory density testing is conducted to determine the MDD of the coarser material. It should be recognized, however, that field density testing of such materials using nuclear densometer methods can be problematic.

The sample of well-graded gravelly sand from the Northeast of Man & Beast Pit is considered suitable as backfill material, but the measured fines content of 9% is considered to be marginal. The Master Municipal Construction Document (MMCD) limits the fines content of construction aggregates to 8% due to the moisture sensitivity that develops at higher fines contents. Additional sampling and grain size analyses are recommended to determine the variability in the fines content of the material from this part of the pit. If the fines contents are generally less than 8%, the material would be considered suitable for use and would be considered preferable to the sandy gravel materials due to the lower oversize fraction which makes the material less prone to segregation and less problematic from a quality control perspective. If the average fines content of this material is around 8% to 10%, as indicated by the sample already tested, the material could be used provided that construction is expected to occur primarily under dry conditions and in above-freezing temperatures.

Please call the undersigned if you wish to discuss the results of this test program.

Regards,

Thurber Engineering Ltd.
Stephen Bean, M.Eng., P.Eng.
Review Principal

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
C. N. WEECH
28218
Dec. 2, '15

Chris Weech, M.A.Sc., P.Eng.
Geotechnical Engineer

THURBER

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

APPENDIX A

GRAIN SIZE DISTRIBUTIONS
&
NATURAL WATER CONTENTS

THURBER ENGINEERING LTD.

SIEVE ANALYSIS REPORT
Sikanni Remedial Specification
Sample from Northwest of Man & Beast Pit (km 258)

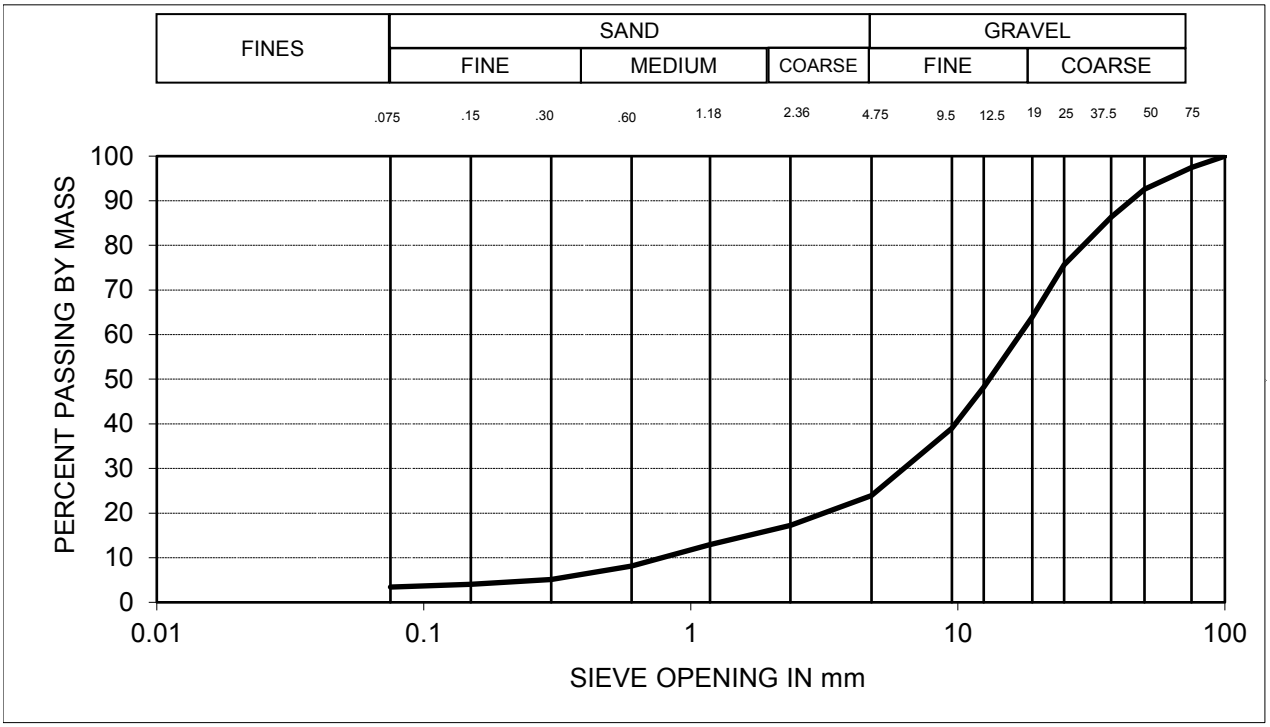
File Number: 10049

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 12-Nov-15 By: RDM
Checked By:

Sample Source: Grab Sample
Description: sandy GRAVEL (GW), trace of fines
Test Method: ASTM C 136 & C 117

Remarks: Cobble = 2.6 % Gravel = 73.5 % Sand = 20.5 % Fines = 3.4 %
As Received Moisture Content = 4.8 %



Gravel Size		Percent	Specifications		
Inches	mm	Passing	Upper	Lower	Check
4	100	100			
3	75	97			
2	50	93			
1.5	37.5	86			
1	25	76			
.75	19	64			
.5	12.5	48			
.375	9.5	39			

Sand Size		Percent	Specifications		
Inches	mm	Passing	Upper	Lower	Check
#4	4.75	24			
#8	2.36	17			
#16	1.18	13			
#30	0.6	8			
#50	0.3	5			
#100	0.15	4			
#200	0.075	3.4			

THURBER ENGINEERING LTD.

SIEVE ANALYSIS REPORT
Kikanni Remedial Specification
Sample from Far East of Man & Beast Pit (km 258)

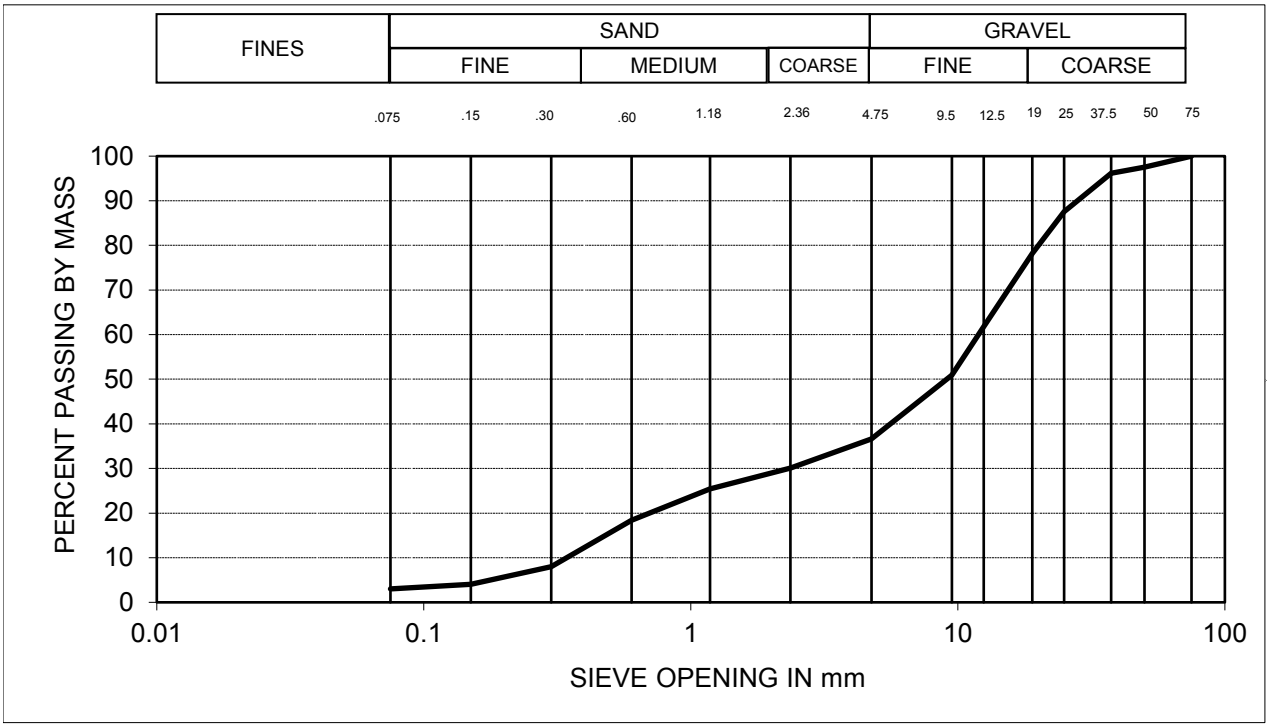
File Number: 10049

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 12-Nov-15 By: RDM
Checked By:

Sample Source: Grab Sample
Description: sandy GRAVEL (GW), trace of fines
Test Method: ASTM C 136 & C 117

Remarks: Gravel = 63.4 % Sand = 33.6 % Fines = 3.0 %
As Received Moisture Content = 6.3 %



Gravel Size		Percent	Specifications			Sand Size		Percent	Specifications		
Inches	mm	Passing	Upper	Lower	Check	Inches	mm	Passing	Upper	Lower	Check
3	75	100				#4	4.75	37			
2	50	98				#8	2.36	30			
1.5	37.5	96				#16	1.18	25			
1	25	88				#30	0.6	18			
.75	19	78				#50	0.3	8			
.5	12.5	62				#100	0.15	4			
.375	9.5	51				#200	0.075	3.0			

THURBER ENGINEERING LTD.

SIEVE ANALYSIS REPORT
Kikanni Remedial Specification
Sample from Northeast of Man & Beast Pit (km 258)

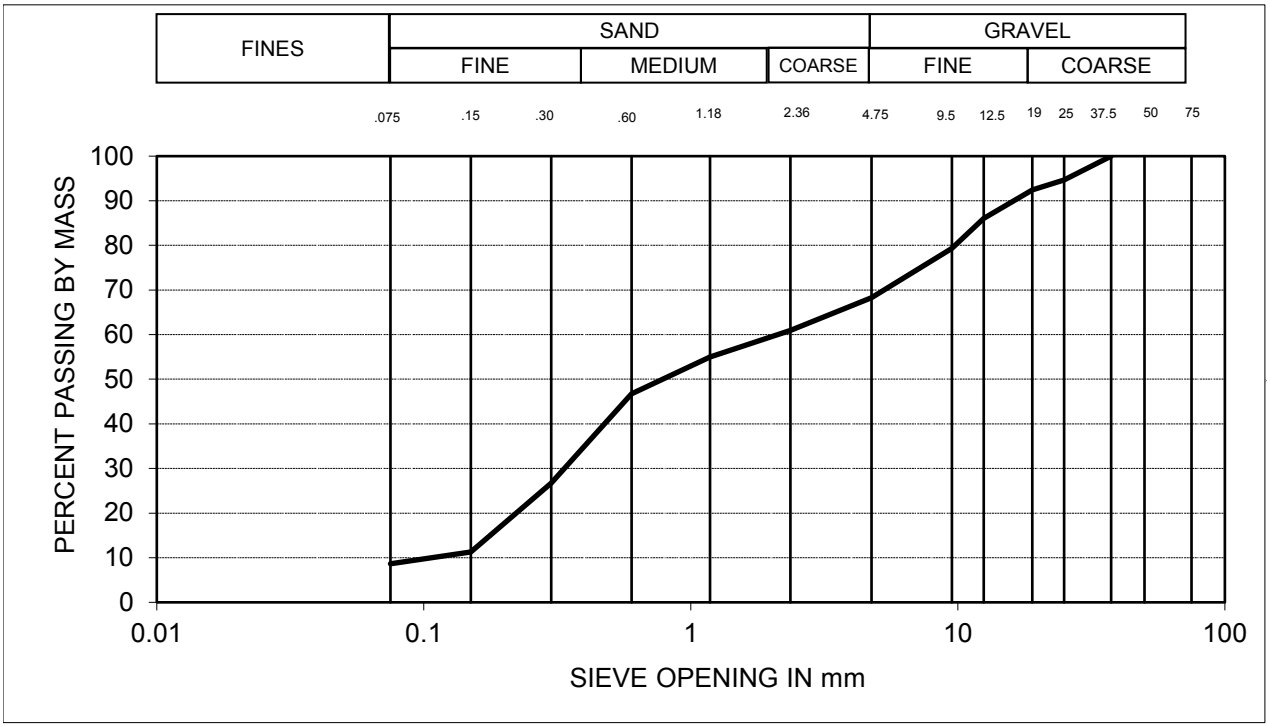
File Number: 10049

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 12-Nov-15 By: RDM
Checked By:

Sample Source: Grab Sample
Description: gravelly SAND (SP-SM), trace of fines
Test Method: ASTM C 136 & C 117

Remarks: Gravel = 31.7 % Sand = 59.7 % Fines = 8.6 %
As Received Moisture Content = 5.9 %



Gravel Size		Percent	Specifications			Sand Size		Percent	Specifications		
Inches	mm	Passing	Upper	Lower	Check	Inches	mm	Passing	Upper	Lower	Check
3	75	100				#4	4.75	68			
2	50	100				#8	2.36	61			
1.5	37.5	100				#16	1.18	55			
1	25	95				#30	0.6	47			
.75	19	92				#50	0.3	27			
.5	12.5	86				#100	0.15	11			
.375	9.5	79				#200	0.075	8.6			

THURBER ENGINEERING LTD.

SIEVE ANALYSIS REPORT
Kikanni Remedial Specification
Sample from km 262

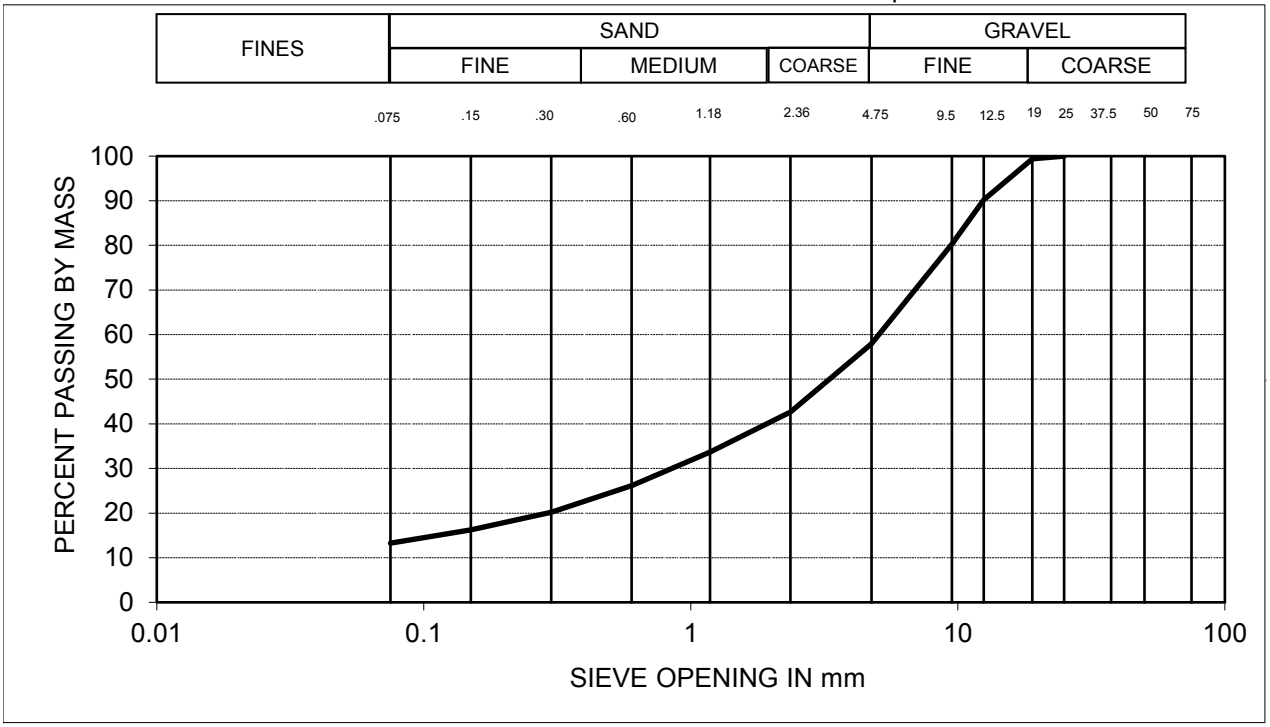
File Number: 10049

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 12-Nov-15 By: RDM
Checked By:

Sample Source: Grab Sample
Description: GRAVEL and SAND (SP-SM), some fines
Test Method: ASTM C 136 & C 117

Remarks: Gravel = 42.0 % Sand = 44.7 % Fines = 13.3 %
As Received Moisture Content = 6.4 %
One rounded 75 mm diameter cobble removed from sample.



Gravel Size		Percent	Specifications			Sand Size		Percent	Specifications		
Inches	mm	Passing	Upper	Lower	Check	Inches	mm	Passing	Upper	Lower	Check
3	75	100				#4	4.75	58			
2	50	100				#8	2.36	43			
1.5	37.5	100				#16	1.18	34			
1	25	100				#30	0.6	26			
.75	19	99				#50	0.3	20			
.5	12.5	90				#100	0.15	16			
.375	9.5	80				#200	0.075	13.3			

APPENDIX B

MODIFIED PROCTOR DENSITY TEST REPORTS

THURBER ENGINEERING LTD.

MOISTURE - DENSITY RELATIONSHIP REPORT

Sikanni Remedial Specification
Grab Sample from Far East of Man & Beast Pit (km 258)

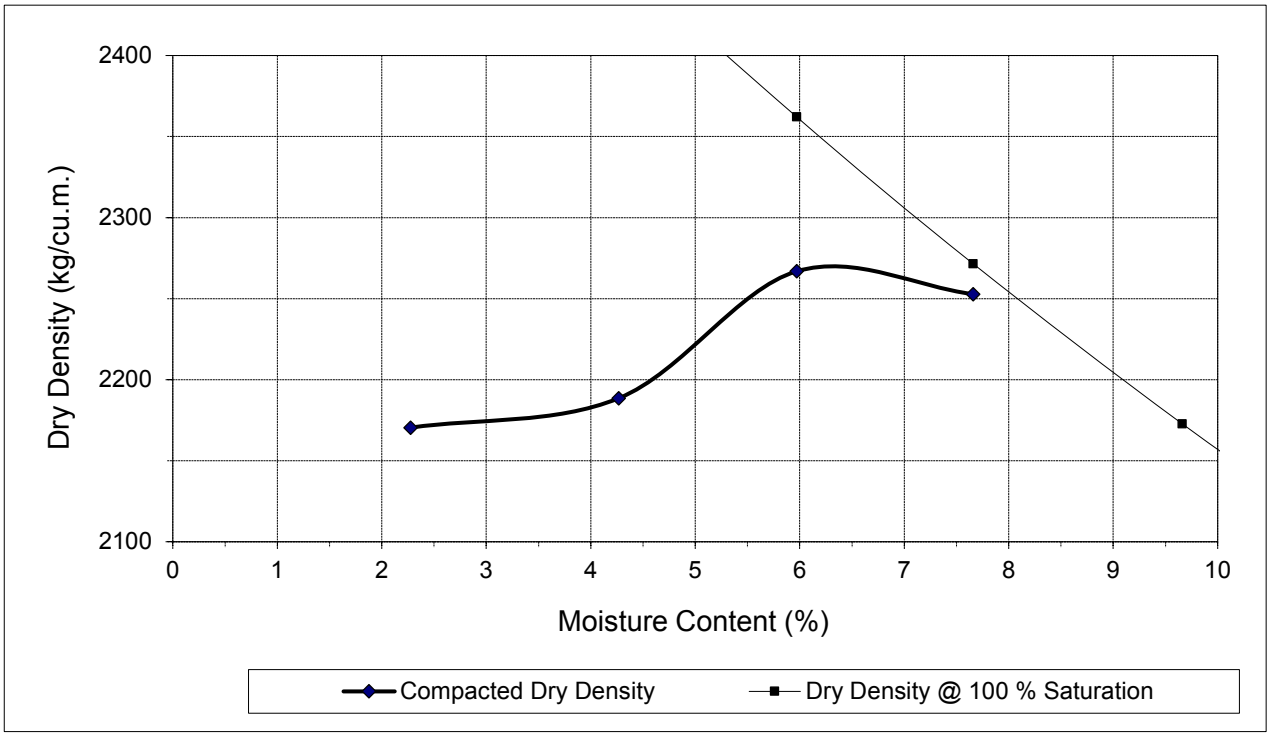
File Number: 10049
Report Date: 19-Nov-15

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 18-Nov-15 By: JSH
Checked By:

Test Method: ASTM D1557, method C
Test run on sample after removal of 22% oversize fraction (19 mm plus)
Gradation of test specimen: 53% fine gravel, 43% sand, 4% fines
Description: GRAVEL and SAND (GP), trace of fines

MODIFIED MAXIMUM DRY DENSITY = 2267 kg/m3
MODIFIED OPTIMUM MOISTURE CONTENT = 6 %
(Uncorrected for Oversize Material)



Notes: 100 % Saturation curve based on assumed Specific Gravity = 2.75
Bleeding slightly during compaction at 6.0% moisture content.

THURBER ENGINEERING LTD.

MOISTURE - DENSITY RELATIONSHIP REPORT
Kikanni Remedial Specification
Sample from Northeast of Man & Beast Pit (km 258)

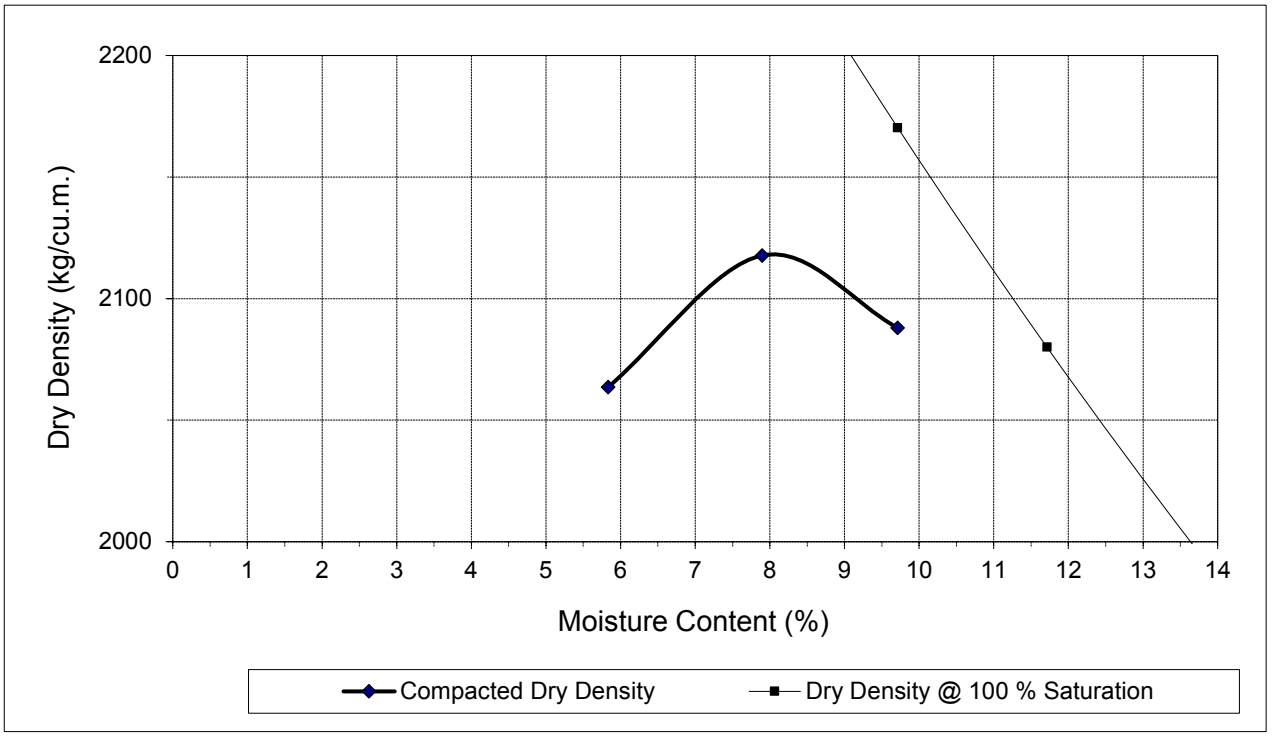
File Number: 10049
Report Date: 19-Nov-15

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 18-Nov-15 By: JSH
Checked By:

Test Method: ASTM D1557, method C
Test run on sample after removal of 8% oversize fraction (19 mm plus)
Gradation of test specimen: 26% fine gravel, 65% sand, 9% fines
Description: gravelly SAND (SP-SM), trace of fines

MODIFIED MAXIMUM DRY DENSITY = 2118 kg/m3
MODIFIED OPTIMUM MOISTURE CONTENT = 7.9 %
(Uncorrected for Oversize Material)



Notes: 100 % Saturation curve based on assumed Specific Gravity = 2.75
Bleeding during compaction at 9.7% moisture content.
Modified Maximum Dry Density corrected for 8% oversize fraction
= 2,157 kg/m3

APPENDIX C

VIBRATORY TABLE TEST RESULTS

Grain Size Distributions of Test Specimens
Maximum Dry Densities Measured in Vibratory Table Tests
Oversize Correction Factors from Vibratory Table Tests
Dry Density Targets to Achieve 95% of Modified Proctor Maximum Dry Density

THURBER ENGINEERING LTD.

SIEVE ANALYSIS REPORT
Sikanni Remedial Specification
Sample from Northwest of Man & Beast Pit (km 258)

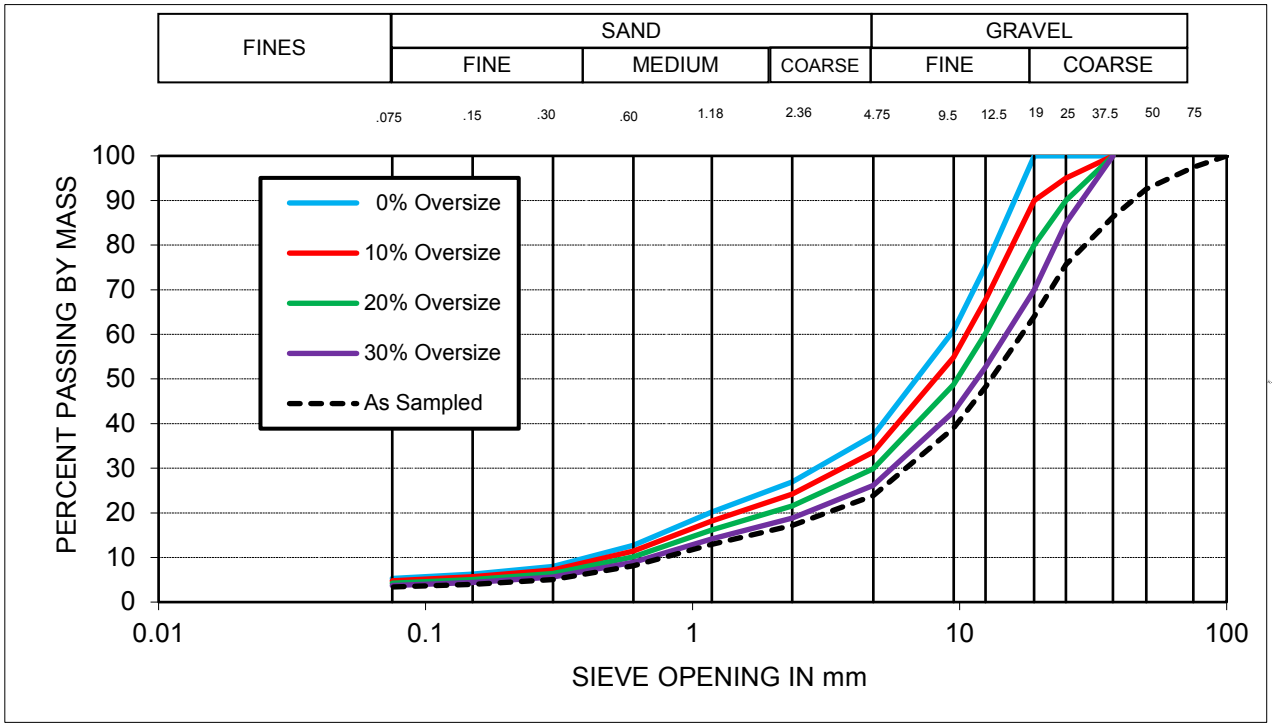
File Number: 10049

SLR Consulting (Canada) Ltd.
#6 - 40 Cadillac Avenue
Victoria, BC
V8Z 1T2

Sampled: 4-Nov-15 By: Client
Received: 10-Nov-15 By: BRE
Tested: 12-Nov-15 By: RDM
Checked By:

Sample Source: Grab Sample
Description: sandy GRAVEL (GW), trace of fines
Test Method: ASTM C 136 & C 117

Sample Before Screening of Oversize Particles:
Gravel = 76.1 % Sand = 20.5 % Fines = 3.4 %
As Received Moisture Content = 4.8 %



Grain Size Distribution After Modifying Oversize Fraction:

Gravel Size		Percent Passing (%)				Sand Size		Percent Passing (%)			
Inches	mm	0% o/s	10% o/s	20% o/s	30% o/s	Inches	mm	0% o/s	10% o/s	20% o/s	30% o/s
1.5	37.5	100	100	100	100	#4	4.75	37	34	30	26
1	25	100	95	90	85	#8	2.36	27	24	22	19
.75	19	100	90	80	70	#16	1.18	20	18	16	14
.5	12.5	75	68	60	53	#30	0.6	13	11	10	9
.375	9.5	61	55	49	43	#50	0.3	8	7	6	6
						#100	0.15	6	6	5	4
						#200	0.075	5	5	4	4

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Sikanni Remediation

Maximum Density Test Results and Oversize Correction Factors

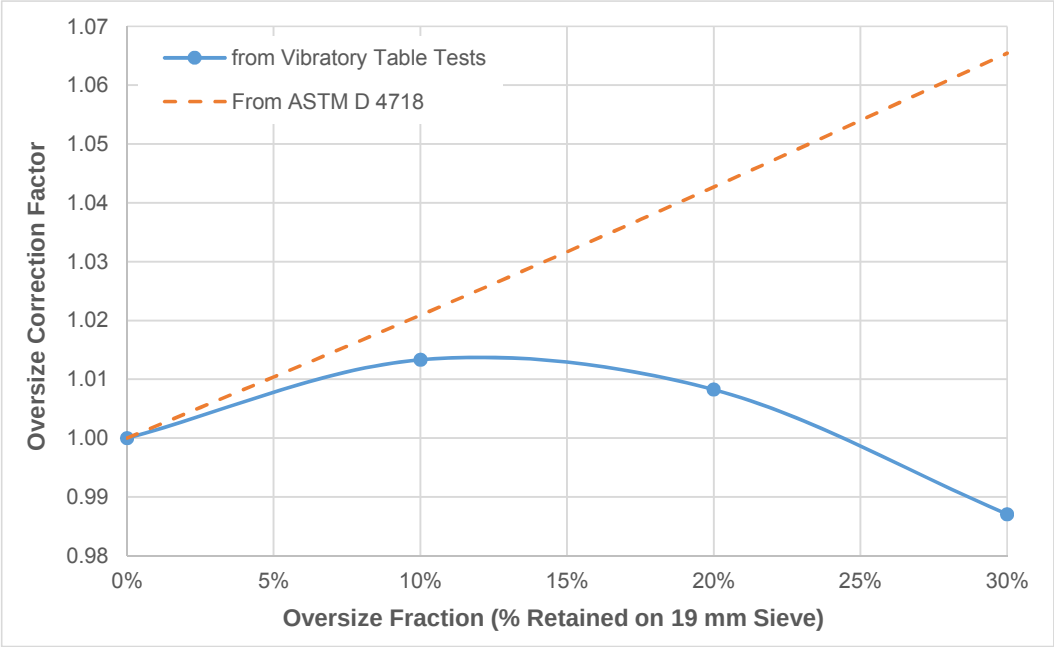
Modified Proctor Max Dry Density - MPMDD (kg/m^3) = 2267

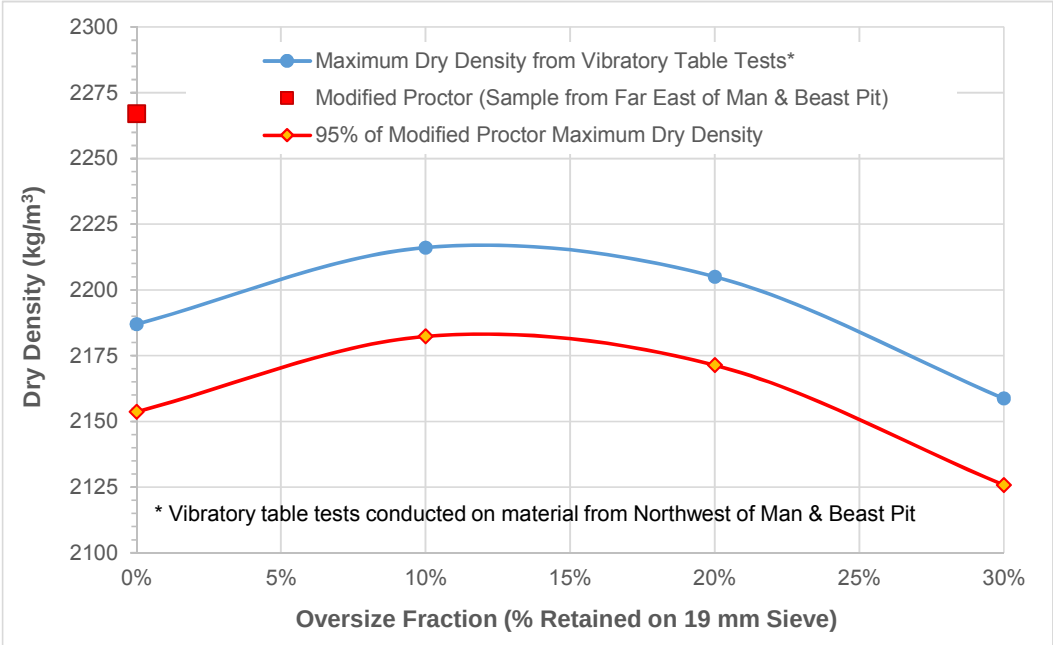
Oversize (O/S) Fraction	Vibratory Table Test Results		O/S Correction Factor* from ASTM D 4718	Specified 95% of MPMDD incl. O/S Correction** (kg/m^3)
	Max Dry Density - MDD (kg/m^3)	O/S Correction Factor		
0%	2187	1.000	1.000	2154
10%	2216	1.013	1.021	2182
20%	2205	1.008	1.043	2171
30%	2159	0.987	1.065	2126

Notes specific gravity = 2.75

* Based on specific gravity as assumed above, and MDD of 19mm minus fraction from Vibratory Table Test

** Based on MPMDD of 19mm minus fraction, and O/S Correction Factors from Vibratory Table Tests





Client: SLR Consulting (Canada) Ltd.
File No. 10049
E-File: Sikanni Remediation_Oversize Correction Factor Comparison.xlsx

02/12/2015

APPENDIX G
SNC-Lavalin Regulated Building Materials Survey

Sikanni Maintenance Camp Building Relocation and Remedial Specification
Kilometre 254 of the Alaska Highway, BC
SLR Project No.: 205.03748.00000

SNC-Lavalin Inc.
8648 Commerce Court
Burnaby, British Columbia, Canada, V5A 4N6
604.515.5151 604.515.5150

February 16, 2016 Project 633299

Public Works and Government Services Canada
#219 – 800 Burrard Street
Vancouver, BC V6Z 0B9

ATTENTION: Jennifer Kolodziej, Environmental Specialist

REFERENCE: **Regulated Building Material Survey of Four Buildings, Sikanni Maintenance Yard, Alaska Highway, BC**

Introduction

On behalf of Public Works and Government Services Canada (PWGSC), SNC-Lavalin Inc. (SNC-Lavalin) has completed a regulated building materials survey of four buildings located at the Sikanni Maintenance Yard, KM 254, Alaska Highway, BC (the "Site"). SNC-Lavalin understands that the purpose of the work was to complete a non-destructive regulated building materials survey of the Site to identify potential materials of concern. At the time of the survey, the Site was an operating highway maintenance yard.

The buildings assessed during the regulated building materials survey are as follows:

- Maintenance garage;
- Sign shed;
- Old generator shed; and,
- New generator shed.

All work was completed as per the *Hazardous Materials Assessment Consulting Services Task Authorization – EZ113-150642/003/PWY* under Task Authorization No. 700340743.

Scope of Work

On December 21, 2015, SNC-Lavalin personnel observed the interior and exterior of the four buildings to identify the potential existence of the following regulated materials:

- asbestos;
- lead paint;
- polychlorinated biphenyls (PCB);
- ozone depleting substances (ODS);
- miscellaneous solid and liquid wastes;
- liquid mercury;
- radiological sources and/or substances;
- silica; and,
- mould and/or moisture.

Representative samples were collected and laboratory analysis completed for suspected asbestos-containing materials (ACMs) and lead-containing paint.

It should be noted that due to the potential for compromising the roofing system, sampling and analysis of roofing materials were specifically excluded from the scope of work.

The following sections provide details of the regulatory framework related to regulated building materials, methodology used to complete the survey, a summary of the results, and SNC-Lavalin's recommendations with regards to the Site.

Summary

Based on the results of the survey, there are regulated building materials located on the Site requiring specific procedures prior to deconstruction/demolition for: handling; abatement; demolition; and disposal, as outlined in Tables 1 through 4. The sample locations are presented on Drawings 633299-BMS1, 633299-BMS2, and 633299-BMS3, included as Attachment 1. Select photographs of the sample locations are included in Attachment 2. Copies of the laboratory analytical reports for the results of the asbestos and lead analyses are included in Attachments 3 and 4, respectively.

A summary of the material on Site is as follows:

MAINTENANCE GARAGE

The following hazardous materials were identified:

Asbestos-Containing Materials:

- **Asbestos-containing black mastic** was identified in a patch on the exterior of the Maintenance Garage (Photograph 3). No similar mastic was identified on the Maintenance Garage; however, if any is identified, it should be considered asbestos-containing.

Suspect Asbestos-Containing Materials:

- Vermiculite insulation was not observed in the inspected wall cavities or in the attic area of the buildings. However, all areas could not be inspected due to the non-destructive nature of the survey; therefore, there is potential that vermiculite insulation may exist within the building.
- Due to the potential for compromising the roofing system, sampling and analysis of roofing materials were specifically excluded from the scope of work. There is potential that some or all of the roofing system may contain ACMs.
- The exterior man-doors to the Maintenance Garage are suspected of being fire doors and may contain asbestos-containing material inside the doors.
- Electrical wiring insulation throughout the building may contain ACMs; however, this material was not sampled due to safety concerns with live electrical wiring.

- There is potential for underground asbestos-containing cement pipes at the Site. The identification of potential ACMs below ground was not within the scope of this report, and should be addressed during any excavation at the Site.

Lead-Based Paint:

- **Lead-containing green paint** was identified on the flooring in the upper storage area of the Maintenance Garage (Photograph 4).
- **Lead-containing red paint** was identified on the I-beams framing the Maintenance Garage. (Photograph 5).
- **Lead-containing white and off-white paints** were identified on the walls of the main area of the Maintenance Garage and on the walls near the stairs, respectively (Photograph 6).
- **Lead-containing red and green paints** were identified on the man-door nearest the roll-up door of the Maintenance Garage (Photograph 7).
- **Lead-containing yellow paints** were identified on the exterior of the Maintenance Garage (Photograph 8).

Based on these results, all materials found at the Site of similar colours as identified above should be considered as lead-containing.

PCB Materials:

- **Potentially PCB-containing high intensity discharge (HID) light ballasts** may exist in the Maintenance Garage in the following locations:
  - **One (1) HID fixture** affixed to the wall. The ballast label was visible (Photograph 12); however, the presence of a wall mounted heater prevented access, such that determination of the date code on the ballast could not be completed.
  - **Two (2) HID fixtures** suspended from the ceiling (Photograph 13). The ballasts were contained in metal housings, preventing access to the ballast labels.
  - **Approximately an additional six (6) HID fixtures** were suspended from the ceiling. The ballasts could not be checked due to access constraints.
  - **One (1) HID fixture** located on the roof (Photograph 14). The ballast could not be checked due to access constraints.

Solid and Liquid Wastes:

- **An aboveground waste oil tank** was identified outside the Maintenance Garage (Photographs 8 and 16).
- **Two aboveground propane tanks** were identified outside the Maintenance Garage (Photograph 17).

- **Three (3) unlabelled drums and two (2) unlabelled pails** were identified between the Maintenance Garage and the Sign Shed (Photograph 18).
- **Approximately 11 fire extinguishers** were identified near the parts storage area (Photograph 19).
- **One (1) waste oil collection drum** located near the parts storage area (Photograph 19).
- **Three (3) pails of suspect waste oil** near the rear man-door (Photograph 20).
- **Lead-acid batteries** located in various areas and within stored equipment. There is also the potential for lead-containing batteries located within emergency lighting.
- **One (1) parts washer** located adjacent a work bench.
- **One (1) large propane cylinder** located in the centre of vehicle parking area (Photograph 21).
- **One (1) oxyacetylene torch and associated gas cylinders** located on a dolly (Photograph 22).
- **Various consumer- and bulk-packaged vehicle and equipment maintenance materials and sundries** (e.g., oils, greases, antifreeze, etc.) throughout the building.
- **Various consumer-packaged materials** (e.g., cleaning products, paint, etc.) were identified throughout the building.
- **One (1) empty plastic above-ground storage tank** (AST) located centrally (Photograph 23).

Silica:

- **Potential silica-containing concrete floors** (building foundations) were identified in the Maintenance Garage.

Mould and/or Moisture:

- **Significant moisture** was present in the Maintenance Garage due to equipment with ice and snow build-up being allowed to thaw prior to maintenance. No mould or odours were identified.
- **A below ground sump** was identified in the Maintenance Garage and water and traces of oil were observed to be draining to the sump. An oily sheen was observed on the surface of the standing water; however, no mould or odours were identified.

OLD GENERATOR SHED

The following hazardous materials were identified:

Asbestos-Containing Materials:

- **Asbestos-containing black mastic** was identified on the exterior of the Old Generator Shed. (Photograph 1). All black mastic on the Old Generator Shed should be considered as asbestos-containing.

- **Asbestos-containing off-white panelling** was identified in the chimney space in the Old Generator Shed (Photograph 2). All similar panelling should be considered as asbestos-containing.

Suspect Asbestos-Containing Materials:

- Vermiculite insulation was not observed in the inspected wall cavities or in the attic area of the building. However, all areas could not be inspected due to the non-destructive nature of the survey; therefore, there is potential that vermiculite insulation may exist within the building.
- Due to the potential for compromising the roofing system, sampling and analysis of roofing materials were specifically excluded from the scope of work. There is potential that some or all of the roofing system may contain ACMs.
- Electrical wiring insulation throughout the building may contain ACMs; however, this material was not sampled due to safety concerns with live electrical wiring.
- There is potential for underground asbestos-containing cement pipes at the Site. The identification of potential ACMs below ground was not within the scope of this report, and should be addressed during any excavation at the Site.

Lead-Based Paint:

- **Lead-containing paints** (two layers of white and one red layer) were identified on the metal beams framing the Old Generator Shed. (Photograph 10).
- **Lead-containing black and red paints** were identified on the metal window frames and the surrounding wooden trim in the interior of the Old Generator Shed, respectively (Photograph 10).
- **Lead-containing grey paints** were identified within the chimney and on the entry door of the Old Generator Shed (Photographs 2 and 11, respectively).

Based on these results, all materials found at the Site of similar colours as identified above should be considered as lead-containing.

PCB Materials:

- **One (1) potentially PCB-containing HID light ballast** may exist on the exterior of the Old Generator Shed (Photograph 15). The ballast was not accessible for assessment.

Solid and Liquid Wastes:

- **Potential for lead-containing batteries** located within emergency lighting.
- **Various garbage/debris** throughout the building (Photograph 27).
- **Various consumer- and bulk-packaged vehicle and equipment maintenance materials and sundries** (e.g., oils, greases, antifreeze, etc.) throughout the building.

Silica:

› **Potential silica-containing concrete floors** (building foundations) were identified in the Old Generator Shed.

Mould and/or Moisture:

› **Evidence of mould** was present on the interior wall adjacent the access door (Photograph 28).

SIGN SHED

The following hazardous materials were identified:

Suspect Asbestos-Containing Materials:

› Vermiculite insulation was not observed in the inspected wall cavities or in the attic area of the building. However, all areas could not be inspected due to the non-destructive nature of the survey; therefore, there is potential that vermiculite insulation may exist within the building.

› Due to the potential for compromising the roofing system, sampling and analysis of roofing materials were specifically excluded from the scope of work. There is potential that some or all of the roofing system may contain ACMs.

› Electrical wiring insulation throughout the building may contain ACMs; however, this material was not sampled due to safety concerns with live electrical wiring.

› There is potential for underground asbestos-containing cement pipes at the Site. The identification of potential ACMs below ground was not within the scope of this report, and should be addressed during any excavation at the Site.

Lead-Based Paint:

› **Lead-containing yellow paints** were identified on the exterior of the Sign Shed (Photograph 9).

› **Lead-containing red paint** was identified on the frame of the man-door of the Sign Shed (Photograph 9).

› **Lead-containing off-white paint** was identified on the protective beam beside the roll-up door of the Sign Shed (Photograph 9).

Based on these results, all materials found at the Site of similar colours as identified above should be considered as lead-containing.

Solid and Liquid Wastes:

› **Three (3) unlabelled drums and two (2) unlabelled pails** were identified between the Maintenance Garage and the Sign Shed (Photograph 18).

› **One (1) lead-acid battery** was identified within a secondary containment tote (Photograph 24). There is also the potential for lead-containing batteries located within emergency lighting.

Silica:

› **Potential silica-containing concrete floors** (building foundations) were identified in the Sign Shed.

NEW GENERATOR SHED

The following hazardous materials were identified:

Suspect Asbestos-Containing Materials:

› Vermiculite insulation was not observed in the inspected wall cavities or in the attic area of the building. However, all areas could not be inspected due to the non-destructive nature of the survey; therefore, there is potential that vermiculite insulation may exist within the building.

› Due to the potential for compromising the roofing system, sampling and analysis of roofing materials were specifically excluded from the scope of work. There is potential that some or all of the roofing system may contain ACMs.

› Electrical wiring insulation throughout the building may contain ACMs; however, this material was not sampled due to safety concerns with live electrical wiring.

› There is potential for underground asbestos-containing cement pipes at the Site. The identification of potential ACMs below ground was not within the scope of this report, and should be addressed during any excavation at the Site.

PCB Materials:

› **One (1) potentially PCB-containing HID light ballast** may exist on the exterior of the New Generator Shed. The ballast was not accessible for assessment.

Solid and Liquid Wastes:

› **Approximately six (6) lead-acid batteries** were identified on the floor within the New Generator Building (Photograph 25). There is also the potential for lead-containing batteries to be present within emergency lighting.

› **Various consumer-packaged equipment maintenance materials and sundries** (e.g., oils and greases, etc.).

› **Oiled surfaces** were observed on the walls and floor (Photograph 26).

› **Oiled absorbent pads** were observed on the floor (Photograph 25 and 26).

Recommendations

SNC-Lavalin understands that PWGSC does not intend to demolish and/or deconstruct the Site, and in this case SNC-Lavalin recommends that PWGSC implement an Asbestos Management Plan (AMP) for the Site in accordance with federal and provincial regulations. General recommendations for an AMP are presented on page 14 of WorkSafeBC's *Safe Work Practices for Handling Asbestos*[1].

PWGSC has indicated that the Maintenance Garage and possibly some of the sheds may be relocated on the Site. This may cause disturbance to the buildings that is equivalent to (partial) demolition, deconstruction or salvage activities. According to WorkSafeBC OH&S Regulations Section 201.112, before beginning work on the demolition or salvage of machinery, equipment, buildings, or structures, an employer or owner must:

- Have a qualified person inspect the site to identify any asbestos containing materials that may be handled, disturbed, or removed;
- Have the inspection results available at the worksite; and
- Ensure that asbestos-containing materials are safely contained or removed.

As PWGSC clarifies plans for relocation of buildings, SNC-Lavalin can review these to provide further recommendations regarding necessary actions based on the results reported here-in.

If PWGSC undertakes renovations, demolition, or deconstruction activities on the Site, then known and suspect ACMs that were identified must be removed by a qualified contractor in accordance with applicable federal or provincial regulations. In addition, the roofing system and the wall cavities should be surveyed for ACMs prior to demolition.

WorkSafeBC suggests that improper removal of paint with a lead concentration of 600 mg/kg or more can result in airborne lead concentrations that exceed 50% of the airborne lead exposure limit of 0.05 mg/m^3; this would trigger the requirement for an employer to file a Notice of Project Lead (NOPL) and the development and implementation of an exposure control plan and safe work procedures prior to any work being completed.

There is the potential for lead exposure for high risk individuals in the event that lead-based paint with lead concentrations >90 mg/kg is burned and/or becomes airborne during renovation, deconstruction/demolition activities such as cutting, grinding, etc. Therefore, these individuals should be excluded from the work area whenever lead-based paint is being disturbed by work activities to minimize potential lead exposure to these individuals.

Lead-based paint on structures is not generally considered a hazardous waste as it is in small enough proportions relative to the entire mass of the structure that it would not be expected to pose a concern. However, if lead-based paint is removed from the structure then the paint should be collected and submitted for analysis to determine if lead is found in the leachate in concentrations exceeding the acceptance criteria of the receiving site.

[1] http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/asbestos.pdf

Although all HID and fluorescent fixtures inspected during the investigation were confirmed to contain PCB-Free ballasts, several fixtures were not accessible for inspection as noted above. If these fixtures will be removed during future renovations of demolition work, ballasts in these fixtures should be inspected to confirm if they are PCB-Free, and managed accordingly[2].

Suspected silica-containing material, such as the buildings concrete foundation, must be managed appropriately. Parts 5, 6 and 20 of the *Occupational Health and Safety Regulation* (OHSR) set out occupational exposure guidelines and controls for silica dust to eliminate, reduce, or manage workers' exposure risk. WorkSafeBC identifies the requirement to develop an exposure control plan to protect workers from overexposure to airborne silica dust in excess of 50% of the exposure limit (i.e., crystalline silica has an OHSR occupational exposure limit of 0.025 mg/m^3).

If PWGSC undertakes renovations or demolition at the site, PWGSC should require that the qualified contractors (i.e., abatement, demolition and/or disposal contractors) submit the following documentation to PWGSC to verify that the qualified contractors have acted in a responsible manner in accordance with the existing applicable regulations:

- notice of project for work involving asbestos (NOPA) to be filed with WSBC prior to asbestos abatement;
- NOPL to be filed with WSBC prior to lead abatement;
- site-specific work procedures for materials of concern (asbestos and lead procedures are included with NOPA and NOPL);
- letter stating that the PCB disposal work was completed; and
- relevant Waste Disposal Manifests.

The above documentation should be retained by PWGSC to verify compliance with the applicable regulations. The information supplied by the contractor(s) should include, but not be limited to the above list.

Regulatory Framework

Federal and provincial regulations require that regulated building materials be properly identified and managed to prevent potential exposure to workers. In addition, a more intrusive survey is required to identify materials of concern prior to renovations, salvage, or demolition of a building or structure. These materials must be properly controlled, removed, and/or disposed of at a suitably permitted facility in accordance with the applicable federal and provincial regulations. The following federal and provincial regulations relate to these materials:

[2] *Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2* (August 1991), by Environment Canada

Federal

- Various Regulations made under the Canadian Environmental Protection Act (CEPA), 1999, S.C. 1999, c. 33, as amended up to February 26, 2015 and current to October 15, 2015, including specialized handling and/or disposal requirements for materials including lead, PCBs, mercury, halocarbons (ODSs and Non-ODSs), radiological sources and/or substances and solid/hazardous wastes. Regulations include the following:
  - *Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations* (SOR/2005-149);
  - *Federal Halocarbon Regulations*, 2003 (SOR/2003-289) and *Regulations Amending the Federal Halocarbon Regulations*, 2003 (SOR/2009-221);
  - *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations*, 2008 (SOR/2008-197);
  - *Interprovincial Movement of Hazardous Waste Regulations* (SOR/2002-301);
  - *Ozone-Depleting Substances Regulations,* 1998 (SOR/99-7);
  - *PCB Regulations* (SOR/2008-273); and
  - *PCB Waste Export Regulations*, 1996 (SOR/97-109).
- *Transportation of Dangerous Goods* (TDG) *Act,* 1992, S.C. 1992, c. 34, as amended up to February 26, 2015, Transportation of Dangerous Goods Regulations (SOR/2001-286) requires that radioactive materials must be transported in accordance with the provisions of the Act.
- Hazardous *Products Act* (R.S.C., 198, c. H-3), as amended up to February 11, 2015, prohibits the sale or importation of UFFI into Canada.
- *Surface Coating Materials Regulations,* SOR/2005-109, as amended up to June 20, 2011, requires the concentration of total lead present in a surface coating material to be not more than 90 mg/kg.
- *Human Resources Social Development Canada (HRSDC), Canada Labour Code Part II*, Canada Occupational Health and Safety Regulations, Part X, Hazardous Substances, as amended, requires that all hazardous substances in the workplace, including asbestos, be identified and controlled to minimize potential exposure to workers. Under the Canada Labour Code Part II definitions, a “hazardous substance” includes a controlled product and a chemical, biological, or physical agent that, by reason of a property that the agent possess, is hazardous to the safety or health of a person exposed to it.

Provincial

- WorkSafeBC *Occupational Health and Safety Regulation* (OHSR), BC Reg. 296/97, as amended by B.C. Reg. 30/2015, requires that materials including any asbestos, lead, or other heavy metal or toxic substance, and flammable or explosive materials that may be handled, disturbed or removed during demolition must be identified and removed or safely contained prior to demolition. In addition, a copy of the observation report identifying these materials must be available at the work site.

- Environmental *Management Act* (EMA), S.B.C. 2003, c. 53, as am. by S.B.C. 2004, c. 18., *Ozone Depleting Substances (ODS) and Other Halocarbons Regulation*, BC Reg. 387/99, including amendments up to BC Reg. 317/2012, requires ODS to be recovered from equipment prior to disposal.
- *Hazardous Waste Regulation* (HWR), B.C. Reg. 63/88, including amendments up to B.C. Reg. 63/2009, requires all Hazardous Wastes (HW) must be properly managed and disposed of.

We note that at the time of this report, the provincial OHSR defines ACM as any manufactured article or other material which contains 0.5% or more asbestos by weight and vermiculite insulation containing any amount of asbestos. Other federal and provincial legislation defines ACM as containing 1% or more asbestos by weight. Therefore, for the purposes of this report the more stringent criterion of 0.5% has been used to identify ACM.

Federal and provincial guidelines limit lead concentrations in paint to 90 mg/kg for high risk individuals (i.e., pregnant women and children), and any concentrations that exceed this limit would be considered a lead based paint. WorkSafeBC suggests that improper removal of paint with a lead concentration of 600 mg/kg or more can result in airborne lead concentrations that exceed 50% of the airborne lead exposure limit of 0.05 mg/m^3; this would trigger the requirement for an employer to file a NOPL and the development and implementation of an exposure control plan and safe work procedures prior to any work being completed. Therefore, for the purposes of this report we have identified paint as lead based if the total lead concentration is >90 mg/kg as per the federal regulations, and if the paint contains lead concentrations >600 mg/kg, an exposure control plan may be required if the paint is disturbed in such a manner that workers could be exposed to lead at >50% of the exposure limit.

There are no special disposal requirements for materials coated with lead paint unless the lead is found to be leachable in excess of the regulated standard of 5 mg/L in the HW regulations while considering the entire mass of the object the paint is coating.

Radioactive materials are listed under the current Federal TDG Act. Substances with a specific radioactivity greater than 70 kBq/kg are considered Class 7 (Radioactive Materials) within the TDG Act and must be transported in accordance with the provisions of the TDG Act. The Nuclear Safety and Control Act (1997, c.9), Nuclear Substances and Radiation Devices Regulations (SOR/2000-207), advises that radioactive substances that do not contain more than 185 kBq of americium 241 or, where it is in a commercial or industrial facility, more than 740 kBq of americium 241 is considered as a radioactive source under the TDG Act. These levels may be reached if more than 20 radioactive smoke detection devices are collected and stored together.

WorkSafeBC indicates that employers are required under Section 5.54 of the OHSR to develop an exposure control plan when workers are or may be exposed to airborne silica dust in excess of 50% of the exposure limit. Exposure limits vary depending on the type of silica identified.

Methodology

The following sections outline the specific protocols followed when completing the survey.

Asbestos

The methodology for completing the asbestos assessment was in accordance with WorkSafeBC guidelines and included the identification of suspect materials and collection of an adequate number of representative samples of these materials. All accessible areas of the Site were observed for possible ACM with the exception of the roofing system due to the potential of compromising the system. Accessible wall cavities and the attic were inspected for the possible presence of vermiculite insulation.

On December 21, 2015, a total of 15 samples were collected and submitted for asbestos analysis to International Asbestos Testing Laboratories in Mt. Laurel, NJ, USA (IATL). Samples were analyzed in accordance with the applicable regulations.

Lead Paint

Different paint colours may contain different concentrations of lead; therefore, SNC-Lavalin personnel inspected the Site to determine primary paint colour(s) that had been applied to major surfaces. The approach was to try to obtain samples from structures that may need to be cut, ground, or sanded during renovation or demolition/deconstruction. In general, factory painted metal surfaces are not sampled as the paint is applied in thin layers, making it difficult to obtain a sufficient amount of paint to analyze.

During the survey, 22 samples were collected and submitted to Maxxam Analytics in Burnaby, BC (Maxxam) for analysis of total lead in accordance with the applicable regulations.

Polychlorinated Biphenyls (PCBs)

The survey included the observation of accessible areas of the Site for items or equipment that could possibly contain PCBs, such as fluorescent light fixtures, HID lamps, and oil-filled electrical equipment.

SNC-Lavalin personnel inspected fluorescent light ballasts and compared the manufacturer and/or date codes on the ballast labels to the Environment Canada publication, "*Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2*" (August 1991) to determine if they contain or are suspected of containing PCBs.

Ozone Depleting Substances

SNC-Lavalin personnel observed the interior and exterior spaces of the Site to identify if air conditioning units, refrigerators, freezers, or other sources of ODS exist. If a unit was identified, the manufacturer's nameplate (if accessible) was observed to determine the type and amount of refrigerant used.

Miscellaneous Solid and Liquid Wastes

The survey included observations of solid and liquid wastes identified at the Site such as fuel tanks and consumer-packaged materials. SNC-Lavalin personnel compiled an inventory of materials with the potential of containing solid or liquid waste.

Liquid Mercury

The interior of the building was observed for thermostats that may contain small amounts of liquid mercury. The covers of thermostats found were opened to assess the presence of mercury ampoules.

Radiological Sources and/or Substances

Radioactive sources and/or substances may be present in smoke detection devices.

The accessible areas of the Site were observed for potential radiological sources and/or substances and, if found, SNC-Lavalin compiled an inventory. Any remaining radiological sources and/or substances should be properly disposed of by a qualified contractor prior to renovations or demolition/deconstruction.

Silica

Silica is a common substance found in sand, rock, and building materials such as concrete and brick. Cutting and grinding, or drilling these materials releases dangerous crystalline silica dust into the air that, when breathed in, can cause permanent damage to the lungs.

SNC-Lavalin personnel noted materials at the Site that are suspected of containing silica.

Mould and/or Moisture

SNC-Lavalin personnel observed interior and exterior areas of the Site for the presence of mould and/or moisture. Any suspect areas identified (e.g., beneath sinks or adjacent hot water tanks) were noted and photographed.

Results

Details of the results are presented for each regulated material of concern in Table 1, below. This information includes recommendations for removal/handling during renovation or demolition / deconstruction activities, where required.

TABLE 1: Detailed Inventory of Regulated Materials – Maintenance Garage – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM)		
Suspect ACM sampled: › A1 – Maint. Garage, yellow window mastic, upper storage area. › A2 – Maint. Garage, black window mastic, upper storage area. › A3 – Maint. Garage, off-white window mastic, exterior. › A13 – Maint. Garage, door sweep, off-white, fibrous. › **A14 – Maint. Garage, black mastic, patch near man-door.** › A15 – Maint. Garage, clear mastic, electrical service, exterior.	Analytical Result: › non-asbestos › non-asbestos › non-asbestos › non-asbestos › **4.3% Chrysotile** › non-asbestos	Prior to renovation/demolition, the ACM must be removed by a qualified asbestos removal contractor. Work should be performed in accordance with the OHSR and BC HWR. **Note:** At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.
Suspect Vermiculite: › Accessible wall cavities were inspected. No evidence of vermiculite insulation was observed.	Analytical Result: › N/A	No renovation/pre-demolition requirements necessary.
Suspect ACMs not sampled: › The roofing material and any associated mastic(s) were not sampled to prevent compromising the integrity of the roof membrane. › Two (2) suspect fire doors in the Maintenance Garage (man-doors to the exterior). › Electrical wiring insulation throughout the building.	Analytical Result: › N/A › N/A › N/A	The roofing materials should be analyzed for potential asbestos content prior to replacement and/or demolition/deconstruction of the roof. The material, if any, within the doors should be analyzed for potential asbestos content prior to replacement and/or demolition/deconstruction. The electrical wiring insulation should be analyzed for potential asbestos content prior to replacement and/or removal.

TABLE 1 (Cont'd): Detailed Inventory of Regulated Materials – Maintenance Garage – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
LEAD PAINT (mg/kg)		
Suspect lead-based paint sampled: › P1 – Maintenance Garage, white walls, upper storage area. › **P2 – Maintenance Garage, green floor, upper storage area.** › P3 – Maintenance Garage, red trim, upper storage area & stairs. › P4 – Maint. Garage, white ceiling beams, upper storage area. › **P5 – Maint. Garage, red, vertical I-beams, upper storage area.** › **P17 – Maint. Garage, yellow, building exterior.** › P18 – Maint. Garage, red (all layers), bollard beside roll-up door. › **P19 – Maint. Garage, red, man-door frame.** › **P20 – Maint. Garage, green, man-door frame (beneath red).** › **P21 – Maint. Garage, white, wall paint, main area.** › **P22 – Maint. Garage, off-white, wall, main area, near stairs.**	Analytical Result: › <12 mg/kg › **1,010 mg/kg** › 34 mg/kg › 5 mg/kg › **115 mg/kg** › **8,100 mg/kg** › 56.5 mg/kg › **1,520 mg/kg** › **10,800 mg/kg** › **286 mg/kg** › **4,490 mg/kg**	Lead paint was identified containing **>90 mg/kg** in the majority of samples. If cutting torch, grinding equipment or other work methods are used on the painted areas of the structures that could mobilize lead dust or fumes then high risk individuals such as pregnant women or children should be kept out of the work area. Most of the paint samples were also found to be containing lead concentrations **>600 mg/kg**. Therefore, an exposure control plan must be implemented if work activities could generate lead dust or fumes. A fog nozzle to wet the area should be used to reduce particles during the demolition process.

TABLE 1 (Cont'd): Detailed Inventory of Regulated Materials – Maintenance Garage – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
POLYCHLORINATED BIPHENYLS		

Fluorescent light ballasts were identified/suspected in the following areas:
› Throughout the Maintenance Garage:
  › Approximately two (2) ballasts in the parts area;
  › Approximately seven (7) ballasts in the main shop.
 	
High Intensity Discharge (HID) light ballasts were identified in the following areas:
› Maintenance Garage interior:
  › Approximately eight (8) ceiling-mounted units. (Ballasts not accessible for assessment).
  › Approximately one (1) wall-mounted unit. (Ballast not accessible for assessment).
› Maintenance Garage exterior:
  › Approximately one (1) HID ballast. (Ballast not accessible for assessment).
	› All ballast labels indicated the ballasts do not contain PCBs.
	
	› **Potential PCB-containing light ballasts** located within the Maintenance Garage.
		Prior to renovation/demolition remove all light ballasts and/or capacitors. Inspect for PCB-containing and/or suspect PCB-containing ballasts as per Environment Canada publication, *Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2,* August 1991.
		
		Place known or suspect PCB-containing ballasts in an 18-gauge steel painted drum with a close fitting removable steel lid on top of a gasket of PCB-resistant material. The drum is to be supplied by the demolition contractor. Drums should be disposed of in Canada in accordance with HWR.

TABLE 1 (Cont'd): Detailed Inventory of Regulated Materials – Maintenance Garage – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
SOLID AND LIQUID WASTES		
› **An aboveground waste oil tank** was observed adjacent to the Maintenance Garage.	› Dated 1990's with a capacity of 1,000 L.	These materials must be removed prior to demolition. However, if these materials are to be disposed of or recycled, it is the responsibility of the qualified contractor to correctly identify and characterize the wastes observed and dispose of or recycle appropriately.
› **Two aboveground propane tanks** were observed outside the Maintenance Garage.	› No tags. Estimated size of 2,800 L each.	
› **Three unlabelled drums and two unlabelled pails** were present between the Maintenance Garage and the Sign Shed.	› Potential for liquid waste.	
› **Approximately 11 fire extinguishers** were identified within the parts storage area.	› Potential for liquid waste.	
› **A waste oil collection drum** was identified within the Maintenance Garage.	› Potential for liquid waste.	
› **Three unlabelled pails** suspected to contain used oil were present near the door adjacent the parts storage area.	› Potential for liquid waste.	
› **Lead-based batteries** were identified in various locations in the Maintenance Garage. There is the potential for lead-based batteries in emergency lighting fixtures located in the building.	› Potential for lead containing material.	
› **A parts washer** was identified in the Maintenance Garage.	› Potential for liquid waste.	
› **One (1) oxyacetylene torch and associated gas cylinders** located on a dolly.	› Potential for liquid waste.	
› **One (1) large propane cylinder** located in the centre of vehicle parking area.	› Potential for liquid waste.	
› **Various consumer- and bulk-packaged vehicle and equipment maintenance materials and sundries (e.g., oils, greases, antifreeze, etc.)** were observed throughout the Maintenance Garage.	› Potential for solid/liquid waste.	
› **Various consumer-packaged materials** (e.g., cleaning products, paint, etc.) were identified throughout the building.	› Potential for solid/liquid waste.	
› **A large, empty, unlabelled plastic aboveground storage tank** was present in the Maintenance Garage.	› Potential for liquid waste.	

TABLE 1 (Cont'd): Detailed Inventory of Regulated Materials – Maintenance Garage – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
OZONE DEPLETING SUBSTANCES		
No ozone depleting substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
LIQUID MERCURY		
Four thermostats were observed in the Maintenance Garage › Two immediately outside the office area (no mercury). › Two immediate adjacent the man-door next to the roll-up doors (no mercury).	› None identified.	No renovation/pre-demolition requirements necessary.
RADIOLOGICAL SOURCES AND SUBSTANCES		
No suspect radiological sources or substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
SILICA		
Concrete floor was identified in the Maintenance Garage.	› Potential silica-containing materials	If the material is to be cut, ground, drilled or broken up during renovation/demolition, then airborne silica particles may be released. Therefore, an exposure control plan must be implemented if work activities could generate silica dust.
MOULD AND/OR MOISTURE		
› Significant moisture was present in the Maintenance Garage due to equipment with ice and snow build-up being allowed to thaw prior to maintenance. › A below ground sump was identified in the Maintenance Garage and was being used to collect water from the thawing of snow and ice build-up on equipment. A hydrocarbon-like sheen and hydrocarbon-like odours were identified within the sump. No mould was identified.	› None identified.	No renovation/pre-demolition requirements necessary.

TABLE 2: Detailed Inventory of Regulated Materials – Old Generator Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM)		
Suspect ACM sampled: › A4 – Old Gen. Shed, door sealant, grey, fibrous. › **A5 – Old Gen. Shed, black mastic, exterior, adjacent window.** › A6 – Old Gen. Shed, tan mastic (window putty), interior. › **A7 – Old Gen. Shed, off-white panel in chimney.** › A8 – Old Gen. Shed, black window mastic, entry door. › A9 – Old Gen. Shed, grey mastic, patch, exterior below window. › A10 – Old Gen. Shed, tan mastic (window putty patch, interior. › A11 – Old Gen. Shed, tan mastic between window frame & wall. › A12 – Old Gen. Shed, ceiling tile.	Analytical Result: › non-asbestos › **3.8% Chrysotile** › non-asbestos › **90% Chrysotile** › non-asbestos › non-asbestos › non-asbestos › <0.25% chrysotile › non-asbestos	Prior to renovation/demolition, the ACM must be removed by a qualified asbestos removal contractor. Work should be performed in accordance with the OHSR and BC HWR. **Note:** At the time of this report, ACM means any manufactured article or other material, which contains 0.5% or more asbestos by weight as defined in the regulations.
Suspect Vermiculite: › Accessible wall cavities were inspected. No evidence of vermiculite insulation was observed.	Analytical Result: › N/A	No renovation/pre-demolition requirements necessary.
Suspect ACMs not sampled: › The roofing material and any associated mastic(s) were not sampled to prevent compromising the integrity of the roof membrane. › Electrical wiring insulation throughout the building.	Analytical Result: › N/A › N/A	The roofing materials should be analyzed for potential asbestos content prior to replacement and/or demolition/deconstruction of the roof. The electrical wiring insulation should be analyzed for potential asbestos content prior to replacement and/or removal.

TABLE 2 (Cont'd): Detailed Inventory of Regulated Materials – Old Generator Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
LEAD PAINT (mg/kg)		
Suspect lead-based paint sampled: › **P6 – Old Gen. Shed, white ceiling beams, (outer layer).** › **P7 – Old Gen. Shed, red window trim, interior.** › **P8 – Old Gen. Shed, white ceiling beams (original layer).** › **P9 – Old Gen. Shed, red primer, ceiling beams (base layer).** › **P10 – Old Gen. Shed, grey, interior side of entry door.** › P11 – Old Gen Shed, white, flooring. › **P12 – Old Gen. Shed, black, metal window frame, interior.** › **P13 – Old Gen. Shed, grey, chimney vent frame, ceiling.**	Analytical Result: › **452 mg/kg** › **675 mg/kg** › **1,660 mg/kg** › **1,530 mg/kg** › **955 mg/kg** › 23.7 mg/kg › **761 mg/kg** › **2,170 mg/kg**	Lead paint was identified containing **>90 mg/kg** in the majority of samples. If cutting torch, grinding equipment or other work methods are used on the painted areas of the structures that could mobilize lead dust or fumes then high risk individuals such as pregnant women or children should be kept out of the work area. Most of the paint samples were also found to be containing lead concentrations **>600 mg/kg**. Therefore, an exposure control plan must be implemented if work activities could generate lead dust or fumes. A fog nozzle to wet the area should be used to reduce particles during the demolition process.
POLYCHLORINATED BIPHENYLS		
Fluorescent light ballasts were identified/suspected in the following areas: › Old Generator Shed Exterior: › Approximately one (1) HID ballast on the building exterior. (Ballast not accessible for assessment).	› **Potential PCB-containing light ballast** located on the Old Generator Shed.	Prior to renovation/demolition remove all light ballasts and/or capacitors. Inspect for PCB-containing and/or suspect PCB-containing ballasts as per Environment Canada publication, *Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2,* August 1991. Place known or suspect PCB-containing ballasts in an 18-gauge steel painted drum with a close fitting removable steel lid on top of a gasket of PCB-resistant material. The drum is to be supplied by the demolition contractor. Drums should be disposed of in Canada in accordance with HWR.

TABLE 2 (Cont'd): Detailed Inventory of Regulated Materials – Old Generator Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
SOLID AND LIQUID WASTES		
› **Lead-based batteries** potential within emergency lighting fixtures located in the building. › **Various garbage/debris** throughout the building › **Various consumer- and bulk-packaged vehicle and equipment maintenance materials and sundries** (e.g., oils, greases, antifreeze, etc.) were observed within the Old Generator Shed.	› Potential for lead containing material. › Potential for solid/liquid waste. › Potential for solid/liquid waste.	These materials must be removed prior to demolition. However, if these materials are to be disposed of or recycled, it is the responsibility of the qualified contractor to correctly identify and characterize the wastes observed and dispose of or recycle appropriately.
OZONE DEPLETING SUBSTANCES		
No ozone depleting substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
LIQUID MERCURY		
No liquid mercury was identified in the building	› None identified.	No renovation/pre-demolition requirements necessary.
RADIOLOGICAL SOURCES AND SUBSTANCES		
No suspect radiological sources or substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
SILICA		
No suspect silica was identified.	› N/A	No renovation/pre-demolition requirements necessary.
MOULD AND/OR MOISTURE		
› Mould was identified on the walls of the Old Generator Shed. No odour was identified.	› **Identified mould** in the Old Generator Shed.	During renovation / demolition, dust and/or spore dispersion must be minimized. Therefore, an exposure control plan with safety control measures must be implemented as per Table 1 of the OHSR – Guidelines Part 4 – Indoor air quality (G4.79).

TABLE 3: Detailed Inventory of Regulated Materials – Sign Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM)		
No suspect ACM was identified in the Sign Shed.	› N/A	No renovation/pre-demolition requirements necessary.
Suspect Vermiculite: › Accessible wall cavities were inspected. No evidence of vermiculite insulation was observed.	Analytical Result: › N/A	No renovation/pre-demolition requirements necessary.
Suspect ACMs not sampled: › The roofing material and any associated mastic(s) were not sampled to prevent compromising the integrity of the roof membrane. › Electrical wiring insulation throughout the building.	Analytical Result: › N/A › N/A	The roofing materials should be analyzed for potential asbestos content prior to replacement and/or demolition/deconstruction of the roof. The electrical wiring insulation should be analyzed for potential asbestos content prior to replacement and/or removal.
LEAD PAINT (mg/kg)		
Suspect lead-based paint sampled: › **P14 – Sign Shed, red man-door frame.** › **P15 – Sign Shed, yellow, building exterior.** › **P16 – Sign Shed, off-white, protective beam by roll-up door.**	Analytical Result: › **1,320 mg/kg** › **287 mg/kg** › **2,150 mg/kg**	Lead paint was identified containing **>90 mg/kg** in the majority of samples. If cutting torch, grinding equipment or other work methods are used on the painted areas of the structures that could mobilize lead dust or fumes then high risk individuals such as pregnant women or children should be kept out of the work area. Most of the paint samples were also found to be containing lead concentrations **>600 mg/kg**. Therefore, an exposure control plan must be implemented if work activities could generate lead dust or fumes. A fog nozzle to wet the area should be used to reduce particles during the demolition process.

TABLE 3 (Cont'd): Detailed Inventory of Regulated Materials – Sign Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
POLYCHLORINATED BIPHENYLS		
No suspect PCB-containing material was identified in the Sign Shed.	› None identified.	No renovation/pre-demolition requirements necessary.
SOLID AND LIQUID WASTES		
› **Three unlabelled drums and two unlabelled pails** were present between the Maintenance Garage and the Sign Shed. › **Lead-based battery** (one [1]) was present within a secondary containment tote in the Sign Shed. There is the potential for lead-based batteries in emergency lighting fixtures in building.	› Potential for liquid waste. › Potential for lead containing material.	These materials must be removed prior to demolition. However, if these materials are to be disposed of or recycled, it is the responsibility of the qualified contractor to correctly identify and characterize the wastes observed and dispose of or recycle appropriately.
OZONE DEPLETING SUBSTANCES		
No ozone depleting substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
LIQUID MERCURY		
No liquid mercury was identified in the building	› None identified.	No renovation/pre-demolition requirements necessary.
RADIOLOGICAL SOURCES AND SUBSTANCES		
No suspect radiological sources or substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.

TABLE 3 (Cont'd): Detailed Inventory of Regulated Materials – Sign Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
SILICA		
Concrete floor was identified in the Sign Shed.	› Potential silica-containing materials	If the material is to be cut, ground, drilled or broken up during renovation/demolition, then airborne silica particles may be released. Therefore, an exposure control plan must be implemented if work activities could generate silica dust.
MOULD AND/OR MOISTURE		
No mould and/or moisture were identified in the Sign Shed.	› None identified.	No renovation/pre-demolition requirements necessary.

TABLE 4: Detailed Inventory of Regulated Materials – New Generator Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
ASBESTOS-CONTAINING MATERIALS (ACM)		
No suspect ACM was identified in the New Generator Shed.	› N/A	No renovation/pre-demolition requirements necessary.
Suspect Vermiculite: › Accessible wall cavities were inspected. No evidence of vermiculite insulation was observed.	Analytical Result: › N/A	No renovation/pre-demolition requirements necessary.
Suspect ACMs not sampled: › The roofing material and any associated mastic(s) were not sampled to prevent compromising the integrity of the roof membrane. › Electrical wiring insulation throughout the building.	Analytical Result: › N/A › N/A	The roofing materials should be analyzed for potential asbestos content prior to replacement and/or demolition/deconstruction of the roof. The electrical wiring insulation should be analyzed for potential asbestos content prior to replacement and/or removal.
LEAD PAINT (mg/kg)		
No suspect lead paint was identified in the New Generator Shed.	› N/A	No renovation/pre-demolition requirements necessary.

TABLE 4 (Cont'd): Detailed Inventory of Regulated Materials – New Generator Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
POLYCHLORINATED BIPHENYLS		
Fluorescent light ballasts were identified/suspected in the following areas: › New Generator Shed: › Approximately one (1) HID ballast located on the building exterior. (Ballast not accessible for assessment).	› **Potential PCB-containing light ballast** located within the New Generator Shed.	Prior to renovation/demolition remove all light ballasts and/or capacitors. Inspect for PCB-containing and/or suspect PCB-containing ballasts as per Environment Canada publication, *Identification of Lamp Ballasts Containing PCBs, Report EPS 2/CC/2,* August 1991. Place known or suspect PCB-containing ballasts in an 18-gauge steel painted drum with a close fitting removable steel lid on top of a gasket of PCB-resistant material. The drum is to be supplied by the demolition contractor. Drums should be disposed of in Canada in accordance with HWR.
SOLID AND LIQUID WASTES		
› **Lead-based batteries** (six [6]) were identified on the floor of the New Generator Building. There is the potential for lead-based batteries in emergency lighting fixtures in the building. › **Various consumer- and bulk-packaged vehicle and equipment maintenance materials and sundries** (e.g., oils, greases, antifreeze, etc.) were observed in the New Generator Shed.	› Potential for lead containing material. › Potential for solid/liquid waste.	These materials must be removed prior to demolition. However, if these materials are to be disposed of or recycled, it is the responsibility of the qualified contractor to correctly identify and characterize the wastes observed and dispose of or recycle appropriately.
OZONE DEPLETING SUBSTANCES		
No ozone depleting substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
LIQUID MERCURY		
No liquid mercury was identified in the building	› None identified.	No renovation/pre-demolition requirements necessary.

TABLE 4 (Cont'd): Detailed Inventory of Regulated Materials – New Generator Shed – Sikanni Maintenance Yard, Alaska Highway, BC

Issue / Location	Results	Renovation/Pre-Demolition Requirement
RADIOLOGICAL SOURCES AND SUBSTANCES		
No suspect radiological sources or substances were observed.	› None identified.	No renovation/pre-demolition requirements necessary.
SILICA		
No suspect silica was identified.	› N/A	No renovation/pre-demolition requirements necessary.
MOULD AND/OR MOISTURE		
No mould and/or moisture were identified in the New Generator Shed.	› None identified.	No renovation/pre-demolition requirements necessary.

Notice to Reader

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This report is intended to provide information to Canada to assist it in making business decisions. SNC-Lavalin is not a party to the various considerations underlying the business decisions, and does not make recommendations regarding such business decisions.

The findings, conclusions and recommendations in this report have been developed in a manner consistent with the level of skill normally exercised by environmental professionals currently practising under similar conditions in the area. The findings contained in this report are based, in part, upon information provided by others. If any of the information is inaccurate, modifications to the findings, conclusions and recommendations may be necessary.

The findings, conclusions and recommendations presented by SNC-Lavalin in this report reflect SNC-Lavalin's best judgement based on the site conditions at the time of the site inspection on the date(s) set out in this report and on information available at the time of preparation of this report. They have been prepared for specific application to this site and are based, in part, upon visual observation of the site, subsurface investigation at discrete locations and depths, and specific analysis of specific materials as described in this report during a specific time interval. Substances other than those described may exist within the site, reported substance parameters may exist in areas of the site not investigated, and concentrations of substances greater or less than those reported may exist between sample locations.

The findings and conclusions of this report are valid only as of the date of this report. If site conditions change, new information is discovered, or unexpected site conditions are encountered in future work, including excavations, borings, or other studies, the findings, conclusions and/or recommendations of this report should be re-evaluated. It is recommended that users of this report should engage a suitably qualified professional to assist in interpreting the significance, if any, of the findings.

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We trust this provides you with the information you currently require. If you have any questions, please contact this office at your earliest convenience.

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Project Scientist

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Senior Project Manager

Environment & Water
Infrastructure

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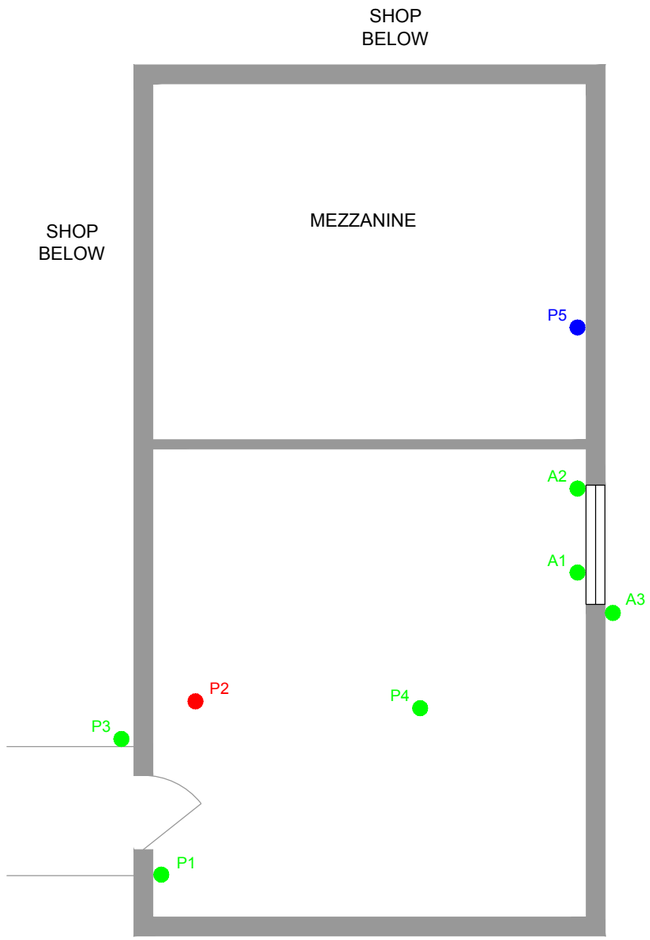
ATTACHMENTS
1. Drawings:
   - 633299-BMS1 – Building Material Survey
   - 633299-BMS2 – Building Material Survey
   - 633299-BMS3 – Building Material Survey
2. Photographs
3. Laboratory Analytical Report (IATL)
4. Laboratory Analytical Report (Maxxam)

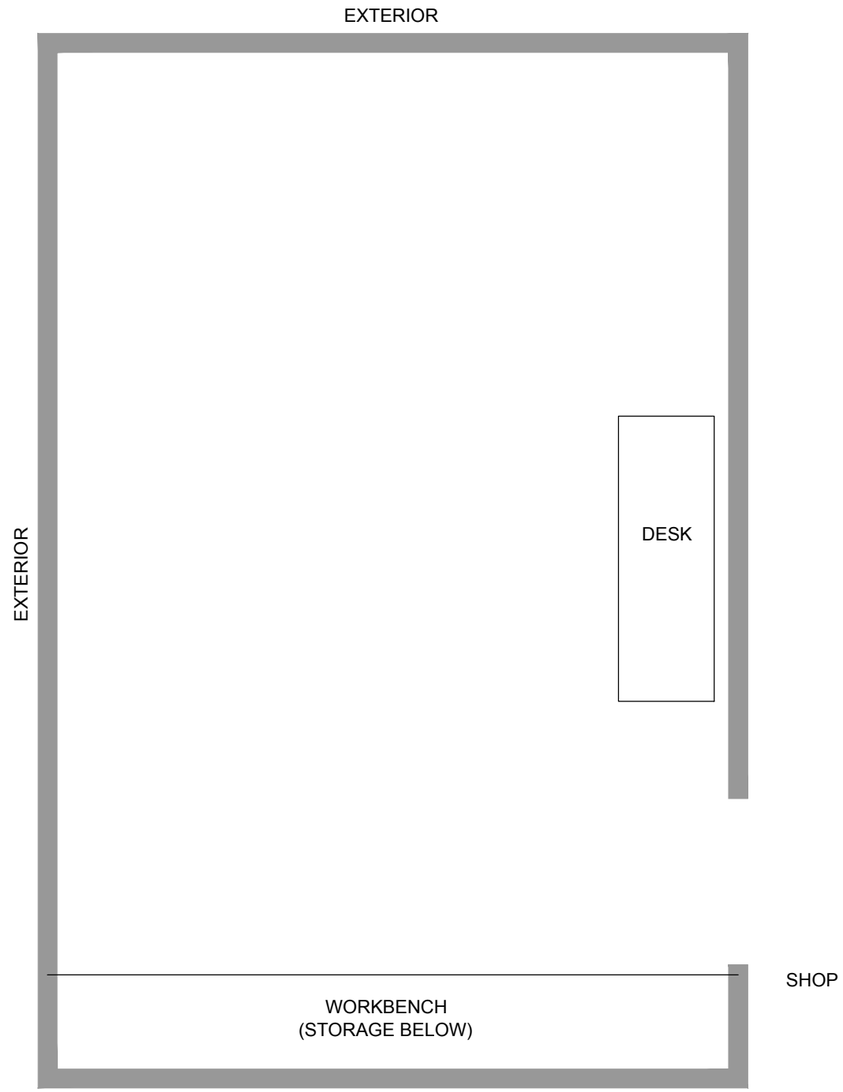
ATTACHMENT 1

Drawings

› 633299-BMS1 – Building Material Survey
› 633299-BMS2 – Building Material Survey
› 633299-BMS3 – Building Material Survey



MAINTENANCE GARAGE -
UPPER AREA



OFFICE IN MAINTENANCE
GARAGE

LEGEND

P4 ●	PAINT SAMPLE WITH LEAD CONCENTRATION LESS THAN OR EQUAL TO 90mg
P5 ●	PAINT SAMPLE WITH LEAD CONCENTRATION GREATER THAN 90mg AND LESS THAN 600mg
P2 ●	PAINT SAMPLE WITH LEAD CONCENTRATION GREATER THAN OR EQUAL TO 600mg
A1 ●	ASBESTOS SAMPLE WITH CONCENTRATION LESS THAN 0.5%

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2016-02-03	ISSUED TO CLIENT AS FINAL	PRT	TD
0	2016-01-28	ISSUED TO CLIENT AS DRAFT	PRT	TD

SNC·LAVALIN

CLIENT NAME:
PUBLIC WORKS AND GOVERNMENT SERVICES

PROJECT LOCATION:
SIKANNI MAINTENACE YARD
KM254, ALASKA HIGHWAY, BC

TITLE:
BUILDING MATERIAL SURVEY

DWN BY: PRT	SCALE: NTS	DATE: 2016-01-07	DWG No: REV.: 1
CHK'D: TD	PLOT: 20160203.1155	CADFILE: 633299-BM1	633299-BM1

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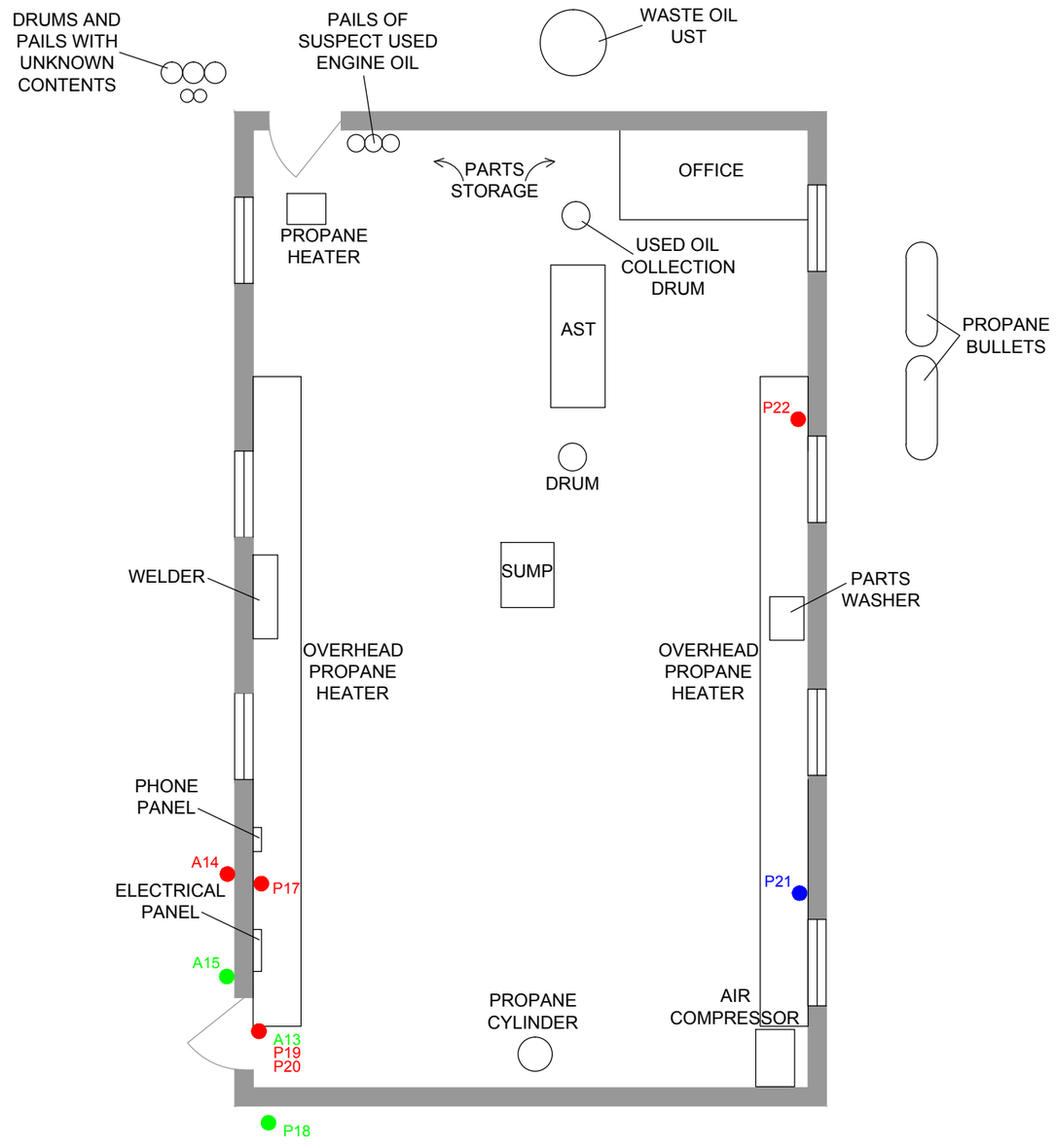
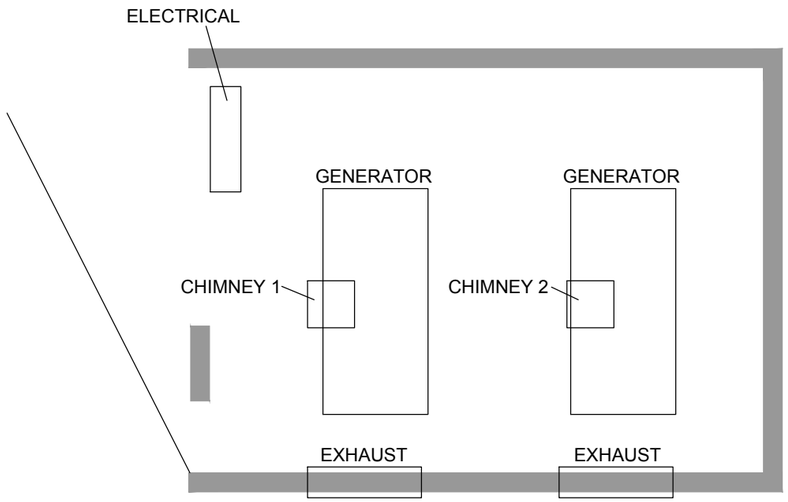


MAINTENANCE GARAGE



NEW GENERATOR SHED

LEGEND

P18 ●	PAINT SAMPLE WITH LEAD CONCENTRATION LESS THAN OR EQUAL TO 90mg
P21 ●	PAINT SAMPLE WITH LEAD CONCENTRATION GREATER THAN 90mg AND LESS THAN 600mg
P17 ●	PAINT SAMPLE WITH LEAD CONCENTRATION GREATER THAN OR EQUAL TO 600mg
A13 ●	ASBESTOS SAMPLE WITH CONCENTRATION LESS THAN 0.5%
A14 ●	ASBESTOS SAMPLE WITH CONCENTRATION GREATER THAN OR EQUAL TO 0.5%

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2015-02-03	ISSUED TO CLIENT AS FINAL	PRT	TD
0	2016-01-28	ISSUED TO CLIENT AS DRAFT	PRT	TD

SNC·LAVALIN

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES

PROJECT LOCATION: SIKANNI MAINTENACE YARD KM254, ALASKA HIGHWAY, BC

TITLE: BUILDING MATERIAL SURVEY

DWN BY: PRT	SCALE: NTS	DATE: 2016-01-07	DWG No: 633299-BM2 REV.: 1
CHK'D: TD	PLOT: 20160203.1155	CADFILE: 633299-BM1	

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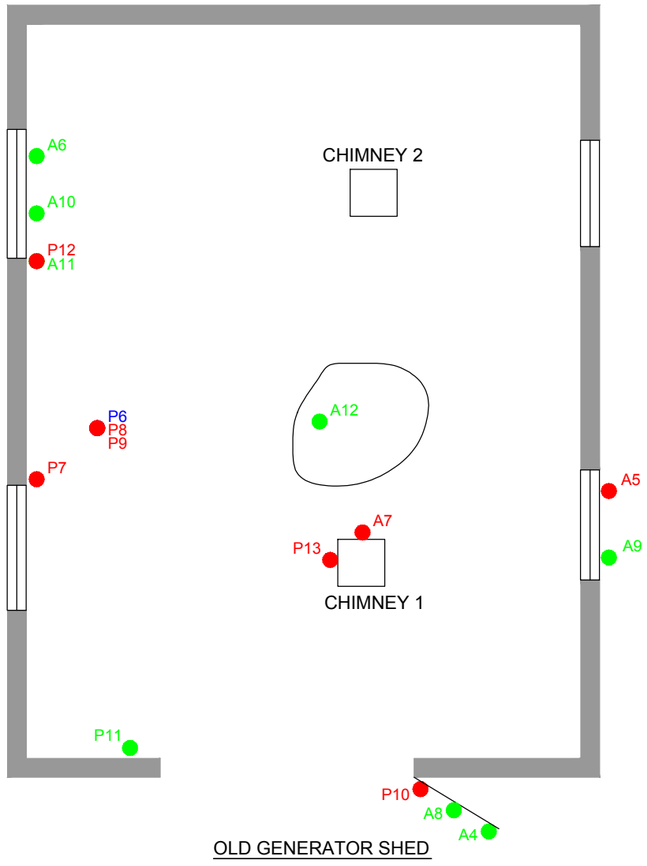

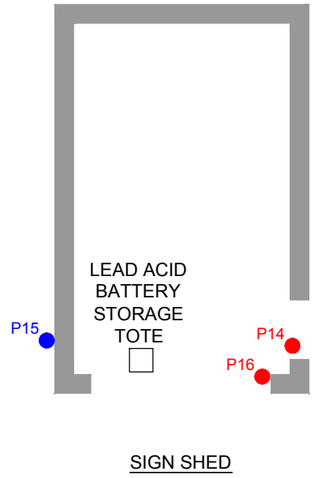

LEGEND

P11 ●	PAINT SAMPLE WITH LEAD CONCENTRATION LESS THAN OR EQUAL TO 90mg
P6 ●	PAINT SAMPLE WITH LEAD CONCENTRATION GREATER THAN 90mg AND LESS THAN 600mg
P7 ●	PAINT SAMPLE WITH LEAD CONCENTRATION GREATER THAN OR EQUAL TO 600mg
A6 ●	ASBESTOS SAMPLE WITH CONCENTRATION LESS THAN 0.5%
A7 ●	ASBESTOS SAMPLE WITH CONCENTRATION GREATER THAN OR EQUAL TO 0.5%

REFERENCE DRAWINGS

DWG. NO.	DATE	DESCRIPTION

REVISIONS

REV.	DATE	DESCRIPTION	BY	CHK
1	2016-02-03	ISSUED TO CLIENT AS FINAL	PRT	TD
0	2016-01-28	ISSUED TO CLIENT AS DRAFT	PRT	TD

SNC·LAVALIN

CLIENT NAME: PUBLIC WORKS AND GOVERNMENT SERVICES

PROJECT LOCATION: SIKANNI MAINTENACE YARD KM254, ALASKA HIGHWAY, BC

TITLE: BUILDING MATERIAL SURVEY

DWN BY: PRT	SCALE: NTS	DATE: 2016-01-07	DWG No: REV.: 1
CHK'D: TD	PLOT: 20160203.1156	CADFILE: 633299-BM1	633299-BM3

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ATTACHMENT 2

Photographs

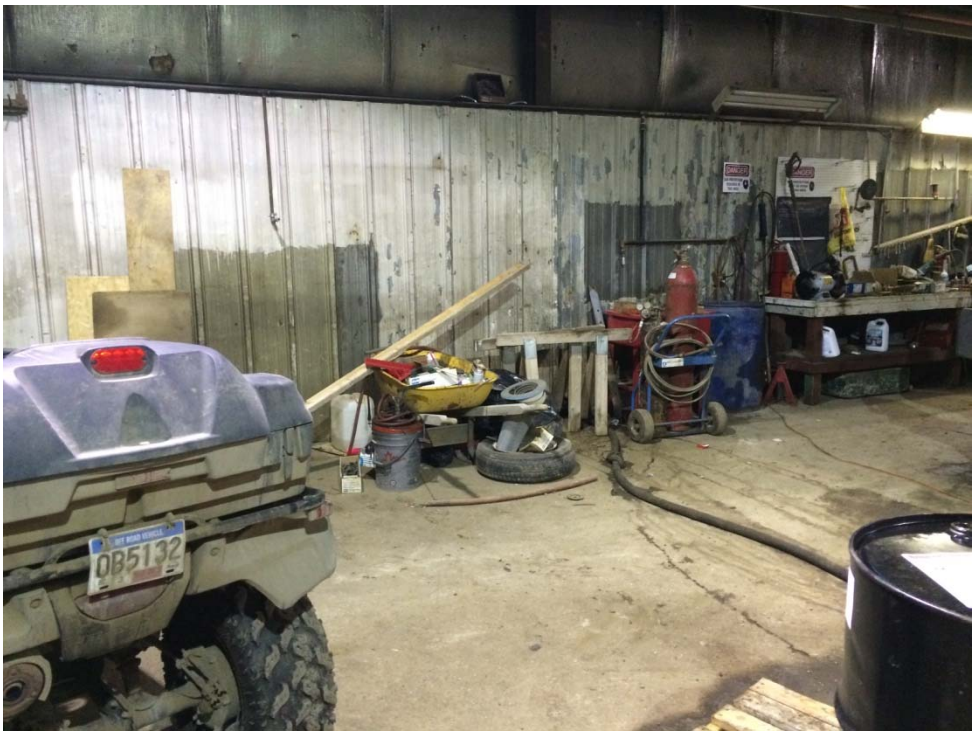
Photograph 1: Sample A5 – Old Generator Shed - Asbestos-containing black mastic above the exterior window.

Photograph 2: Sample A7 – Old Generator Shed – Asbestos-containing off-white insulation in the chimney located nearest the entry door.

Photograph 3: Sample A14 – Maintenance Garage – Asbestos-containing black mastic surrounding a patch on the exterior wall.

Photograph 4: Sample P2 – Maintenance Garage – Lead-containing green floor paint within the upper mezzanine area collected to the right of the orange toolbox.

Photograph 5: Sample P5 – Maintenance Garage – Lead-containing red paint on the framing I-beams.



Photograph 6: Samples P21 and 22 – Maintenance Garage – Lead-containing white (peeling) and off-white paints on the interior walls.

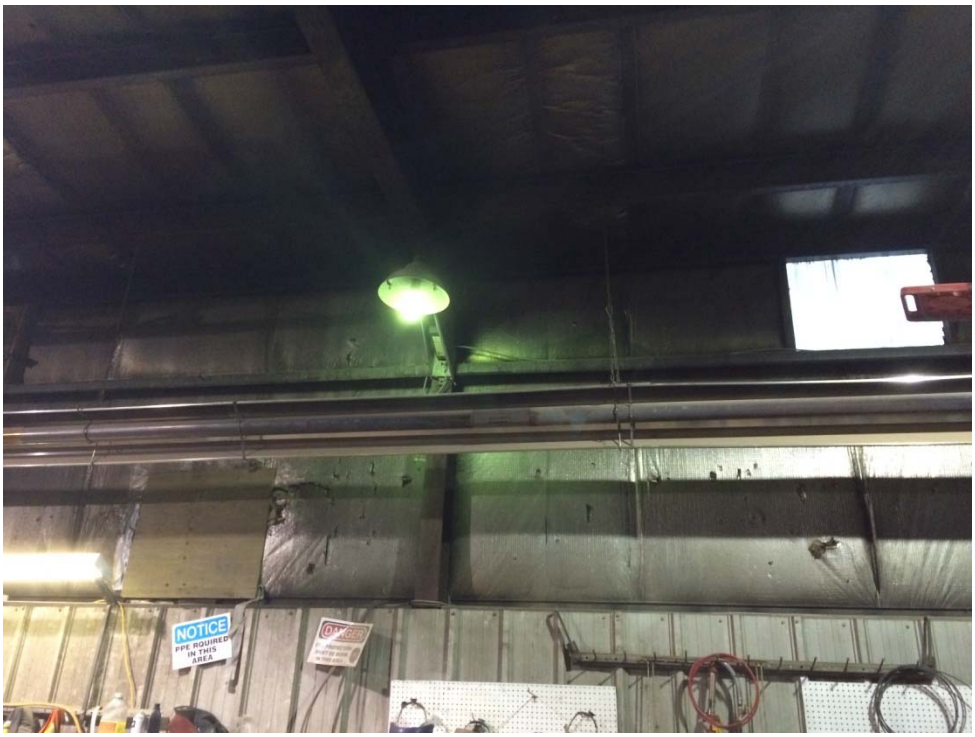
Photograph 7: Samples P19 and P20 – Maintenance Garage – Lead-containing red (P19) and green (P20) paints on the man-door entrance.

Photograph 8: Sample P17 – Maintenance Garage – Lead-containing yellow paint on the exterior. A waste oil tank is also visible.

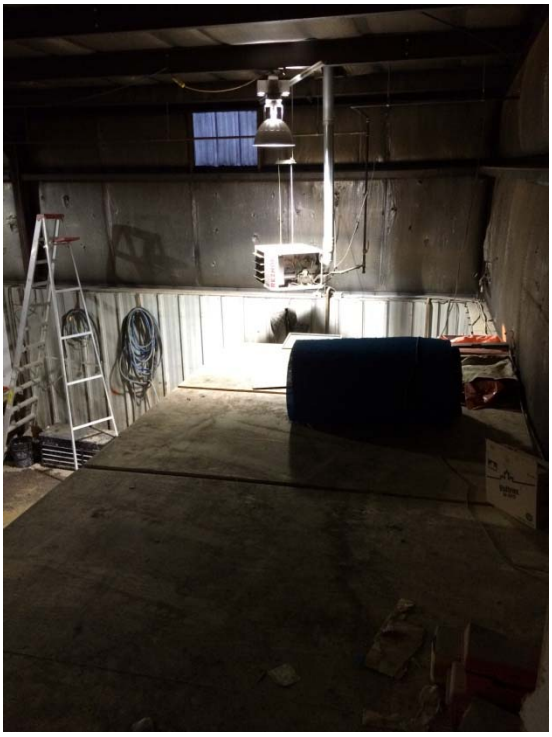
Photograph 9: Samples P14, P15 and P16 – Sign Shed – Lead containing red (P14), yellow (P15), and white (P16) paints on the exterior.

Photograph 10: Samples P6, P7, P8, P9 and P12 – Old Generator Shed – Lead-Containing white (P6 and P8) and red (P9) paint on the metal framing beams, and black (P12) and red (P7) paint on the window frames and wooden trim.

Photograph 11: Sample P10 – Old Generator Shed – Lead-containing grey paint on the entry door.



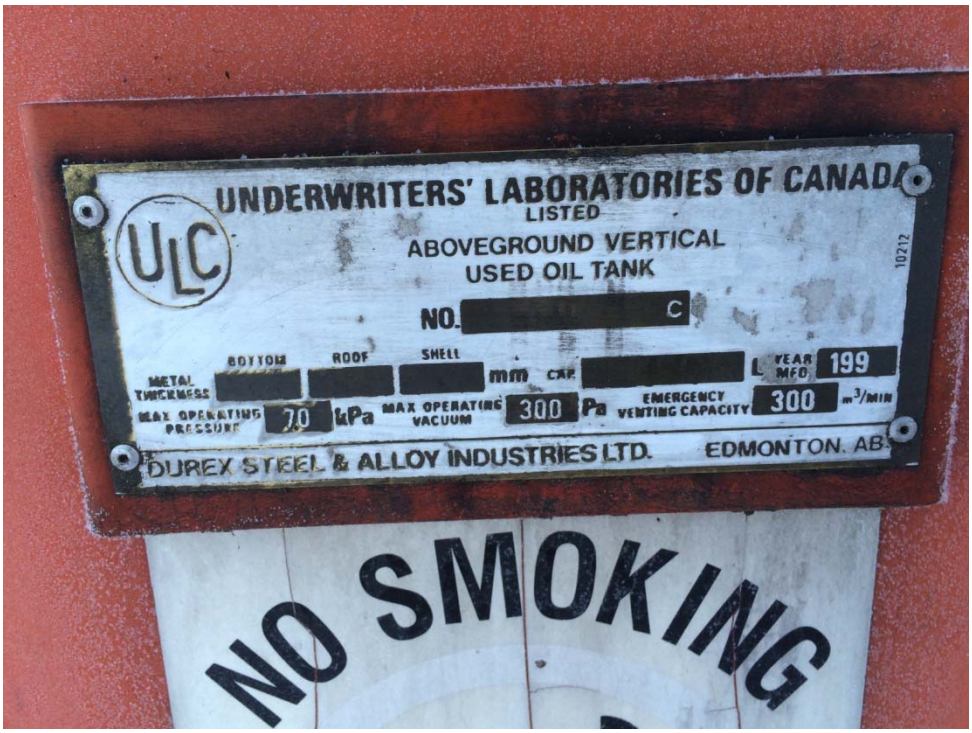
Photograph 12: Suspect PCB-containing HID ballast in the Maintenance Garage. This HID was the only wall-mounted HID identified.



Photograph 13: Suspect PCB-containing HID ballasts (2) were contained within metal housings in the Maintenance Garage.

Photograph 14: Suspect PCB-containing HID fixture on the exterior wall of the Maintenance Garage.

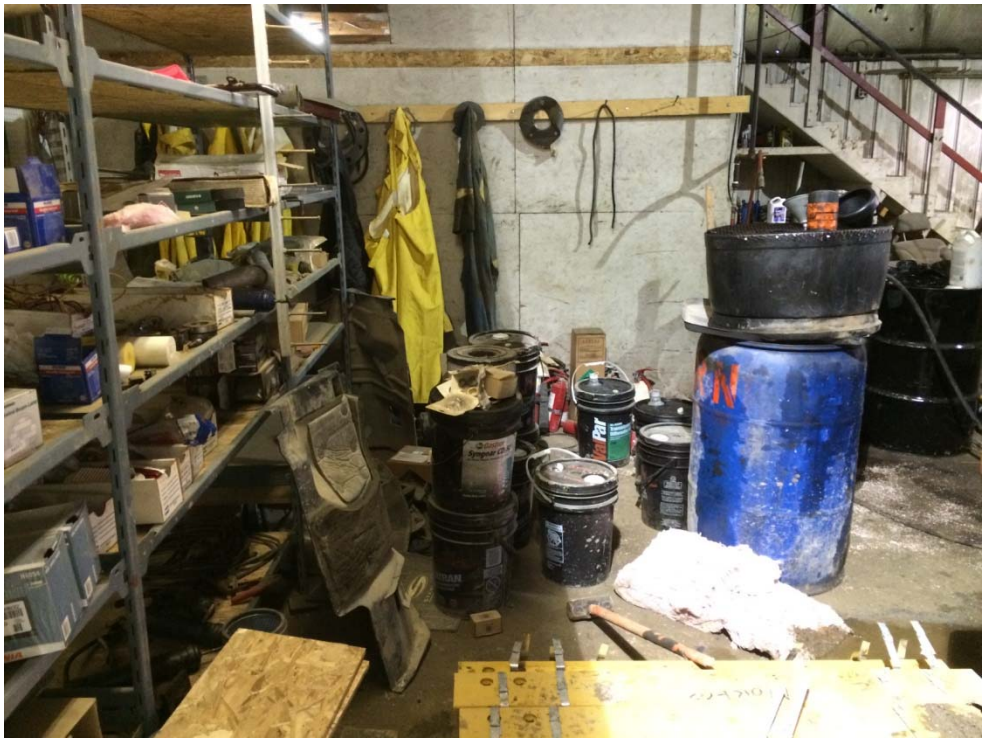
Photograph 15: Suspect PCB-containing HID fixture on the exterior of the Old Generator Shed.



Photograph 16: Details of the waste oil tank tag outside the Maintenance Garage. The year of manufacture was not legible.

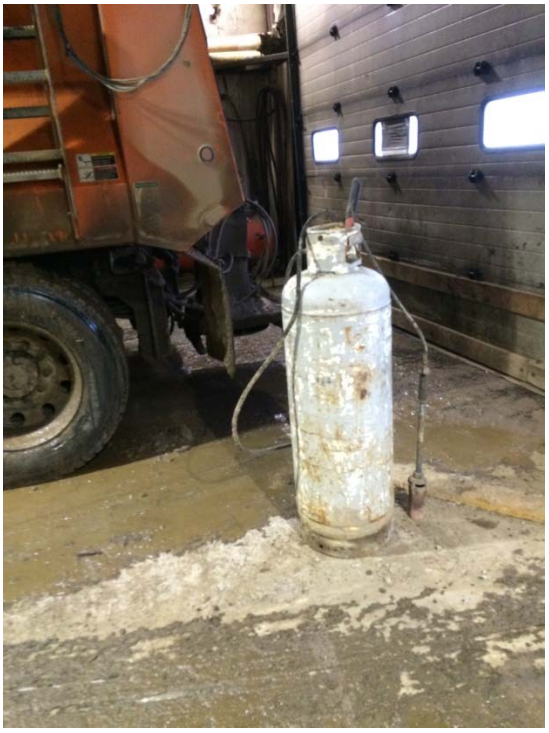
Photograph 17: Propane tanks located on the exterior of the Maintenance Garage.

Photograph 18: Drums & pails (unknown contents) outside the Sign Shed.

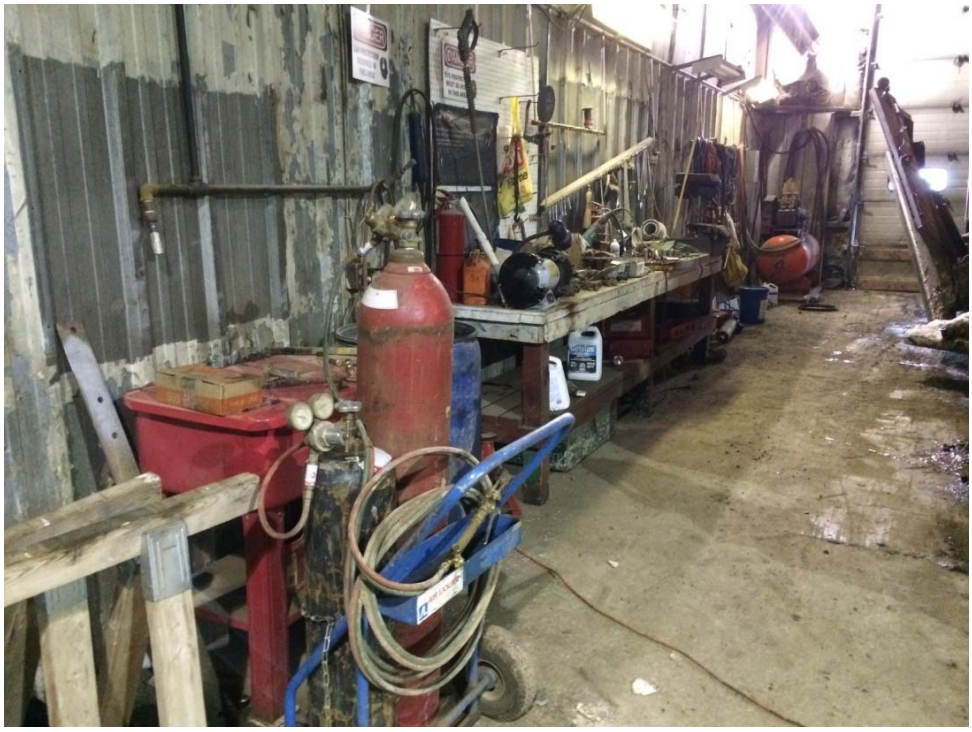


Photograph 19: Maintenance shop – fire extinguishers on back wall and blue oil collection drum.

Photograph 20: Maintenance shop – 3 pails of suspect waste oil adjacent back door.



Photograph 21: Maintenance Garage – propane cylinder in the vehicle parking area.



Photograph 22: Maintenance Garage – oxyacetylene torch and gas cylinders.

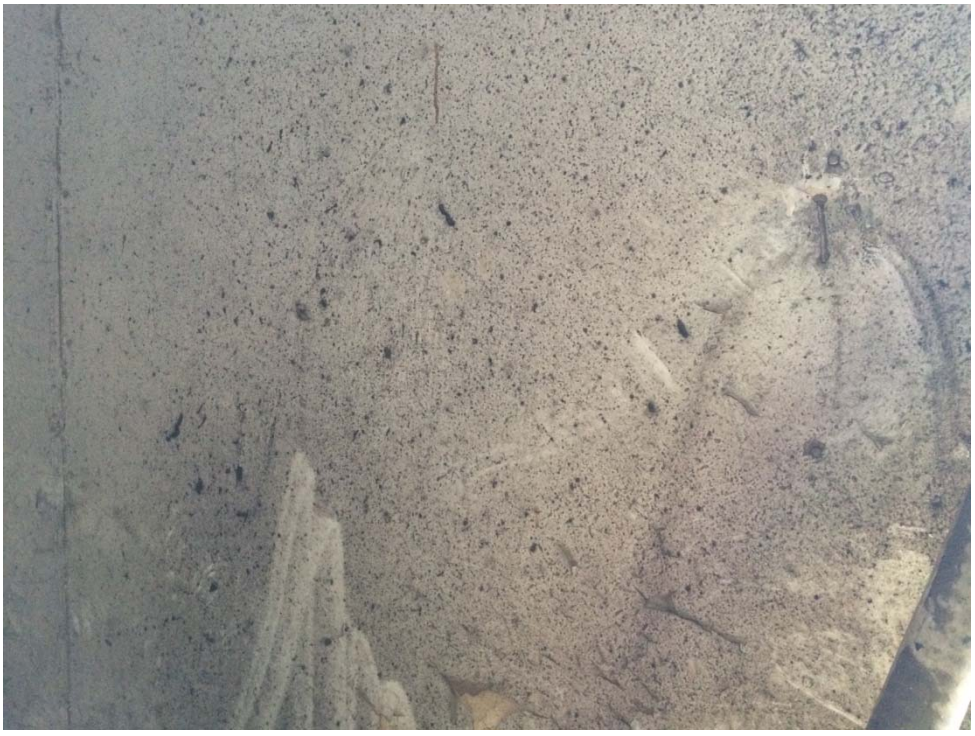
Photograph 23: Maintenance Garage – white AST with unknown contents.

Photograph 24: Sign Shed – used battery storage tote.

Photograph 25: New Generator Shed – battery & absorbent pads.

Photograph 26: New Generator Shed – absorbent pads under generator.

Photograph 27: Old Generator Shed – garbage and debris throughout building.



Photograph 28: Old Generator Shed – mould on entrance wall left side (behind door).

ATTACHMENT 3

Laboratory Analytical Report (IATL)

9000 Commerce Parkway Suite B
Mt. Laurel,NJ 08054
Telephone: (856) 231-9449
Email: customerservice@iatl.com

Cover Letter

Jan 26, 2016

SNC - Lavalin, Inc.

Thank you for choosing iATL for your analytical needs. The Report herein along with the chain of custody contains details of (1) the transmittal of the samples from you to our laboratory, (2) the acceptance and analysis of the samples, (3) the supporting documentation tied to this project, (4) any QA notifications or communications, and (5) our invoice for this project. In addition:

- Please carefully look over these report deliverables and make sure that it meets your needs. Depending upon regulator and accrediting body limitations, you may have some choices for the formatting and data presentation beyond what follows. Please contact our customer service department for information on any options.
- You may intend for all, or select, samples in this submittal to move forward in the laboratory for other testing procedures. The batch sheet in this Report may list that authorization to proceed. Please login to our secure client portal and check this status or to confirm any additional analyses.
- If there are other offices, individuals, or customers who you think should receive this report – please send us that information and we will happily forward the report.

iATL is always seeking to improve our services and the customer experience. Any feedback that you can supply would benefit our commitment to quality. Please consider emailing any of the contacts on the next page of this report.

Finally, I wanted to take this opportunity to express our appreciation in your choice of iATL. We value our customers and seek to earn your business… one sample at a time.

Regards,

Eric Snyder
President, iATL

Frank Ehrenfeld
Laboratory
Director, iATL

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 1/26/2016
Report No.: 500022 - PLM
Project: PWGSC
Project No.: 633299

Preface to Analytical Report:

Customer Contact: Tony Kavelares
Analysis: US EPA 600, R93-116

This preface seeks to promote greater understanding of any observations, exceptions, special instructions, or circumstances that the laboratory needs to communicate to the client concerning the above samples. The information below is used to help promote your ability to make the most informed decisions for you and your customers. Please note the following points of contact for any questions you may have.

iATL Customer Service: customerservice@iatl.com
iATL Office Manager: cdavis@iatl.com
iATL Account Representative: Shirley Clark

Project Summary:
Sample Login Notes: See Batch Sheet Attached
Sample Matrix: Bulk Building Materials
Exceptions Noted: See Following Pages

General Terms, Warrants, Limits, Qualifiers:

General information about iATL capabilities and client/laboratory relationships and responsibilities are spelled out in iATL policies that are listed at www.iATL.com and in our Quality Assurance Manual per ISO 17025 standard requirements. The information therein is a representation of iATL definitions and policies for turnaround times, sample submittal, collection media, blank definitions, quantification issues and limit of detection, analytical methods and procedures, sub-contracting policies, results reporting options, fees, terms, and discounts, confidentiality, sample archival and disposal, and data interpretation.

iATL warrants the test results to be of a precision normal for the type and methodology employed for each sample submitted. iATL disclaims any other warrants, expressed or implied, including warranty of fitness for a particular purpose and warranty of merchantability. iATL accepts no legal responsibility for the purpose for which the client uses test results. Any analytical work performed must be governed by our Standard Terms and Conditions. Prices, methods and detection limits may be changed without notification. Please contact your Customer Service Representative for the most current information.

This confidential report relates only to those item(s) tested and does not represent an endorsement by NIST-NVLAP, AIHA LAP LLC, or any agency of local, state or province governments nor of any agency of the U.S. government.

This report shall not be reproduced except in full, without written approval of the laboratory.

Information Pertinent to this Report:

Analysis by US EPA 600 93-116: Determination of Asbestos in Bulk Building Materials by Polarized Light Microscopy (PLM).

Certification: NIST-NVLAP No. 101165-0
NY-DOH No. 11021
AIHA-LAP, LLC No. 100188

Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative

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CERTIFICATE OF ANALYSIS

Client:	SNC - Lavalin, Inc.	**Report Date:**	1/26/2016
	8648 Commerce Court	**Report No.:**	500022 - PLM
	Burnaby BC V5A 4N6	**Project:**	PWGSC
		Project No.:	633299
Client:	SNC483		

transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analytical Methodology Alternatives: Your initial request for analysis may not have accounted for recent advances in regulatory requirements or advances in technology that are routinely used in similar situations for other qualified projects. You may have the option to explore additional analysis for further information. Below are a few options, listed as the matrix followed by the appropriate methodology. Also included are links to more information on our website.

Bulk Building Materials that are Non-Friable Organically Bound (NOB) by Gravimetric Reduction techniques employing PLM and TEM: ELAP 198.6 (PLM-NOB), ELAP 198.4 (TEM-NOB)

Loose Fill Vermiculite Insulation, Attic Insulation, Zonolite (copyright), etc.: US EPA 600 R-4/004 (multi-tiered analytical process)
Sprayed On Insulation/Fireproofing with Vermiculite (SOF-V): ELAP 198.8 (PLM-SOF-V)

Soil, sludge, sediment, aggregate, and like materials analyzed for asbestos or other elongated mineral particles (ex. erionite, etc.): ASTM D7521, CARB 435, and other options available

Asbestos in Surface Dust according to one of ASTM's Methods (very dependent on sampling collection technique – by TEM): ASTM D 5755, D5756, or D6480

Various other asbestos matrices (air, water, etc.) and analytical methods are available.

Disclaimers / Qualifiers:

There may be some samples in this project that have a "NOTE:" associated with a sample result. We use added disclaimers or qualifiers to inform the client about something that requires further explanation. Here is a complete list with highlighted disclaimers pertinent to this project. For a full explanation of these and other disclaimers, please inquire at **customerservice@iatl.com**.

1) Note: No mastic provided for analysis.
2) Note: Insufficient mastic provided for analysis.
3) Note: Insufficient material provided for analysis.
4) Note: Insufficient sample provided for QC reanalysis.
5) Note: Different material than indicated on Sample Log / Description.
6) Note: Sample not submitted.
7) Note: Attached to asbestos containing material.
8) Note: Received wet.
9) Note: Possible surface contamination.
10) Note: Not building material. 1% threshold may not apply.
11) Note: Recommend TEM-NOB analysis as per EPA recommendations.
12) Note: Asbestos detected but not quantifiable.
13) Note: Multiple identical samples submitted, only one analyzed.
14) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.080%.
15) Note: Analyzed by EPA 600/R-93/116. Point Counting detection limit at 0.125%.

Recommendations for Vermiculite Analysis:

Several analytical protocols exist for the analysis of asbestos in vermiculite. These analytical approaches vary depending upon the nature of the vermiculite mineral being tested (e.g. un-processed gange, homogeneous exfoliated books of mica, or mixed mineral composites).

IATL recommends initial testing using the EPA 600/R-93/116 method. This method is specifically designed for the analysis of asbestos in bulk building materials. It provides an acceptable starting point for primary screening of vermiculite for possible asbestos.

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CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
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Client: SNC483

Report Date: 1/26/2016
Report No.: 500022 - PLM
Project: PWGSC
Project No.: 633299

Results from this testing may be inconclusive. EPA suggests proceeding to a multi-tiered analysis involving wet separation techniques in conjunction with PLM and TEM gravimetric analysis (EPA 600/R-04/004).

Further information on this method and other vermiculite and asbestos issues can be found at the following: Agency for Toxic Substances and Disease Registry (ATSDR) www.atsdr.cdc.gov, United States Geological Survey (USGS) www.minerals.usgs.gov/minerals/, US EPA www.epa.gov/asbestos. The USEPA also has an informative brochure "Current Best Practices for Vermiculite Attic Insulation" EPA 747F03001 May 2003, that may assist the health and remediation professional.

The following is a summary of the analytical process outlines in the EPA 600/R-04/004 Method:

1) **Analytical Step/Method:** Initial Screening by PLM, EPA 600R-93/116
Requirements/Comments: Minimum of 0.1 g of sample. ~0.25% LOQ for most samples.
Pricing/Turnaround Time: Please contact your client representative for options available.

2) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.
Pricing/Turnaround Time: Please contact your client representative for options available.

3) **Analytical Step/Method:** Wet Separation by PLM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Floats" only.
Pricing/Turnaround Time: Please contact your client representative for options available.

4) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Sinks" only.
Pricing/Turnaround Time: Please contact your client representative for options available.

5) **Analytical Step/Method:** Wet Separation by TEM Gravimetric Technique, EPA R-04/004
Requirements/Comments: Minimum 50g** of dry sample. Analysis of "Suspension" only.
Pricing/Turnaround Time: Please contact your client representative for options available.

LOQ, Limit of Quantitation estimates for mass and volume analyses.
*With advance notice and confirmation by the laboratory.
**Approximately 1 Liter of sample in double-bagged container (~9x6 inch bag of sample).

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

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CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 1/26/2016
Report No.: 500022 - PLM
Project: PWGSC
Project No.: 633299

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5821597 **Description:** Tan Caulk **Location:**
Client No.: A1 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100

Lab No.: 5821598 **Description:** Tan Caulk **Location:**
Client No.: A2 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100

Lab No.: 5821599 **Description:** White Caulk **Location:**
Client No.: A3 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100

Lab No.: 5821600 **Description:** Tan Fibrous **Location:**
Client No.: A4 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	100 Synthetic	None Detected

Lab No.: 5821601 **Description:** Black Tar **Location:**
Client No.: A5 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
PC 3.8 *Chrysotile*	None Detected	96.2

Lab No.: 5821602 **Description:** Lt.Grey Glazing **Location:**
Client No.: A6 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100

Lab No.: 5821603 **Description:** Lt.Grey Insulation **Location:**
Client No.: A7 **Facility:**

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
90 *Chrysotile*	None Detected	10

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 12/28/2015
Date Analyzed: 1/4/2016 10:41:38 PM

Signature:
Analyst: Muhammad Mirza

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

iATL INTERNATIONAL
ASBESTOS TESTING LABORATORIES

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Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 1/26/2016
Report No.: 500022 - PLM
Project: PWGSC
Project No.: 633299

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5821604 **Client No.:** A8	**Description:** Black Caulk **Facility:**	**Location:**
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 5821605 **Client No.:** A9	**Description:** Tan Caulk **Facility:**	**Location:**
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 5821606 **Client No.:** A10	**Description:** Grey Glazing **Facility:**	**Location:**
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 5821607 **Client No.:** A11	**Description:** Grey Glazing **Facility:**	**Location:**
Percent Asbestos: ***PC Trace*** *Chrysotile*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 100
Lab No.: 5821608 **Client No.:** A12	**Description:** Lt.Grey/Tan Ceiling Tile **Facility:**	**Location:**
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: 98 Cellulose	Percent Non-Fibrous Material: 2
Lab No.: 5821609 **Client No.:** A13	**Description:** Tan Fibrous **Facility:**	**Location:**
Percent Asbestos: *None Detected*	Percent Non-Asbestos Fibrous Material: 100 Synthetic	Percent Non-Fibrous Material: None Detected
Lab No.: 5821610 **Client No.:** A14	**Description:** Black Tar **Facility:**	**Location:**
Percent Asbestos: ***PC 4.3*** *Chrysotile*	Percent Non-Asbestos Fibrous Material: None Detected	Percent Non-Fibrous Material: 95.7

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 12/28/2015
Date Analyzed: 1/4/2016 10:41:38 PM

Signature:
Analyst: Muhammad Mirza

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

9000 Commerce Parkway Suite B
Mt. Laurel, New Jersey 08054
Telephone: 856-231-9449
Email: customerservice@iatl.com

CERTIFICATE OF ANALYSIS

Client: SNC - Lavalin, Inc.
8648 Commerce Court
Burnaby BC V5A 4N6

Client: SNC483

Report Date: 1/26/2016
Report No.: 500022 - PLM
Project: PWGSC
Project No.: 633299

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 5821611
Client No.: A15

Description: Clear Caulk
Facility:

Location:

Percent Asbestos:	Percent Non-Asbestos Fibrous Material:	Percent Non-Fibrous Material:
None Detected	None Detected	100

Please refer to the Preface of this report for further information regarding your analysis.

Date Received: 12/28/2015
Date Analyzed: 1/4/2016 10:41:38 PM

Signature:
Analyst: Muhammad Mirza

Approved By:
Frank E. Ehrenfeld, III
Laboratory Director

ATTACHMENT 4

Laboratory Analytical Report (Maxxam)

Success Through Science®

Your Project #: 633299
Site Location: SIKANNI
Your C.O.C. #: G107578, G107579, G107580

Attention:Tim Drozda

SNC-LAVALIN INC.
BURNABY, ENVIRONMENT DIVISION
8648 COMMERCE COURT
BURNABY, BC
CANADA V5A 4N6

Report Date: 2015/12/30
Report #: R2106720
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B5B3465
Received: 2015/12/23, 09:25

Sample Matrix: PAINT
Samples Received: 22

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Elements by ICP-AES (acid extr. solid)	20	2015/12/29	2015/12/29	BBY7SOP-00018	EPA 6010c R3 m
Elements by ICP-AES (acid extr. solid)	2	2015/12/29	2015/12/30	BBY7SOP-00018	EPA 6010c R3 m

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Graham Rudkin
30 Dec 2015 16:23:30 -08:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Graham Rudkin, Project Manager, Environmental
Email: GRudkin@maxxam.ca
Phone# (604)638-5926 Ext:5926

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B3465
Report Date: 2015/12/30

SNC-LAVALIN INC.
Client Project #: 633299
Site Location: SIKANNI
Sampler Initials: MAH

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		NW9385	NW9386		NW9387		NW9388	NW9389	NW9390		
Sampling Date		2015/12/21	2015/12/21		2015/12/21		2015/12/21	2015/12/21	2015/12/21		
COC Number		G107578	G107578		G107578		G107578	G107578	G107578		
	UNITS	P1	P2	RDL	P3	RDL	P4	P5	P6	RDL	QC Batch
Total Metals by ICP											
Total Lead (Pb)	mg/kg	<12 (1)	1010 (1)	12	34 (1)	21	5.0	115	452	3.0	8154290

RDL = Reportable Detection Limit
(1) Detection limits raised based on sample weight used for analysis.

Maxxam ID		NW9390	NW9391	NW9392		NW9393		NW9394	NW9395		
Sampling Date		2015/12/21	2015/12/21	2015/12/21		2015/12/21		2015/12/21	2015/12/21		
COC Number		G107578	G107578	G107578		G107578		G107578	G107579		
	UNITS	P6 Lab-Dup	P7	P8	RDL	P9	RDL	P10	P11	RDL	QC Batch
Total Metals by ICP											
Total Lead (Pb)	mg/kg	434	675	1660	3.0	1530 (1)	30	955	23.7	3.0	8154290

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
(1) Detection limits raised based on sample weight used for analysis.

Maxxam ID		NW9396		NW9397	NW9398		NW9399		NW9400		
Sampling Date		2015/12/21		2015/12/21	2015/12/21		2015/12/21		2015/12/21		
COC Number		G107579		G107579	G107579		G107579		G107579		
	UNITS	P12	RDL	P13	P14	RDL	P15	RDL	P16	RDL	QC Batch
Total Metals by ICP											
Total Lead (Pb)	mg/kg	761 (1)	12	2170	1320	3.0	287 (1)	75	2150 (1)	9.0	8154290

RDL = Reportable Detection Limit
(1) Detection limits raised based on sample weight used for analysis.

Maxxam ID		NW9401		NW9402	NW9403		NW9404			NW9405		
Sampling Date		2015/12/21		2015/12/21	2015/12/21		2015/12/21			2015/12/21		
COC Number		G107579		G107579	G107579		G107579			G107580		
	UNITS	P17	RDL	P18	P19	RDL	P20	RDL	QC Batch	P21	RDL	QC Batch
Total Metals by ICP												
Total Lead (Pb)	mg/kg	8100 (1)	75	56.5	1520	3.0	10800 (1)	30	8154290	286	3.0	8154291

RDL = Reportable Detection Limit
(1) Detection limits raised based on sample weight used for analysis.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B3465
Report Date: 2015/12/30

SNC-LAVALIN INC.
Client Project #: 633299
Site Location: SIKANNI
Sampler Initials: MAH

LEAD IN PAINT CHIPS (PAINT)

Maxxam ID		NW9406		
Sampling Date		2015/12/21		
COC Number		G107580		
	UNITS	**P22**	**RDL**	**QC Batch**
Total Metals by ICP				
Total Lead (Pb)	mg/kg	4490 (1)	60	8154291

RDL = Reportable Detection Limit

(1) Detection limits raised based on sample weight used for analysis.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B3465
Report Date: 2015/12/30

SNC-LAVALIN INC.
Client Project #: 633299
Site Location: SIKANNI
Sampler Initials: MAH

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B5B3465
Report Date: 2015/12/30

QUALITY ASSURANCE REPORT

SNC-LAVALIN INC.
Client Project #: 633299
Site Location: SIKANNI
Sampler Initials: MAH

			Method Blank		RPD		QC Standard	
QC Batch	**Parameter**	**Date**	**Value**	**UNITS**	**Value (%)**	**QC Limits**	**% Recovery**	**QC Limits**
8154290	Total Lead (Pb)	2015/12/29	<3.0	mg/kg	4.0	35	91	80 - 120
8154291	Total Lead (Pb)	2015/12/30	<3.0	mg/kg	5.5	35	96	80 - 120

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

G107578

Maxxam
A Bureau Veritas Group Company

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5. Toll Free (800) 665-8566

CHAIN OF CUSTODY RECORD

COC #:

BBY FCD-00077/05

Page 1 of 3

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: SNC-Lavalin Inc.	Company Name: As At Left	Quotation #: SNC-Lavalin Pricing	[X] Regular TAT 5 days (Most analyses)
Contact Name: Aaron Hall / Tim Drozda	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 8648 Commerce Court	Address:	Project #: 633299	Rush TAT (Surcharges will be applied)
Burnaby BC PC: V5A4N6	PC:	Site Location: Sikanni	[ ] Same Day [ ] 2 Days
Phone: 604-515-5151	Phone:	Site #:	[ ] 1 Day [ ] 3 Days
Email: aaron.hall@snclavalin.com	Email: cc: tim.drozda@snclavalin.com	Sampled By: MAH	Date Required:

Regulatory Criteria

[ ] BC CSR Soil [ ] BC CSR Water
[ ] CCME (Specify) [X] Other (Specify) 90 mg/kg DL
[ ] Drinking Water [ ] BC Water Quality

Special Instructions

[ ] Return Cooler
[ ] Ship Sample Bottles (Please Specify)

Analysis Requested: BTEX/VPH / MTBE / VOC/VPH; EPH / TEH; PAH / LEPH/HEPH; CCME-PHC / BTEX/F1 / F2-F4; Dissolved Metals Filtered? Preserved?; Dissolved Mercury Filtered? Preserved?; Total Metals Field Preserved?; Total Mercury Field Preserved?; Chloride / Fluoride / Sulphate; TSS / TDS / BOD / COD; pH / Conductivity / Alkalinity; Nitrite / Nitrate / Ammonia; LEAD IN PAINT; DL must ≤ 90 mg/kg; # OF CONTAINERS SUBMITTED; HOLD - DO NOT ANALYZE

Rush Confirmation #:

LABORATORY USE ONLY

CUSTODY SEAL Y / (N)		COOLER TEMPERATURES
Present	Intact	
NA		NA

COOLING MEDIA PRESENT Y / (N)

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

#	Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	LEAD IN PAINT	# of Containers Submitted	Comments
1	P1	NW9385	2015-DEC-21	–	Paint	X	1	Contact Aaron or
2	P2	NW9386	↓	↓	↓	X	1	Tim Immediately
3	P3	NW9387	↓	↓	↓	X	1	if requested
4	P4	NW9388	↓	↓	↓	X	1	detection limit
5	P5	NW9389	↓	↓	↓	X	1	cannot be met
6	P6	NW9390	↓	↓	↓	X	1	
7	P7	NW9391	↓	↓	↓	X	1	
8	P8	NW9392	↓	↓	↓	X	1	
9	P9	NW9393	↓	↓	↓	X	1	
10	P10	NW9394	↓	↓	↓	X	1	

B5B3465_COC

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
M. Aaron Hall	2015-DEC-23	0925	Laurel Berthier	2015/12/23	09:25	B5B3465

COC-1020

G107579

Maxxam
A Bureau Veritas Group Company

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5. Toll Free (800) 665-8566

CHAIN OF CUSTODY RECORD

COC #:

BBY FCD-00077/05

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: SNC-Lavalin Inc.	Company Name: As at left	Quotation #: SNC-Lavalin pricing	[X] Regular TAT 5 days (Most analyses)
Contact Name: Aaron Hall / Tim Drozda	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 8648 Commerce Court Burnaby, BC PC: V5A 4N6	Address: PC:	Project #: 633299	Rush TAT (Surcharges will be applied) [ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3 Days
Phone: 604-95-5151	Phone:	Site Location: Sikanni	
Email: aaron.hall@snclavalin.com	Email: cc: tim.drozda@snclavalin.com	Site #: Sampled By: MAH	Date Required:
			Rush Confirmation #:

Regulatory Criteria	Special Instructions
[ ] BC CSR Soil [ ] BC CSR Water	[ ] Return Cooler
[ ] CCME (Specify) [X] Other (Specify) DL: 9Dmg/kg	[ ] Ship Sample Bottles (Please Specify)
[ ] Drinking Water [ ] BC Water Quality	

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

	Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	BTEX/VPH	EPH	PAH	CCME-PHC	Dissolved Metals	Dissolved Mercury	Total Metals	Total Mercury	Chloride	TSS	pH	Nitrite	LEAD IN PAINT	# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE	Comments
1	P11	NW9395	2015-DEC-21	—	PAINT													X	1		Contact Aaron or Tim immediately if requested detection limit cannot be met
2	P12	NW9396																X	1		
3	P13	NW9397																X	1		
4	P14	NW9398																X	1		
5	P15	NW9399																X	1		
6	P16	NW9400																X	1		
7	P17	NW9401																X	1		
8	P18	NW9402																X	1		
9	P19	NW9403																X	1		
10	P20	NW9404																X	1		

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
NA		

COOLING MEDIA PRESENT Y / N

COMMENTS

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
M. Aaron Hall	2015-DEC-23	0925	Laurel Berthier	2015/12/23	09:25	B5B3465

COC-1020

G107580

Maxxam
A Bureau Veritas Group Company

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5. Toll Free (800) 665-8566

CHAIN OF CUSTODY RECORD

COC #:

BBY FCD-00077/05

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: SNC-Lavalin Inc.	Company Name: AS AT LEFT	Quotation #: SNC Lavalin Priory	[X] Regular TAT 5 days (Most analyses)
Contact Name: Aaron Hall / Tim Drozda	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 8648 Commerce Court Burnaby, BC PC: V5A 4N6	Address: PC:	Project #: 633209	Rush TAT (Surcharges will be applied)
Phone: 604-515-5751	Phone:	Site Location: Skeena	[ ] Same Day [ ] 2 Days [ ] 1 Day [ ] 3 Days
Email: aaron.hall@snclavalin.com	Email: cc: tim.drozda@snclavalin.com	Site #:	Date Required:
		Sampled By: MAH	Rush Confirmation #:

Regulatory Criteria	Special Instructions
[ ] BC CSR Soil [ ] BC CSR Water	[ ] Return Cooler
[ ] CCME (Specify) [X] Other (Specify) 90 mg/kg	[ ] Ship Sample Bottles (Please Specify)
[ ] Drinking Water [ ] BC Water Quality	

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested: [ ] BTEX/VPH [ ] MTBE [ ] VOC/VPH [ ] EPH [ ] TEH [ ] PAH [ ] LEPH/HEPH [ ] CCME-PHC [ ] BTEX/ F1 [ ] F2 - F4 [ ] Dissolved Metals [ ] Filtered? [ ] Preserved? [ ] Dissolved Mercury [ ] Filtered? [ ] Preserved? [ ] Total Metals [ ] Field Preserved? [ ] Total Mercury [ ] Field Preserved? [ ] Chloride [ ] Fluoride [ ] Sulphate [ ] TSS [ ] TDS [ ] BOD [ ] COD [ ] pH [ ] Conductivity [ ] Alkalinity [ ] Nitrite [ ] Nitrate [ ] Ammonia; Lead in Paint DL ≤ 90 mg/kg

	Sample Identification	Lab Identification	Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix	# OF CONTAINERS SUBMITTED	HOLD - DO NOT ANALYZE
1	P21	NW9405	2015-DEC-21	—	PAINT	X	
2	P22	NW9406	〃	〃	〃	X	
3							
4							
5							
6							
7							
8							
9							
10							

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
NA		NA

COOLING MEDIA PRESENT Y / N

COMMENTS: Contact Aaron or Tim immediately if requested detection limit cannot be met.

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
M. Aaron Hall	2015-DEC-23	0925	[signature]	2015/12/23	09:25	B5B3465

COC-1020