PROJECT TITLE MANITOULIN ISLAND, ON
UPGRADES TO MISSISSAGI STRAIT AND
JANET HEAD LIGHTHOUSES.

PROJECT NUMBER R.078293.001

PROJECT DATE 2016-03-31

END

Architectural Design: R. D. Peterman P.Eng, POW Peterman P.Eng., Consulting Engineers

LICENSED PROFESSIONAL ENGINEER
03.31.16
R.D. PETERMAN
PROVINCE OF ONTARIO

Structural Design: Philip Lampkin P.Eng., Riggs Enineering Ltd.

LICENSED PROFESSIONAL ENGINEER
2016 03.31
P.F.F. LAMPKIN
PROVINCE OF ONTARIO

END OF SECTION

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Title and description of Work.

.2 Contract Method.

.3 Work sequence.

.4 Contractor use of premises.

.5 Owner occupancy.

1.2 PRECEDENCE

.1 For Federal Government projects, Division 01 Sections take precedence over technical specification sections in other Divisions of this Project Manual.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises of repairs and upgrades to the lighthouses located on Manitoulin Island at Mississagi Strait west of Meldrum Bay and located at Janet Head north of Gore Bay.

1.4 CONTRACT METHOD

.1 Construct work under stipulated price contract.

1.5 COST BREAKDOWN

.1 Within 48 hours of notification of acceptance of bid furnish a cost breakdown of the lump sum amount by Section aggregating the lump sum amount of the contract price.
.1 Submit prices for each line item for the unit of measure specified.

.2 Within 48 hours of acceptance of bid submit a list of subcontractors.

1.6 WORK SEQUENCE

.1 Construct Work to accommodate Owner's occassional maintenance entrance to the site during construction to carry out maintenance. Maintenance of the light and power supply from time to time.

1.6 WORK SEQUENCE (Cont'd)

.2 Work at Janet Head and Mississagi Strait locations shall be undertaken concurrently for timely completion of all work.

.2 Coordinate Progress Schedule and coordinate with Departmental Representative during construction.

.3 Maintain fire access/control.

1.7 CONTRACTOR USE OF PREMISES

.1 Contractor has unrestricted use of site until Substantial Performance except as noted.

.2 Contractor shall limit use of premises for access, to allow:
.1 Owner maintenance of light and power supply from time to time.

.3 Coordinate use of premises under direction of Departmental Representative.

.4 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.8 OWNER OCCUPANCY

.1 Owner will occupy premises during the construction period from time to time for execution of normal maintenance operations.

.2 Cooperate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

PART 1 - GENERAL

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

.1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.

.2 Maintain existing services to building and provide for personnel access.

.3 Where security is reduced by work provide temporary means to maintain security.

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

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to building operations and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.

.3 Construct barriers in accordance with Section 01 56 00.

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16.

.2 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.

.3 Keep within limits of work and avenues of ingress and egress.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 ADMINISTRATIVE

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

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting 4 days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

.7 Reproduce and distribute copies of minutes within three days after meetings and transmit to Departmental Representative, meeting participants and affected parties not in attendance.

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

1.2 PRECONSTRUCTION MEETING

.1 Within 5 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

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

1.2 PRECONSTRUCTION MEETING (Cont'd)

.5 Agenda to include:
.1 Appointment of official representative of participants in the Work.
.2 Schedule of Work: in accordance with Section 01 32 16.
.3 Schedule of submission of shop drawings, samples, mock-ups, colour chips. Submit submittals in accordance with Section 01 33 00.
.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00.
.5 Site security in accordance with Section 01 56 00.
.6 Health and safety in accordance with Section 01 35 29.
.7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
.8 Record drawings and specifications in accordance with Sections 01 33 00 and 01 78 00.
.9 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00.
.10 Monthly progress claims, administrative procedures, photographs, hold backs.
.11 Appointment of inspection and testing agencies or firms.
.12 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and 2 weeks prior to project completion, schedule biweekly progress meetings.

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

.3 Notify parties minimum 3 days prior to meetings.

.4 Recording minutes of meetings and circulation to attending parties and affected parties not in attendance shall be the responsibility of the Departmental Representative.

.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.

1.3 PROGRESS MEETINGS (Cont'd)

.5 Agenda to include the following:(Cont'd)
.4 Problems which impede construction schedule.
.5 Review of off-site 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.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

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 (GANTT Chart): graphic display of schedule-related information. In typical bar chart, 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 Chart should be derived from commercially available computerized project management system.

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

.4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) 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 workdays or workweeks.

.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.

.9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.

1.2 REQUIREMENTS

.1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.

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

.3 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Certificate of Substantial Performance and Certificate of Completion as defined times of completion are of essence of this contract.

1.3 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Submit to Departmental Representative within 3 working days of Award of Contract Bar (GANTT) 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.
.1 Certificate of Substantial Performance within 8 weeks of Award of Contract date.

1.5 MASTER PLAN

.1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT).

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

.3 Revise impractical 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 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestones and activity types as follows:
.1 Award.
.2 Permits.
.3 Mobilization.
.4 Shop Drawings, Samples.
.5 Mississagi Strait Modified Bitumous Membrane Roof.
.6 Janet Head Modified Bitumous Membrane Roof.
.7 Cedar Shake Roof.
.8 Siding Replacement.
.9 Mississagi Strait Window and Door Repairs.
.10 Janet Head Window and Door Repairs.
.11 Metal Painting.
.12 Mississagi Strait Brick Masonry Repairs.
.13 Janet Head Brick Masonry Repairs.
.14 Mississagi Strait Painting and Repainting.
.15 Janet Head Painting and Repainting.
.16 Repointing and Stone Masonry Repairs.
.17 Timber Railing Replacment.
.18 Timber kicker plate and top rail replacement.
.19 Demobilization.

1.7 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on bi-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 regular progress meetings specified in Section 01 31 19, 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 approved dates shown on baseline schedule.

1.8 PROJECT MEETINGS (Cont'd)

.2 Weather related delays with their remedial measures will be discussed and negotiated.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

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 stating reasons for deviations.

.7 Verify field measurements and affected adjacent Work are co-ordinated.

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

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

.10 Keep one reviewed copy of each submission on site.

1.1 ADMINISTRATIVE (Cont'd)

.11 Submit in electronic format as pdf files. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, MS Project and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

.2 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario of Canada.

.3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.4 Allow 5 working days for Departmental Representative's review of each submission.

.5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract AmountPrice. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.

.7 Accompany submissions with elctronic transmittal letter, containing:
- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.7 (Cont'd)
.4 Identification and quantity of each shop drawing, product data and sample.
.5 Other pertinent data.

.8 Submissions shall include:
.1 Date and revision dates.
.2 Project title and number.
.3 Name and address of:
.1 Subcontractor.
.2 Supplier.
.3 Manufacturer.
.4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
.5 Details of appropriate portions of Work as applicable:
.1 Fabrication.
.2 Layout, showing dimensions, including identified field dimensions, and clearances.
.3 Setting or erection details.
.4 Capacities.
.5 Performance characteristics.
.6 Standards.
.7 Operating weight
.8 Single line and schematic diagrams.
.9 Relationship to adjacent work.

.9 After Departmental Representative's review, distribute copies.

.10 Submit one electronic copy of shop drawings for each requirement requested in specification Sections and as Departmental Representative may reasonably request.

.11 Submit one electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.12 (Cont'd)
.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit one electronic copy of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit one electronic copy of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

.15 Submit one electronic copy of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.

.16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

.17 Submit three hard copies and one electronic copy of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.18 Delete information not applicable to project.

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

.20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made,electronic copy will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before

1.2 SHOP DRAWINGS AND PRODUCT DATA (Cont'd)

.20 (Cont'd)
fabrication and installation of Work may proceed.

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) or Departmental Representative is for sole purpose of ascertaining conformance with general concept.
.1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.
.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

.1 Submit for review samples in duplicate as requested in respective specification Sections. Label samples with origin and intended use.

.2 Deliver samples prepaid to Departmental Representative's business address.

.3 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.

.4 Where colour, pattern or texture is criterion, submit full range of samples.

.5 Adjustments made on samples by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.

.6 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.

1.3 SAMPLES (Cont'd)

.7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic colour digital photography in jpg format, fine resolution.

.2 Identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: 10 minimum. Locations of viewpoints as agreed upon with Departmental Representative.

.4 Frequency: minimum weekly with verbal progress statement and supplimented as directed by Departmental Representative.

1.5 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Safety and Insurance Board Experience Report.

.2 Submit transcription of insurance immediately after award of Contract.

1.6 FEES, PERMITS AND CERTIFICATES

.1 Provide authorities having jurisdiction with information requested.

.2 Pay fees and obtain certificates and permits required.

.3 Furnish certificates and permits.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA): Canada
.1 CSA S350-M1980(R2003), Code of Practice for Safety in Demolition of Structures.

.2 National Building Code 2010 (NBC):
.1 NBC 2015, Division B, Part 8 Safety Measures at Construction and Demolition Sites.

.3 National Fire Code 2010 (NFC):
.1 NFC 2015, Division B, Part 5 Hazardous Processes and Operations, subsection 5.6.1.3 Fire Safety Plan.

.4 Province of Ontario:
.1 Occupational Health and Safety Act Revised Statutes of Ontario 1990, Chapter O.1 as amended, and Regulations for Construction Projects, O. Reg. 213/91 as amended.
.2 O. Reg. 490/09, Designated Substances.
.3 Workplace Safety and Insurance Act, 1997.
.4 Municipal statutes and authorities.

.5 Treasury Board of Canada Secretariat (TBS):
.1 Treasury Board, Fire Protection Standard April 1, 2010 www.tbs-sct.gc.ca/pol/doc-eng.aspx ?id=17316&section=text.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 5 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
.1 Results of site specific safety hazard assessment.
.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
.3 Measures and controls to be implemented to address identified safety hazards and risks.

.3 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Building, Evacuation Plan in place at the site.

1.2 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.3 (Cont'd)
Departmental Representative will provide Building, Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 5 days before commencing work.

.4 Contractor's and Sub-contractors' Safety Communication Plan.

.5 Contingency and Emergency Response Plan addressing standard operating procedures specific to the project site to be implemented during emergency situations. Coordinate plan with existing Building, Emergency Response requirements and procedures provided by Departmental Representative.

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 3 days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 3 days after receipt of comments from Departmental Representative.

.7 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

.8 Submit names of personnel and alternates responsible for site safety and health.

.9 Submit records of Contractor's Health and Safety meetings when requested.

.10 Submit 1 electronic copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative weekly.

.11 Submit 1 copy of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative, weekly.

.12 Submit copies of orders, directions or reports issued by health and safety inspectors of the authorities having jurisdiction.

.13 Submit copies of incident and accident reports.

1.2 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.14 Submit Material Safety Data Sheets (MSDS).

.15 Submit Workplace Safety and Insurance Board (WSIB)- Experience Rating Report.

.16 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel, in accordance with O. Reg. 490, prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.

1.3 FILING OF NOTICE

.1 File Notice of Project with Provincial authorities prior to commencement of Work.

1.4 WORK PERMIT

.1 Obtain building permits related to project prior to commencement of Work.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

.1 Schedule and administer Health and Safety meeting with Departmental Representative prior to commencement of Work.

1.7 REGULATORY REQUIREMENTS

.1 Comply with the Acts and regulations of the Province of Ontario.

.2 Comply with specified standards and regulations to ensure safe operations at site.

1.8 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:
.1 Silica in glass and mortar
.2 Mercury in lighthouse tower stairs and light mounting base.
.3 Asbestos in vinyl composition tiles.
.4 Lead in interior and exterior paint, on walls, siding and metal surfaces.
.5 Refer to "Designated Substance and Hazardous Materials Survey, Mississagi Strait

1.8 PROJECT/SITE CONDITIONS (Cont'd)

.1 (Cont'd)

.5 (Cont'd)
Lightstation, Manitoulin Island, ON, March 1, 2016" found attached at the end of this specification in Appendix A.

.6 Refer to "Environmental Property Assessment, Janet Head Lighthouse", Gore Bay Ontario March 31, 2015. found attached at this specification in Appendix B.

1.9 GENERAL REQUIREMENTS

.1 Develop written site-specific Health and Safety Plan based on hazard assessment prior to beginning site Work and continue to implement, maintain, and enforce plan until final demobilization from site. Health and Safety Plan must address project specifications.

.2 Departmental Representative may respond in writing, where deficiencies or concerns are noted and may request re-submission with correction of deficiencies or concerns either accepting or requesting improvements.

.3 Relief from or substitution for any portion or provision of minimum Health and Safety standards specified herein or reviewed site-specific Health and Safety Plan shall be submitted to Departmental Representative in writing.

1.10 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990 Chapter 0.1, as amended.

1.11 RESPONSIBILITY

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

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

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and

1.11 RESPONSIBILITY (Cont'd)

.3 (Cont'd)
Regulations for Construction Projects for the Province of Ontario.

1.12 UNFORSEEN HAZARDS

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

.2 Follow procedures in place for Employees Right to Refuse Work as specified in the Occupational Health and Safety Act for the Province of Ontario.

1.13 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:
.1 Have site-related working experience specific to activities associated with abatement of lead and asbestos containing materials.
.2 Have working knowledge of occupational safety and health regulations.
.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.
.5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.14 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
.1 Contractor's Safety Policy.
.2 Constructor's Name.
.3 Notice of Project.
.4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).

1.14 POSTING OF DOCUMENTS (Cont'd)

.1 (Cont'd)
.5 Ministry of Labour Orders and reports.
.6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
.7 Address and phone number of nearest Ministry of Labour office.
.8 Material Safety Data Sheets.
.9 Written Emeregency Response Plan.
.10 Site Specific Safety Plan.
.11 Valid certificate of first aider on duty.
.12 WSIB "In Case of Injury At Work" poster.
.13 Location of toilet and cleanup facilities.

1.15 CORRECTION OF NON-COMPLIANCE

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

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

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

1.16 BLASTING

.1 Blasting or other use of explosives is not permitted.

1.17 POWDER ACTUATED DEVICES

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

1.18 WORK STOPPAGE

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

.2 Assign responsibility and obligation to Health and Safety Coordinator to stop or start Work when, at Health and Safety Coordinator's necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not used.

END

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 humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.2 REFERENCES

.1 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005-92, Storm Water Management for Construction Activities, Chapter 3.
.2 EPA General Construction Permit (GCP) 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS.

.3 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by Departmental Representative.

.4 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.5 Address topics at level of detail commensurate with environmental issue and required construction tasks.

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.6 Include in Environmental Protection Plan:

.1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.

.2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.

.3 Names and qualifications of persons responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying 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 and EPA 832/R-92-005, Chapter 3.

.6 Drawings indicating locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.

.7 Traffic Control Plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather.

.1 Plans to include measures to minimize amount of material transported onto paved public roads by vehicles or runoff.

.8 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.9 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.10 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.11 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water,

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.6 (Cont'd)

.12 (Cont'd)
or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.13 Waste Water Management Plan identifying methods and procedures for management and or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.

.14 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.

.15 Pesticide treatment plan to be included and updated, as required.

1.4 FIRES

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

1.5 DRAINAGE

.1 Develop and submit erosion and Sediment Control Plan (ESC) identifying type and location of erosion and sediment controls provided. Plan to include 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, EPA 832/R-92-005, Chapter 3.

.2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sediment control plan.

.3 Provide temporary drainage and pumping required to keep excavations and site free from water.

.4 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.

.5 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 shrubs adjacent to construction work and stroage areas.

.2 Minimize stripping of topsoil and vegetation.

1.7 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land only.

.2 Use waterway beds for borrow material only after written receipt of approval from Departmental Representative.

.3 Waterways to be kept free of excavated fill, waste material and debris.

.4 Design and construct temporary crossings to minimize erosion to waterways.

.5 Do not skid construction materials across waterways.

.6 Avoid spawning beds when constructing temporary crossings of waterways.

1.8 POLLUTION CONTROL

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

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

.3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
.1 Provide temporary enclosures where directed by Departmental Representative.

.4 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 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies

1.9 HISTORICAL/ ARCHAEOLOGICAL CONTROL (Cont'd)

.1 (Cont'd) procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.

.2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.10 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, 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 for approval by Departmental Representative.
.1 Take action only after receipt of written approval 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.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
   .1 Leave Work area clean at end of each day.

.2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.

.3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
   .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2010, National Fire Code of Canada (NFC) 2010 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.

.2 Meet or exceed requirements of:
.1 Contract documents.
.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately and notify Departmental Representative if materials which may contain designated substances or PCB's, other than those identified in Section 01 35 29 are discovered in course of work.

1.3 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

1.4 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.5 EXAMINATION

.1 Examine existing conditions and determine conditions affecting work.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Inspection and testing, administrative and enforcement requirements.

1.2 INSPECTION

.1 Allow Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.

.2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative instructions, or law of Place of Work.

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

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

1.3 INDEPENDENT INSPECTION AGENCIES

.1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work above and beyond those required of the Contractor. Cost of such services will be borne by Departmental Representative.

.2 Provide equipment required for executing inspection and testing by appointed agencies.

.3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.

1.3 INDEPENDENT INSPECTION AGENCIES (Cont'd)

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and reinspection.

1.4 ACCESS TO WORK

.1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.

.2 Co-operate to provide reasonable facilities for such access.

1.5 PROCEDURES

.1 Notify appropriate agency and Departmental Representative in advance of requirement for tests, in order that attendance arrangements can be made.

.2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.6 REJECTED WORK

.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

.3 If in opinion of Departmental Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value

1.6 REJECTED WORK (Cont'd)

.3 (Cont'd)
between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.7 REPORTS

.1 Submit 1 electronic copy of inspection and test reports as may be requested to Departmental Representative.

.2 Provide copies to Subcontractor of work being inspected or tested, manufacturer or fabricator of material being inspected or tested.

1.8 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as may be requested.

.2 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Departmental Representative and may be authorized as recoverable.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 NOT USED

END

PART 1 - GENERAL

1.1 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.2 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.3 WATER SUPPLY

.1 Provide continuous supply of potable water for construction use.

.2 Arrange for connection with appropriate utility company and pay all costs for installation, maintenance and removal.

.3 Pay for utility charges at prevailing rates.

1.4 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building 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 Maintain temperatures of minimum 10°C in areas where construction is in progress.

.5 Ventilating:

1.4 TEMPORARY HEATING AND VENTILATION (Cont'd)

.5 Ventilating:(Cont'd)
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Ventilate temporary sanitary facilities.
.6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Pay costs for maintaining temporary heat.

.7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform with 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.

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

1.5 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.

.2 Arrange for connection with appropriate utility company. Pay all costs for installation, maintenance and removal.

.3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for satellite cell phone communication with a data plan to transmit submittals and progress photograghs and for use Departmental Representative when requested.

1.7 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International) Access Scaffold.
.1 CSA-Z797-09(R2014) - Code of Practice for Access Scaffold.

1.2 SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

1.3 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of 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.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CSA Z797.

.2 Provide and maintain scaffolding ramps ladders swing staging platforms temporary stairs.

1.5 HOISTING

.1 Provide, operate and maintain hoists/cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.

.2 Hoists/cranes shall be operated by qualified operator.

1.6 SITE STORAGE/LOADING

.1 Confine work and operations of employees to areas defined by Contract Documents. Do not unreasonably encumber premises with products.

.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

.3 Build and maintain temporary roads as directed by Departmental Representative and provide snow removal during period of Work.

.4 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.9 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

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

1.10 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 construction period except as otherwise

1.10 PROTECTION AND MAINTENANCE OF TRAFFIC (Cont'd)

.2 (Cont'd) 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: responsible for repair of damage to roads caused by construction operations.

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

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

.9 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Departmental Representative.

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

.11 Provide snow removal during period of Work.

1.11 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 stored new or salvaged material.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

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 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around open edges of floors and roofs.

.2 Provide as required by governing authorities.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings and other openings in roofs.

.2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.3 Design enclosures to withstand wind pressure. and snow loading.

1.4 ACCESS TO SITE

.1 Provide and maintain access roads as may be required for access to Work.

1.5 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 the public.

1.6 FIRE ROUTES

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

1.7 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.

1.8 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 Confirm with Departmental Representative locations and installation schedule 3 days prior to installation.

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 Within text of specifications, reference may be made to reference standards.

.2 Conform to these standards, in whole or in part as specifically requested in specifications.

.3 If there is question as to whether any product or system is in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.

.4 The cost for such testing will be born by Departmental Representative in event of conformance with Contract Documents or by Contractor in event of non-conformance.

.5 Conform to latest date of issue of referenced standards in effect on date of submission of Bids, except where specific date or issue is specifically noted.

1.2 QUALITY

.1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of Products provided.

.2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.

.3 Should any dispute arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.

1.2 QUALITY (Cont'd)

.4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.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.

1.3 AVAILABILITY

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

.2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Amount or Contract Time.

1.4 METRIC SIZED MATERIALS

.1 SI metric units of measurement are used exclusively on the drawings and in the specifications for this project.

.2 The Contractor is required to provide metric products in the sizes called for in the Contract Documents except where a valid claim can be made that a particular product is not available on the Canadian market.

.3 Claims for exemptions from use of metric sized products shall be in writing and fully substantiated with supportive documentation. Promptly submit application to Departmental Representative for consideration and ruling. Non-metric sized products may not be used unless Contractor's application has been approved in writing by the Departmental Representative.

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric

1.4 METRIC SIZED MATERIALS (Cont'd)

.4 (Cont'd)
sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

.5 Claims for additional costs due to provision of specified modular metric sized products will not be considered.

1.5 STORAGE, HANDLING AND PROTECTION

.1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.

.3 Store products subject to damage from weather in weatherproof enclosures.

.4 Store cementitious products clear of earth or concrete floors, and away from walls.

.5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.

.6 Store sheet materials, and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.

.7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.

.8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

.9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.6 TRANSPORTATION

.1 Pay costs of transportation of products required in performance of Work.

.2 Transportation cost of products supplied by Owner will be paid for by Departmental Representative. Unload, handle and store such products.

1.7 MANUFACTURER'S INSTRUCTIONS

.1 Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products. Obtain written instructions directly from manufacturers.

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative may establish course of action.

.3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Amount or Contract Time.

1.8 QUALITY OF WORK

.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 required results.

.2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.

.3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.9 CO-ORDINATION

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

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.10 CONCEALMENT

.1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.

.2 Before installation, inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.11 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and install neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.12 FASTENINGS - EQUIPMENT

.1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.

.2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No.304 stainless steel for exterior areas.

1.12 FASTENINGS - EQUIPMENT (Cont'd)

.3 Bolts may not project more than one diameter beyond nuts.

.4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.13 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of Departmental Representative.

1.14 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants.

.2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SUBMITTALS

.1 Submittals: in accordance with Section 01 33 00.

.2 Submit written request in advance of cutting or alteration which affects:
- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:
- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 Required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00.

1.3 PREPARATION

.1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.

.2 After uncovering, inspect conditions affecting performance of Work.

.3 Beginning of cutting or patching means acceptance of existing conditions.

1.3 PREPARATION (Cont'd)

.4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.

.5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

.1 Execute cutting, fitting, and patching to complete Work.

.2 Fit several parts together, to integrate with other Work.

.3 Uncover Work to install ill-timed Work.

.4 Remove and replace defective and non-conforming Work.

.5 Remove samples of installed Work for testing.

.6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.

.7 Employ competent installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

.8 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.

.9 Restore work with new products in accordance with requirements of Contract Documents.

.10 Submit proposed materials, finishes and installation method for patching to Departmental Representative for approval, prior to patching.

.11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

1.5 WASTE MANAGEMENT AND DISPOSAL .1 Separate waste materials for reuse, recycling composting and anaerobic digestion in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Final cleaning.

1.2 PROJECT CLEANLINESS

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

.2 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

.3 Clear snow and ice from access to building.

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

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

.6 Provide and use clearly marked separate bins for recycling. Refer to Section 01 74 20.

.7 Remove waste material and debris from site and deposit in waste container at end of each working day.

.8 Dispose of waste materials and debris off site.

.9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.

.10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.

.11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.

.12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

1.2 PROJECT CLEANLINESS (Cont'd)

.13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

.1 When Work is Substantially Performed, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

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

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

.4 Remove waste products and debris other than that caused by Owner or other Contractors.

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site.

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

.7 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from decorative work, walls, and floors and windows.

.9 HEPA vacuum clean and dust building interiors, behind grilles, louvres and screens.

.10 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.

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

.12 Remove dirt and other disfiguration from exterior surfaces.

1.3 FINAL CLEANING (Cont'd)

.13 Clean and sweep roofs, gutters, areaways, and sunken wells.

.14 Clean roofs, downspouts, and drainage systems.

.15 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.

.16 Remove snow and ice from access to building.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 CONSTRUCTION & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is [60]% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.

.2 Source separate waste and maintain waste audits in accordance with the Environmental Protection Act, Ontario Regulation 102/94 and Ontario Regulation 103/94.
.1 Provide facilities for collection, handling and storage of source separated wastes.
.2 Source separate the following waste:
.1 Brick and portland cement concrete.
.2 Corrugated cardboard.
.3 Wood, not including painted or treated wood or laminated wood.
.4 Gypsum board, unpainted.
.5 Steel.

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.
.1 Indicate how material being removed from the site will be reused, recycled, composted or anaerobically digested using Section 02 42 93, Deconstruction and Waste Products Workplan Summary.

.4 Submit proof that all waste is being disposed of at a licensed land fill site or waste transfer site. A copy of the disposal/waste transfer site's license and a letter verifying that said landfill site will accept the waste must be supplied to Departmental Representative prior to removal of waste from the demolition site.

1.2 WASTE PROCESSING SITES

.1 Province of: Ontario.
.1 Ministry of Environment and Energy, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
.2 Telephone: 800-565-4923 or 416-323-4321.
.3 Fax: 416-323-4682.

1.2 WASTE PROCESSING SITES (Cont'd)

.2 Recycling Council of Ontario: 215 Spadina Avenue, #225, Toronto, ON, M5T 2C7.
- .1 Telephone: 416-657-2797.
- .2 Fax: 416-960-8053.
- .3 Email: rco@rco.on.ca.
- .4 Internet: http://www.rco.on.ca/.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment.

Province	Address	General Inquiries	Fax
Ontario	Ministry of Environment and Energy 135 St Clair Avenue West Toronto, ON M4V 1P5	(416) 323-4321 (800) 565-4923	(416) 323-4682
	Environment Canada Toronto, ON	(416) 734-4494	

END

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an 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 Inspection and that corrections have been made.
.2 Request Departmental Representative's Inspection.

.2 Departmental Representative's Inspection: Departmental Representative and Contractor will perform inspection of Work to identify obvious defects or deficiencies. Contractor to correct Work accordingly.

.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 Work is complete and ready for final inspection.

.4 Final Inspection: when items noted above are completed, request final inspection of Work by Departmental Representative and Contractor. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

1.2 CLEANING

.1 In accordance with Section 01 74 11.

.2 Remove waste and surplus materials, rubbish and construction facilities from the site in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 As-built, samples, and specifications.

.2 Product data, materials and finishes, and related information.

.3 Warranties and bonds.

1.2 SUBMISSION

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

.2 Copy will be returned after final inspection, with Departmental Representative's comments.

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

.4 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, final copies of maintenance manuals in English

.5 Ensure maintenance materials provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

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

.8 Pay costs of transportation.

1.3 FORMAT

.1 Organize data in the form of an instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

.3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

1.3 FORMAT (Cont'd)

.4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content under Section numbers and sequence of Table of Contents od specification.

.6 Provide tabbed fly leaf for each separate section.

.7 Text: Manufacturer's printed data, or typewritten data.

.8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.9 Provide scaled CAD files in dwg format. Forward pdf, NMSEdit Professional spp, MS Word, MS Excel, and Autocad dwg files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

1.4 CONTENTS - EACH VOLUME

.1 Table of Contents: provide title of project;
.1 Date of submission; names,
.2 Addresses, and telephone numbers of Contractor with name of responsible parties;
.3 Schedule of products and systems, indexed to content of volume.

.2 For each product or system:
.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.

.4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating

1.4 CONTENTS - EACH VOLUME (Cont'd)

.5 Typewritten Text:(Cont'd) manufacturer's instructions specified in Section 01 45 00.

1.5 AS-BUILTS AND SAMPLES

.1 In addition to requirements in General Conditions, maintain at the site for Departmental Representative one record copy of:
.1 Contract Drawings.
.2 Specifications.
.3 Amendments and addenda.
.4 Change Orders and other modifications to the 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 Manual. 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 Turn one set, paper copy and electronic copy, of AS-BUILT drawings and specifications over to Departmental Representative on completion of work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternate electronic file sharing service such as ftp, as directed by Departmental Representative.

.7 If project is completed without significant deviations from Contract drawings and specifications submit to Departmental Representative one set of drawings and specifications marked "AS-BUILT".

1.6 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

.2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of elements of foundation in relation to finish first floor datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 Field changes of dimension and detail.
.5 Changes made by change orders.
.6 Details not on original Contract Drawings.
.7 References to related shop drawings and modifications.

.5 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Amendments and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 MATERIALS AND FINISHES

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.

.2 Instructions for cleaning agents and methods, precautions against detrimental agents and

1.7 MATERIALS AND FINISHES (Cont'd)

.2 (Cont'd) methods, and recommended schedule for cleaning and maintenance.

.3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 Additional Requirements: as specified in individual specifications sections.

1.8 MAINTENANCE MATERIALS

.1 Provide maintenance and extra materials, in quantities specified in individual specification sections.

.2 Provide items of same manufacture and quality as items in Work.

.3 Deliver to site or location as directed as directed by Departmental Representative; place and store.

.4 Receive and catalogue all items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

1.9 STORAGE, HANDLING AND PROTECTION

.1 Store maintenance materials in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

.3 Store components subject to damage from weather in weatherproof enclosures.

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.10 WARRANTIES AND BONDS

.1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

.4 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Certificate of Substantial Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END

PART 1 - GENERAL

1.1 SUMMARY

.1 Comply with requirements of this Section when performing following Work:
.1 Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap on walls and as indicated on drawings.
.2 Removal of lead-containing coatings or materials using a power tool with an effective dust collection system equipped with a HEPA filter on walls and as indicated on drawings.
.3 Removal of lead-containing coatings or materials with non-powered hand tool, other than manual scraping and sanding on walls and as indicated on drawings.

1.2 RELATED REQUIREMENTS

.1 Section 09 03 61 - Historic - Painting Exterior Surfaces.

.2 Section 09 91 13.01 - Exterior Repainting.

.3 Section 09 97 19 - Painting Exterior Metal Surfaces.

1.3 REFERENCES

.1 Department of Justice Canada
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.2 Health Canada
.1 Workplace Hazardous Materials Information System (WHMIS), Material Safety Data Sheets (MSDS).

.3 Human Resources and Social Development Canada (HRSDC)
.1 Canada Labour Code Part II, - SOR 86-304 - Occupational Health and Safety Regulations.

.4 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

.5 U.S. Environmental Protection Agency (EPA)
.1 EPA 747-R-95-007-1995, Sampling House Dust for Lead.

1.3 REFERENCES (Cont'd)

.6 U.S. Department of Health and Human Services/Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (NIOSH).
.1 NIOSH 94-113 - NIOSH Manual of Analytical Methods (NMAM), 4th Edition (1994).

.7 U.S. Department of Labour - Occupational Safety and Health Administration (OSHA) - Toxic and Hazardous Substances.
.1 Lead in Construction Regulation - 29 CFR 1926.62-1993.

.8 Underwriters' Laboratories of Canada (ULC).

1.4 DEFINITIONS

.1 HEPA vacuum: High Efficiency Particulate Air filtered vacuum equipment with a filter system capable of collecting and retaining fibres greater than 0.3 microns in any direction at 99.97% efficiency.

.2 Authorized Visitors: Departmental Representative or designated representatives.

.3 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects over cuts and tears, and elsewhere as required to provide protection and isolation. For protection of underlying surfaces from damage and to prevent lead dust entering in clean area.

.4 Sprayer: garden reservoir type sprayer or airless spray equipment capable of producing mist or fine spray. Must be appropriate capacity for scope of work.

.5 Action level: employee exposure, without regard to use of respirators, to airborne concentration of lead of 50 micrograms per cubic meter of air (50 ug/m^3) calculated as 8-hour time-weighted average (TWA). Minimum precautions for lead abatement are based on airborne lead concentrations less than 0.05 milligrams per cubic meter of air for removal of lead based paint by methods noted in paragraph 1.1.

.6 Competent person: individuals Departmental Representative capable of identifying existing lead hazards in workplace taking corrective measures to eliminate them.

1.4 DEFINITIONS (Cont'd)

.7 Lead dust: wipe sampling on vertical surfaces and/or horizontal surfaces, dust and debris is considered to be lead contaminated if it contains more than 40 micrograms of lead in dust per square metre.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Provide proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of lead based paint waste in accordance with requirements of authority having jurisdiction.

.3 Provide proof of Contractor's General and Environmental Liability Insurance.

.4 Quality Control:
.1 Provide Departmental Representative necessary permits for transportation and disposal of lead based paint waste and proof that lead based paint waste has been received and properly disposed.
.2 Provide proof satisfactory to Departmental Representative that employees have had instruction on hazards of lead exposure, respirator use, dress, and aspects of work procedures and protective measures.

1.6 QUALITY ASSURANCE

.1 Regulatory Requirements: comply with Federal, Provincial/Territorial and local requirements pertaining to lead paint, provided that in case of conflict among those requirements or with these specifications more stringent requirement applies. Comply with regulations in effect at time work is performed.

.2 Health and Safety:
.1 Do construction occupational health and safety in accordance with Section 01 35 29.
.2 Safety Requirements: worker and visitor protection.
.1 Protective equipment and clothing to be worn by workers and visitors in work Area include:
.1 Respirator NIOSH approved and equipped with replaceable HEPA filter cartridges with an assigned protection

1.6 QUALITY ASSURANCE (Cont'd)

.2 Health and Safety:(Cont'd)

.2 Safety Requirements:(Cont'd)

.1 (Cont'd)

factor of 10, acceptable to Authority having jurisdiction. Suitable for type of lead and level of lead dust exposure. Provide sufficient amount of filters.

.2 Half mask respirator: half-mask particulate respirator with P - series filter, and 100% efficiency could be provided.

.2 Eating, drinking, chewing, and smoking are not permitted in work area.

.3 Ensure workers wash hands and face when leaving work area.

.4 Visitor Protection:

.1 Provide approved respirators to Authorized Visitors to work areas.

.2 Instruct Authorized Visitors procedures to be followed in entering and exiting work area.

1.7 WASTE MANAGEMENT AND

.1 Separate waste materials for recycling in accordance with Section 01 74 20.

.2 Handle and dispose of hazardous materials in accordance with CEPA, TDGA, Regional and Municipal regulations.

.3 Disposal of lead waste generated by removal activities must comply with Federal, Provincial, Territorial and Municipal regulations. Dispose of lead waste in sealed double thickness 0.154mm bags or leak proof drums. Label containers with appropriate warning labels.

.4 Provide manifests describing and listing waste created. Transport containers by approved means to licensed landfill for burial.

1.8 EXISTING CONDITIONS

.1 Reports and information pertaining to lead based paint to be handled, removed, or otherwise disturbed and disposed of during this Project are available for inspection at bound into this specification immediately after this Section.

1.8 EXISTING CONDITIONS (Cont'd)

.2 Notify Departmental Representative of lead based paint discovered during Work and not apparent from drawings, specifications, or report pertaining to Work. Do not disturb such material until instructed by Departmental Representative.

1.9 SCHEDULING

.1 Not later than two days before beginning Work on this Project notify following in writing:
.1 Appropriate Regional or Zone Director of Medical Services Branch, Health Canada.
.2 Provincial Ministry of Labour.
.3 Disposal Authority.

.2 Inform sub trades of presence of lead-containing materials identified in Existing Conditions.

.3 Provide Departmental Representative copy of notifications prior to start of Work.

1.10 PERSONNEL TRAINING

.1 Provide Departmental Representative satisfactory proof that every worker has had instruction and training in hazards of lead exposure, in personal hygiene, in aspects of work procedures, and in use, cleaning, and disposal of respirators.

.2 Instruction and training related to respirators includes, at minimum:
.1 Proper fitting of equipment.
.2 Inspection and maintenance of equipment.
.3 Disinfecting of equipment.
.4 Limitations of equipment.

.3 Instruction and training must be provided by competent, qualified person.

.4 Supervisory personnel to complete required training.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Polyethylene 0.154 mm thick unless otherwise specified; in sheet size to minimize joints.

.2 Tape: fibreglass - reinforced duct tape suitable for sealing polyethylene under dry conditions and wet conditions using amended water.

.3 Slow - drying sealer: non-staining, clear, water - dispersible type that remains tacky on surface for at least 8 hours and designed for purpose of trapping residual lead paint residue.

.4 Lead waste containers: metal type acceptable to dump operator with tightly fitting covers and 0.154 mm thickness sealable polyethylene liners.
.1 Label containers with pre-printed bilingual cautionary Warning Lead clearly visible when ready for removal to disposal site.

PART 3 - EXECUTION

3.1 SUPERVISION

.1 One Supervisor for every ten workers is required.

.2 Supervisor must remain within work area during disturbance, removal, or handling of lead based paints.

3.2 PREPARATION

.1 Remove and store items to be salvaged or reused.
.1 Protect and wrap items and transport and store in area specified by Departmental Representative.

.2 Work Area:
.1 Shut off and isolate HVAC system to prevent dust dispersal into other building areas. Conduct smoke tests to ensure duct work is airtight.
.2 Pre-clean fixed casework and equipment within work area, using HEPA vacuum and cover and seal with polyethylene sheeting and tape.

3.2 PREPARATION (Cont'd)

.2 Work Area:(Cont'd)

.3 Clean work area using HEPA vacuum. If not practicable, use wet cleaning method. Do not raise dust.

.4 Seal off openings with polyethylene sheeting and seal with tape.

.5 Protect floor surfaces covered from wall to wall with polyethylene sheets.

.6 Maintain emergency fire exits or establish alternatives satisfactory to Authority having jurisdiction.

.7 Where water application is required for wetting lead containing materials, provide temporary water supply appropriately sized for application of water as required.

.8 Provide electrical power and shut off for operation of powered tools and equipment . Provide 24 volt safety lighting and ground fault interrupter circuits on power source for electrical tools, in accordance with applicable CSA Standard. Ensure safe installation of electrical cables and equipment.

.3 Do not start work until:

.1 Arrangements have been made for disposal of waste.

.2 Tools, equipment, and materials waste containers are on site.

.3 Arrangements have been made for building security.

.4 Notifications have been completed and preparatory steps have been taken.

3.3 LEAD ABATEMENT

.1 Removal of lead-containing coatings with a chemical gel or paste and fibrous laminated cloth wrap; or removal equipped with HEPA filters; or removal with using power tools non-powered hand tool, other than manual scraping and sanding.

.2 Remove lead based paint in small sections and pack as it is being removed in sealable 0.154 mm plastic bags and place in labelled containers for transport.

.3 Seal filled containers. Clean external surfaces thoroughly by wet sponging. Remove from immediate working area to staging area. Clean external surfaces thoroughly again by wet sponging. Wash containers thoroughly pending removal to outside. Ensure containers are

3.3 LEAD ABATEMENT (Cont'd)

.3 (Cont'd)
removed by workers who have entered from uncontaminated areas dressed in clean coveralls.

.4 After completion of stripping work, wire brush and wet sponge surface from which lead based paint has been removed to remove visible material. During this work keep surfaces wet.

.5 After wire brushing and wet sponging to remove visible lead based paint, and after encapsulating lead containing material impossible to remove, wet clean entire work area, and equipment used in process. After inspection by Departmental Representative apply continuous coat of slow drying sealer to surfaces of work area. Do not disturb work area for 8 hours no entry, activity, ventilation, or disturbance during this period.

3.4 INSPECTION

.1 Perform inspection to confirm compliance with specification and governing authority requirements. Deviations from these requirements not approved in writing by Departmental Representativewill result in work stoppage, at no cost to Owner.

.2 Departmental Representative will inspect work for:
.1 Adherence to specific procedures and materials.
.2 Final cleanliness and completion.
.3 No additional costs will be allowed by Contractor for additional labour or materials required to provide specified performance level.

3.5 LEAD SURFACE SAMPLING - WORK AREAS

.3 Final lead surface sampling to be conducted as follows:
.1 After work area has passed a visual inspection for cleanliness approved and accepted by Departmental Representative. Apply coat of lock-down agent to surfaces within enclosure, and appropriate setting period of 8 hours has passed, Departmental Representative will perform lead wipe sampling.
.1 Final lead wipe sampling results from horizontal and vertical surfaces must show lead levels of less than 40 micrograms of lead in dust per square foot. Samples

3.5 LEAD SURFACE SAMPLING - WORK AREAS (Cont'd)

.3 (Cont'd)

.1 (Cont'd)

.1 (Cont'd)

collected and analyzed in accordance with EPA 747-R-95-007.

.2 If wipe sampling results show levels of lead in excess of 40 micrograms per square metre, re-clean work area at contractor's expense and apply another acceptable coat of lock-down agent to surfaces.

.3 Repeat as necessary until fibre levels are less than 40 micrograms per square metre.

3.5 FINAL CLEANUP

.1 Following cleaning and when lead wipe surfaces sampling are below acceptable concentrations, proceed with final cleanup.

.2 Remove polyethylene sheet by rolling it away from walls to centre of work area. Vacuum visible lead containing particles observed during cleanup, immediately, using HEPA vacuum.

.3 Place polyethylene sheets, tape, cleaning material, clothing, and contaminated waste in plastic bags and sealed labelled waste containers for transport.

.4 Conduct final check to ensure no dust or debris remains on surfaces as result of dismantling operations.

3.6 RE-ESTABLISHMENT OF OBJECTS AND SYSTEMS

.1 Repair or replace objects damaged in course of work to their original state or better, as directed by Departmental Representative.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.
.2 ASTM C309-11, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
.3 ASTM A497/A497M-07, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
.4 ASTM A1064/A1064M-15, Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.

.3 CSA International
.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
.2 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 At least 4 weeks prior to beginning Work, submit to Departmental Representative samples of following materials proposed for use: curing compound.

.3 Provide testing results for review by Departmental Representative and do not proceed without written approval when deviations from mix design or parameters are found.

.4 Concrete hauling time: provide for review by Departmental Representative deviations exceeding maximum allowable time of 120 for concrete to be delivered to site of Work and discharged after batching.

1.3 QUALITY ASSURANCE

.1 Provide to Departmental Representative, 4 weeks minimum prior to starting concrete work, valid and recognized certificate from plant delivering concrete.
.1 Quality Control Plan: provide written report to Departmental Representative verifying compliance that concrete in place meets performance requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.
.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.
.2 Deviations to be submitted for review by the Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

.1 Alternative 1 - Performance to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by Departmental Representative and provide verification of compliance as described in PART 1 - QUALITY ASSURANCE.

2.3 MATERIALS

.1 Cement: to CAN/CSA-A3001, Type GU.

.2 Aggregates: to CSA A23.1/A23.2.

2.3 MATERIALS (Cont'd)

.3 Admixtures:
.1 Air entraining admixture: to ASTM C260/C260M.
.2 Chemical admixture: to ASTM C494/C494M and ASTM C1017/C1017M. Departmental Representative to approve accelerating or set retarding admixtures during cold and hot weather placing.

.4 Water: to CSA A23.1/A23.2.

.5 Curing compound: white pigmented to ASTM C309, Type II.

.6 Welded steel wire fabric: ASTM A497/A497M, flat sheets only.

.7 Other concrete materials: to CSA A23.1/A23.2.

2.4 MIXES

.1 Alternative 1 - Performance Method for specifying concrete: to meet Departmental Representative performance criteria to CSA A23.1/A23.2.
.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance as described in PART 3 - VERIFICATION.
.2 Provide concrete mix to meet following plastic state requirements:
.1 Uniformity: to CSA A23.1/A23.2..
.2 Workability: free of surface blemishesand segregation.
.3 Finishability: minimize the amount of bleeding. .
.3 Provide concrete mix to meet following hard state requirements:
.1 Durability and class of exposure: C-2.
.2 Compressive strength at 32 MPa minimum.
.3 Intended application: Slab on grade.
.4 Aggregate size 19 mm maximum..
.4 Concrete supplier's certification.
.5 Provide quality management plan to ensure verification of concrete quality to specified performance.

PART 3 - EXECUTION

3.1 PREPARATION

.1 Provide Departmental Representative 24 hours notice before each concrete pour.

.2 During concreting operations:
.1 Development of cold joints not allowed.
.2 Ensure concrete delivery and handling facilitates placing with minimum of rehandling, and without damage to existing structure or Work.

.3 Protect previous Work from staining.

.4 Clean and remove stains prior to application of concrete finishes.

3.2 INSTALLATION/ APPLICATION

.1 Do cast-in-place concrete work in accordance with CSA A23.1/A23.2.

.2 Sleeves and inserts:
.1 Cast in sleeves, ties, slots, anchors, reinforcement, frames, conduit, bolts, waterstops, joint fillers and other inserts required to be built-in.
.2 Sleeves and openings greater than 100 mm x 100 mm not indicated, must be reviewed by Departmental Representative.

3.3 FINISHES

.1 Pavements, walks, curbs and exposed site concrete:
.1 Screed to plane surfaces and use magnesium floats.
.2 Provide round edges and joint spacings using standard tools.
.3 Trowel smooth to provide lightly brushed non-slip finish.

3.4 CONTROL JOINTS

.1 Cut control joints in slabs on grade at locations indicated, to CSA A23.1/A23.2.

3.5 CURING

.1 Use curing compounds compatible with applied finish on concrete surfaces free of bonding agents and to CSA A23.1/A23.2.

3.6 SEALING APPLICATION

.1 After curing is complete, apply poly-siloxane resin blend sealer at 4 m^2 /L.

3.7 FIELD QUALITY CONTROL

.1 Concrete testing: to CSA A23.1/A23.2 by conrete supplier.

3.8 CLEANING

.1 Clean in accordance with Section 01 74 11.

.2 Use trigger operated spray nozzles for water hoses.

.3 Designate cleaning area for tools to limit water use and runoff.

.4 Cleaning of concrete equipment to be done in accordance with Section 01 35 43.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Divert unused concrete materials from landfill to local quarry or facility after receipt of written approval from Departmental Representative.
.2 Provide appropriate area on job site where concrete trucks and be safely washed.
.3 Divert admixtures and additive materials from landfill to approved official hazardous material collections site after receipt of written approval from Departmental Representative.
.4 Do not dispose of unused admixtures and additive materials into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 21 13 - Brick Masonry.

1.2 REFERENCES

.1 ASTM International

.1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A775/A775M-16, Standard Specification for Epoxy-Coated Steel Reinforcing Bars.

.3 ASTM D412-15a, Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

.4 ASTM D2240-15, Standard Test Method for Rubber Property - Durometer Hardness.

.5 ASTM C494/C494M-15a, Standard Specification for Chemical Admixtures for Concrete.

.2 CSA International

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA-A23.3-14, Design of Concrete Structures.

.3 CSA A23.4-16, Precast Concrete-Materials and Construction.

.4 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.5 CSA G30.18-09(R2014), Carbon and Steel Bars for Concrete Reinforcement.

.6 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.7 CSA W47.1-09 (R2014), Certification of Companies for Fusion Welding of Steel Structures.

.8 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.

.9 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.10 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.2 REFERENCES (Cont'd)

.3 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
.1 SCAQMD Rule 1113-A2013, Architectural Coatings.
.2 SCAQMD Rule 1168-A2014, Adhesives and Sealants Applications.

.4 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.
.1 MPI #18 Primer, Zinc Rich Organic.
.2 MPI #79 Primer, Alkyd, Anti-Corrosive for Metal.

.5 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.6 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for concrete mixes and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontgario, Canada.
.2 Submit shop drawings to CSA A23.4 and CAN/CSA-A23.3.
.3 Submit 2 copies of detailed calculations and design drawings for typical precast elements and connections for Departmental Representative for review 4 weeks prior to manufacture.
.4 Indicate on drawings:
.1 Tables and bending diagrams of reinforcing steel.
.2 Finishing schedules.
.3 Methods of handling and erection.

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.3 Shop Drawings:(Cont'd)
.4 Indicate on drawings:(Cont'd)
.4 Openings, sleeves, inserts and related reinforcement. Including embedded handling hardware.

.4 Submit evidence of welding certification including welding procedures before commencing work.

1.4 QUALITY ASSURANCE

.1 Fabricate and erect precast concrete elements using manufacturing plant certified by CSA International in appropriate categoryies to CSA A23.4.

.2 Precast concrete manufacturer to be certified to CSA's certification procedures for precast concrete plants prior to submitting bid and to specifically verify as part of bid that plant is currently certified in appropriate categoryies,Architectural.

.3 Only precast elements fabricated in such certified plants to be acceptable to owner, and plant certification to be maintained for duration of fabrication, erection until warranty expires.

.4 Welder Qualification: certified to CSA W47.1 and for weld type required.

.5 Submit evidence of welding certification including welding procedures before commencing work.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect precast panels from damage.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Storage and Handling Requirements:(Cont'd)
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified inConstruction Waste Management Plan Waste Reduction Workplan in accordance with Section 01 74 20.

1.6 WARRANTY

.1 For spalling and cracking of precast elements 12 months warranty period prescribed is extended to 60 months.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Cement, white cement, aggregates, water, admixtures: to CSA A23.4 and CSA A23.1/A23.2.

.2 Use same brands and source of cement and aggregate for entire project to ensure uniformity of colouration and other mix characteristics.

.3 Reinforcing steel: epoxy coated.

.4 Forms: to CSA A23.4.

.5 Hardware and miscellaneous materials: to CSA A23.1/A23.2.

.6 Anchors and supports: to CSA G40.20/G40.21, Type 350W, galvanized after fabrication.

.7 Welding materials: to CSA W48.

.8 Steel primer: to MPI #79.

.9 Epoxy coating: to ASTM A775/A775M.

.10 Sealant:
.1 Sealant: VOC limit 250 g/L maximum to SCAQMD Rule 1168.

2.2 CONCRETE MIXTURES

.1 Proportion normal density concrete in accordance withCSA A23.1/A23.2 to give following properties: for all concrete as indicated.
.1 Cement: use Type GU Portland cement to CSA A3001.
.2 Minimum compressive strength at 28 days: 35 MPa.
.3 Class of exposure: C-1.
.4 Nominal size of coarse aggregate: 9.5 mm.
.5 Water cement ratio: 0.40.
.6 Air content: 5 to 8 %.
.7 Slump at time and point of discharge: 75 to 100 mm.

2.3 DESIGN REQUIREMENTS

.1 Design precast elements to CAN/CSA-A23.3 CSA A23.4 CAN/CSA-S6 and to resist handling, stockpiling, shipping and erection stresses.

.2 Design precast elements to carry loads as indicated, and in accordance with NBCC applicable codes.
.1 Design to include resistance to creep, shrinkage and temperature effects, and, wind and earthquake loads.

2.4 PERFORMANCE REQUIREMENTS

.1 Tolerance of precast elements: to CSA A23.4.

.2 Cross sectional dimensions of precast elements not to vary from design dimensions by more than plus or minus 16 mm.

.3 Deviations from straight lines not to exceed 3 mm in 1 m.

.4 Precast elements not to vary by more than plus or minus 6 mm from true overall cross sectional shape as measured by difference in diagonal dimensions.

2.5 FABRICATION

.1 Manufacture units to CSA A23.4.

.2 Mark each precast unit to correspond to identification mark on shop drawings for location with date cast on part of unit which will not be exposed.

2.5 FABRICATION (Cont'd)

.3 Design and attach anchors and inserts to precast concrete elements to carry design loads.

.4 Galvanize anchors after fabrication and touch up with zinc-rich primer after welding.

2.6 FINISHES

.1 Finish and colour of precast units to match approved sample in Departmental Representative's office.

.2 Smooth finish: as cast using smooth steel form liners.

.3 Rubbed finish:
.1 Rub exposed face surface of precast concrete panels with carborundum bricks and water until hollows, lines, form marks, and surplus materials have been removed.
.2 Leave surface finish uniformly smooth.
.3 Do not use mortar or grout in rubbing, other than cement paste drawn from green concrete by rubbing process.
.4 Clean panels.

.4 Smooth steel trowel back surface of precast units exposed on both sides.

.5 Protect fluted, smooth or exposed surfaces with 2 coats of sealer as approved in writing by Departmental Representative.
.1 Sealers: in accordance with manufacturer's recommendations for surface conditions:

2.7 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copies of quality control tests related to this project as specified in CSA A23.4.

.2 Upon request provide Provide Departmental Representative with certified copy of mill test report of reinforcing steel supplied, showing physical and chemical analysis.

.3 Precast plants should keep complete records of supply source of concrete material, steel reinforcement, prestressing steel and provide to Departmental Representative for review upon request.

PART 3 - EXECUTION

3.1 GENERAL

.1 Do precast concrete work to CSA A23.4 and CAN/CSA-A23.3 and CAN/CSA-S6.

3.2 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for precast concrete installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.3 ERECTION

.1 Erect precast elements within allowable tolerances as indicated.

.2 Non-cumulative erection tolerances in accordance with CSA A23.4.

.3 Bed Chimney Cap unit in mortar Type S in accordance with Section 04 03 08. Point joints with coloured mortar Rake out joints 10 mm to receive sealant.

.4 Set units dry, without mortar, attaining specified joint dimension with plastic shims.

.5 Remove shims and spacers from joints of non-load bearing panels after fastening but before sealant is applied.

.6 Apply sealers to precast panels to manufacturer's recommendations unless specified otherwise.

3.4 WELDING

.1 Weld to CSA W59 for welding to steel structures and to CSA W186 for welding of reinforcement.

3.5 CLEANING

.1 Obtain approval of cleaning methods from Departmental Representative before cleaning soiled precast concrete surfaces.

.2 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by precast concrete installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 - Common Work Results for Masonry.

.2 Section 07 11 13 - Bituminous Dampproofing.

.3 Section 07 62 00 - Sheet Metal Flashing and Trim.

.4 Section 31 00 00.01 - Earthwork - Short Form.

1.2 PRICE AND PAYMENT PROCEDURES

.1 Work of this Section will be measured by Departmental Representative. Work will be paid for under payment items:
.1 Inspecting and testing to identify unsound joints. This item will not be measured; payment will be according to one fixed lump sum price for work necessary to locate unsound joints.
.2 Pointing - on lump sum basis.

.2 Work necessary for completion of work of this Section will not be paid for separately but will be considered as incidental to work of this Section.

1.3 REFERENCES

.1 Definitions:
.1 Raking: removal of loose/deteriorated mortar to a depth suitable for repointing until sound mortar, and/or 4x joint thickness and/or a specified mm depth is reached.
.2 Repointing: filling and finishing of masonry joints from which mortar is missing, has been raked out or has been omitted.
.3 Back Pointing: repointing to depths greater than minimum raked depths specified, to bring mortar face to specified depth for raked joints.
.4 Finish Pointing: repointing face of joint, to depth specified for raked joints.
.5 Tooling: finishing of masonry joints using tool to provide final contour.
.6 Low-pressure water cleaning: water soaking of masonry using less than 350 kPa (50 psi) water pressure, measured at nozzle tip of hose.

1.3 REFERENCES (Cont'd)

.2 Reference Standards:
.1 CSA Group
.1 CSA A23.1/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Samples:
.1 Provide labelled samples of materials to be used on project for approval before work commences.

1.5 QUALITY ASSURANCE

.1 Masonry Contractor:
.1 Use single Masonry Contractor for masonry work.
.2 Masonry Contractor to have experience in historic stone and brick masonry repair and conservation work on projects of similar size and complexity to Work of this Contract.
.3 Masonry Contractor to have good level of understanding of structural behaviour of masonry walls when masonry work involves replacing or repairing stones which are part of structural masonry work.
.4 Masonry Contractor will be responsible for all aspects of masonry work for duration of project.

.2 Project Supervisor:
.1 Masonry Contractor to employ a Project Supervisor with documented successful experience of historic masonry repair and conservation work of required for this Contract. Project Supervisor to be present on site full-time for duration of Work.
.2 Demonstrate competence levels to satisfaction of Departmental Representative before undertaking Work.

.3 Masons:
.1 Masons to have certificate of qualification with experience in historic stone masonry repair and conservation work required for this Contract.

1.5 QUALITY ASSURANCE (Cont'd)

.3 Masons:(Cont'd)
.2 Masons to have proof of license certification for proprietary restoration mortars.

.4 Grouting: grouting activities should be undertaken by workers experienced in manipulation and grouting methods.

.5 Departmental Representative reserves the right to reject Masonry Contractor or proposed Project Supervisor, mason or apprentice if, documentation provided does not demonstrate level of experience or skill required for successful completion of Work of this Contract.

.6 Obtain written approval from Departmental Representative for changes to qualified personnel.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store cementitious materials and aggregates in accordance with CSA A23.1/A23.2.
.3 Store lime putty in plastic lined sealed drums.
.4 Keep material dry. Protect from weather, freezing and contamination.
.5 Remove rejected or contaminated material from site.
.6 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

.1 Ambient conditions:
.1 Maintain masonry temperature between 10 and 27 degrees C for duration of work.

1.7 SITE CONDITIONS (Cont'd)

.1 (Cont'd)

.2 When ambient temperature is below 10 degrees C or is forecast to fall below 5 degrees C within 24 hours:

.1 Maintain temperature of lime at or above 10 degrees C at all times.

.2 Store mortar materials for immediate use within heated enclosure. Allow mortar materials to reach minimum temperature of 5 degrees C before use.

.3 Heat and maintain sand aggregate temperature to minimum 5 degrees C and maximum 30 degrees C.

.1 Heat and maintain water temperature to minimum of 20 degrees C and maximum of 30 degrees C:

.4 Provide hot water to a maximum 30 degrees C on site during cold weather.

.5 Provide enclosure system around curing area to ensure that stated conditions are maintained for curing period.

.6 Use heated temporary enclosures to maintain temperatures above 5 degrees C in cold weather only with written approval of material manufacturer and Departmental Representative.

.7 Submit enclosure system for approval from Departmental Representative.

.2 Remove work exposed to temperatures lower than 5 degrees C as directed by Departmental Representative.

.3 When ambient temperature is above 21 degrees C:

.1 Protect repointed areas from direct sunlight and wind.

.2 Use protective methods acceptable to the Departmental Representative.

.4 Provide humid cure for a minimum of 7 days.

.5 Use and prepare mortar when the ambient air temperature is between 5 and 27 degrees C at the location of the work.

.6 Maintain sand aggregate temperature between 10 and 30 degrees C.

.7 Mix cement with water or with aggregate or with water-aggregate mixtures when ambient air temperature is between 10 and 30 degrees C.

1.7 SITE CONDITIONS (Cont'd)

.8 Maintain mortar mix temperature between 10 and 30 degrees C.

PART 2 - PRODUCTS

2.1 MORTAR

.1 Mortar: in accordance with CAN/CSA-A179 and Section 04 03 08.

.2 Proportion Specification:
- .1 In accordance with CAN/CSA-A179 Section 04 03 08.

.3 Property Specification:
- .1 Bearing walls:
  - .1 Below grade walls:
    - .1 Bedding mortar: Type N.
    - .2 Pointing mortar: Type N.
      - .1 Mortar compressive strength at 7 days: minimum 3.5 MPa, maximum 5 MPa.
      - .2 Mortar compressive strength at 28 days: minimum 5 MPa, maximum 7.5 MPa.
      - .3 Air entrainment: 8-12%.
      - .4 Flexural bond strength: minimum 0.2 MPa.
  - .2 Above grade walls: Type N.
    - .1 Finish pointing mortar: Type N.
      - .1 Mortar compressive strength at 7 days: minimum 3.5 MPa, maximum 5 MPa.
      - .2 Mortar compressive strength at 28 days: minimum 5 MPa, maximum 7.5 MPa.
      - .3 Air entrainment: 8-12%.
      - .4 Flexural bond strength: minimum 0.2 MPa.
  - .3 Exterior walls:
    - .1 Bedding mortar:
      - .1 Mortar compressive strength at 7 days: minimum 3.5 MPa, maximum 5 MPa.
      - .2 Mortar compressive strength at 28 days: minimum 5 MPa, maximum 7.5 MPa.
      - .3 Air entrainment: 8-12%.
      - .4 Flexural bond strength: minimum 0.2 MPa.
    - .2 Finish pointing mortar:
      - .1 Mortar compressive strength at 7 days: minimum 3.5 MPa, maximum 5 MPa.

2.1 MORTAR (Cont'd)

.3 Property Specification:(Cont'd)
.1 Bearing walls:(Cont'd)
.2 Mortar compressive strength at 28 days: minimum 5 MPa, maximum 7.5 MPa.
.3 Air entrainment: 8-12%.
.4 Flexural bond strength: minimum 0.2 MPa.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify masonry, staging and storage areas and notify Departmental Representativein writing of conditions detrimental to acceptable and timely completion of Work.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform in writing Departmental Representative areas of deteriorated masonry not previously identified.

.2 Notify Departmental Representative immediately if evidence of hazardous materials is discovered in work area.

.3 Stop work in that area and report to Departmental Representative immediately evidence of hazardous materials.

3.2 PROTECTION OF IN-PLACE CONDITIONS

.1 Protection requirements are specified in Section 04 05 00.

3.3 SPECIAL TECHNIQUES

.1 Examine mortar joints.
.1 Examine horizontal and vertical joints to determine which were struck first and whether they are the same style, as well as aspects of quality of work which establish authenticity of original work.
.2 Replicate the style selected by Departmental Representative.

.2 Test mortar joints.
.1 Procedure of testing: examine joints visually for signs of deteriorated masonry such

3.3 SPECIAL TECHNIQUES (Cont'd)

.2 (Cont'd)
.1 Procedure of testing:(Cont'd)
as voids spalled surfaces loose or missing mortar cracking or micro-cracking at edges of joints or across joints and dense cement-rich mortar.
.2 Test joints not visually deteriorated as follows:
.1 Test for voids and weakness by using hammers or other approved means.
.2 Perform examination and testing in co-operation with Departmental Representative so that unsound joints can be marked and recorded.

3.4 RAKING JOINTS

.1 Use manual raking tool to obtain clean masonry surfaces.
.1 Remove deteriorated and adhered mortar from masonry surfaces to full depth of deteriorated mortar but in no case less than 4x joint thickness leaving square corners and flat surface at back of cut.
.2 Clean out voids and cavities encountered.

.2 Remove mortar without chipping, altering or damaging masonry units.

.3 Where use of power tools to remove mortar is deemed appropriate by Departmental Representative:
.1 Rake out using maximum 86 mm diameter blades to centre of joint only, to a maximum depth that is equal to half of joint width. Mortar must remain on each side of saw cut. Raking must not touch masonry units.
.2 Stop saw cut 50 to 75 mm from end of vertical and discontinuous horizontal joints. Do not cut into masonry units.
.3 Notify Departmental Representative to inspect raking, prior to removing remaining mortar with hand tools.
.4 Remove remaining mortar with hand tools.

.4 Clean surfaces of joints by compressed air, with non-ferrous brush and by moderate water wash without damaging texture of exposed joints or masonry units.

.5 Flush open joints and voids; clean open joints and voids with low pressure water and if not free draining blow clean with compressed air.

3.4 RAKING JOINTS (Cont'd)

.6 Leave no standing water.

.7 Replace stone damaged as a result of careless raking of saw cutting, at no cost to Owner.

.8 Remove mortar from top, bottom and side joints, with back surface of joint square and of an even depth.

3.5 REPOINTING

.1 When required repair and replacement work is complete carry out repointing.

.2 Before repointing, wash down wall to be repointed and allow to dry to damp, but not wet. Ensure that dust and debris are removed from joints and wall surfaces prior to repointing.

.3 Keep masonry damp while pointing is being performed.

.4 Completely fill joint with mortar.
.1 If surface of masonry units has worn rounded edges keep pointing back 1 mm from surface to maintain same width of joint
.2 Avoid feathered edges.
.3 Pack mortar firmly into voids and joints, ensuring full contact with back and sides of joint and leaving no voids.

.5 Build-up pointing in layers not exceeding 25 mm in depth.
.1 Allow each layer to set before applying subsequent layers.
.2 Maintain joint width.

.6 Finish joints to match existing profile.
.1 Tool, compact and finish using mason's slick to force mortar into joint. Ensure jointing tool fits within width of joint. Use tools of varying widths to meet this requirement.
.2 Provide final exposed aggregate texture when mortar has dried to thumb-print hardness by striking surface of joint with a stiff bristle brush.

.7 Remove excess mortar from masonry face before it sets.

3.6 PROTECTION DURING CURING PROCESS

.1 Cover completed and partially completed work not enclosed or sheltered at end of each work day.
.1 Membranes should extend to 0.5 m over surface area of work and be tightly installed to prevent finished work from drying out too rapidly.

.2 Cover with waterproof tarps to protect newly laid mortar from frost, rainfall and rapid drying conditions such as wind.
.1 Maintain tarps in place for minimum of 2 weeks after repointing.
.2 Ensure that bottoms of tarps permit airflow to reach mortar in joints.

.3 Anchor coverings securely in position.

.4 Damp cure:
.1 Provide damp cure for back pointing and finish pointing mortars, at a minimum temperature of 5 degrees C.
.2 Install and maintain wetted burlap protection during the curing process, using heavy and tight-woven burlap:
.1 Minimum 3 days.
.3 Wet mist burlap only - ensure no direct spray reaches surface of curing mortar.
.4 Ensure burlap is not in contact with masonry. Leave air space of minimum 50 mm between burlap and masonry.
.5 Shade areas of work from direct sunlight and maintain constant dampness of burlap.
.6 Provide for off-hours and week-end work as required to maintain specified curing conditions.

.5 Protect from drying winds. Pay particular attention at corners of structure.

.6 Maintain ambient temperature of minimum 10 degrees C after repointing masonry for:
.1 Minimum 7 days in summer.
.2 Minimum 30 days in cold weather conditions using dry heated enclosures.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

3.7 CLEANING (Cont'd)

.2 Clean surfaces thoroughly of mortar droppings, stains and other blemishes resulting from work of this contract on a daily basis, as work progresses.

.3 Remove droppings and splashings using clean water and thick cotton rags.

.4 Clean masonry with stiff natural bristle brushes and plain water only if mortar has fully cured.

.5 Clean masonry with low pressure 103 to 310 kPa clean water and soft natural bristle brush.

.6 Obtain approval of Departmental Representative prior to using other cleaning methods for persistent stains.

.7 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.8 PROTECTION OF COMPLETED WORK

.1 Protect adjacent finished work against damage which may be caused by on-going work.

END

PART 1 - GENERAL

1.1 RELATED - REQUIREMENTS

.1 Section 04 03 07 - Historic Mortaring.

.2 Section 04 05 00 - Common Work Results for Masonry.

.3 Section 04 05 23 - Masonry Accessories.

.4 Section 04 05 19 - Masonry Anchorage.

.5 Section 04 21 13 - Brick Masonry.

.6 Section 31 00 00.01 - Earthwork - Short Form.

1.2 ALTERNATES

.1 Obtain Departmental Representative's approval before changing manufacturer's brands or sources of supply of mortar materials during entire contract or other methods of mixing mortar specified elsewhere in this specification.

1.3 REFERENCES

.1 ASTM International

.1 ASTM C5-10, Standard Specification for Quicklime for Structural Purposes.

.2 ASTM C144-11, Standard Specification for Aggregate for Masonry Mortar.

.3 ASTM C185-15a, Standard Test Method for Air Content of Hydraulic Cement Mortar.

.4 ASTM C207-06(2011), Standard Specification for Hydrated Lime for Masonry Purposes.

.5 ASTM C260/C 260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.6 ASTM C270-14a, Standard Specification for Mortar for Unit Masonry.

.7 ASTM C780-15a, Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.

.8 ASTM C1072-13e1, Standard Test Method for Measurement of Masonry Flexural Bond Strength.

.2 CSA International

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.

1.3 REFERENCES (Cont'd)

.2 (Cont'd)
.3 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for mortar and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Prior to mixing or preparation of mortars submit for review to Departmental Representative confirmation of source or product data sheet of:
.1 Aggregate.
.2 Cement.
.3 Lime.
.4 Premixed products.
.5 Pigments.

.3 Samples:
.1 Provide samples in quantity and size in accordance with CAN/CSA-A179.

.4 Test reports:
.1 Submit test results during site work as directed by Departmental Representative's as follows:
.1 Sieve analysis: sand.
.2 Bulking analysis: sand.
.3 Air content: mortar mix in plastic state.
.4 Vicat cone penetration: mortar mix.
.5 Mortar compressive strength: at 7 and 28 days or otherwise required.

1.5 QUALITY ASSURANCE

.1 Qualifications:
.1 Mechanics to have minimum of 5 years experience in lime mortar preparation.
.2 Mortar to be mixed by same mechanics throughout project.
.3 Mechanics to have minimum of 5 years experience in lime mortar preparation.
.4 Mortar to be mixed by same mechanics throughout project.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store cementitious materials and aggregates in accordance with CSA A23.1/A23.2.
.3 Store lime putty in plastic lined sealed drums.
.4 Protect from weather, freezing and contamination.
.5 Remove rejected or contaminated material from site.
.6 Store and protect mortar materials.
.7 Replace defective or damaged materials with new.

1.7 SITE CONDITIONS

.1 Ambient Conditions:
.1 Provide weather-tight enclosure to store materials and mix mortars, maintain air temperature above 10 degrees C at all times.
.2 Maintain maximum/minimum thermometers and relative humidity gauges on site and in enclosures.
.1 Maintain a daily record of temperature and humidity.

.2 Install relative humidity and temperature equipment, record temperature and relative humidity and submit report to Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Water: potable, clean and free from contaminants.

.2 Sand: to CAN/CSA-A179.

Sieve Size	% By Weight Passing Each Sieve	% By Weight Retained on Each Sieve
No. 4 (4.75 mm)	100	0
No. 8	90	10
No. 16 (1.18 mm)	70	20
No. 30 (600 mm)	50	20
No. 50 (300 mm)	30	20
No. 100 (150 mm)	15	15
No. 200 (75 mm)	0	15

.1 Sharp, screened and washed pit sand, free of organic material, with final grading and colour to approval of Departmental Representative .

.2 Custom blend sands where necessary to provide appropriate colour match and gradation to approval of Departmental Representative.

.3 Portland cement: to CAN/CSA-A3000, Type GU.

.4 Masonry cement: to CAN/CSA-A3000, Type GU.

.5 Lime:

.1 Processed Lime (Quicklime): to ASTM C5, fresh, finely ground and crushed; high calcium, 4.76 mm fines, dry bagged.

.2 Hydrated Lime:

.1 Dolomitic finishing lime, Type "S", to ASTM C207.

.2 Hydrated, high calcium, Type "N" masons' lime to ASTM C207.

.3 Lime putty.

.6 Colour:

.1 Ground coloured natural aggregates, . Use minimum amount necessary.

.2 Maximum colour: 2% of total volume of aggregate.

2.1 MATERIALS (Cont'd)

.6 Colour:(Cont'd)
.3 Match core of freshly broken sample of original mortar.
.4 Coloured admixtures: maximum 15% of binder content by mass.

.7 Additives:
.1 Obtain written approval of Departmental Representative before using additives.

.8 Air entrainment:
.1 Vinsol resin type: to ASTM C260/C260M.

2.2 MORTAR MIXES

.1 Property requirements:
.1 Mixes: as required to achieve specified performance criteria, functionally compatible with adjacent materials and components.
.2 Obtain written approval of Departmental Representative before changing mix proportions. Change mix proportions only as directed by Departmental Representative.

2.3 COLOURED MORTAR

.1 Use sand as colouring agent.

.2 Maintain one mortar mixer exclusively for coloured mortar.

2.4 ALLOWABLE TOLERANCES

.1 Mortar compression strength minimum 5 MPa, maximum 8 MPa, cured for 28 days.

.2 If mortar fails to meet the 7 day compressive strength requirements, but meets the 28 day compressive strength requirement, it is acceptable. If mortar fails to meet the 7 day compressive strength requirement, but its strength at 7 days exceeds two thirds of the value required for the 7 day strength, contractor may elect to continue work at his own risk while awaiting the results of the 28 day tests, or to take down the work affected.

PART 3 - EXECUTION

3.1 GENERAL PREPARATIONS

.1 Traditional Mortar:
- .1 Prepare measuring boxes to ensure accurate proportioning of materials.
- .2 Maintain separate measuring boxes for each component.
- .3 Ensure sand is tested and volume corrected for bulking.
- .4 Ensure air entraining agent is available together with a graduated container for accurate volume measurements.
- .5 Ensure testing equipment is ready and in working order.
- .6 Apply Vicat cone test to ensure desirable performance of the mortar and record results.
- .7 Departmental Representative to apply Vicat cone test to ensure desirable performance of mortar and record results.

.2 Premixed Mortar:
- .1 Follow manufacturer's written instructions.
- .2 Whole bag has to be prepared.
- .3 Apply Vicat cone test to ensure desirable performance of the mortar and record results.
- .4 Departmental Representative to apply Vicat cone test to ensure desirable performance of mortar and record results.

3.2 BULKING OF SAND

.1 Test sand for bulking:
- .1 At start of work.
- .2 After each new delivery of sand.
- .3 After severe change in weather.

.2 Test and adjust sand quantities for bulking:
- .1 Obtain sample of sand which accurately reflects average condition of pile of damp sand, as follows:
  - .1 Take 4 shovels full of sand, each from a different level of the pile, and mix thoroughly.
  - .2 Place sand in a conical pile and divide into 4 quarters with a board. Remove 2 opposite quarters from pile, and combine remaining 2 quarters and mix thoroughly.
  - .3 Repeat quartering and mixing procedure until a sample of size required for testing remains.

3.2 BULKING OF SAND (Cont'd)

.2 (Cont'd)

.2 Fill a 1-litre capacity jar, about two-thirds full with damp sand to be tested. Drop sand in loosely. Do not pack it in. Level off surface, measure depth of damp sand (D).

.1 Carefully empty sand into another container, and half fill first container with water.

.2 Pour back about half of test sample of sand slowly into water so it is entirely saturated. Rod it thoroughly to remove air.

.3 Add rest of sand, rodding again to remove air and level off surface. Measure depth of saturated sand (S), which will be less than depth of damp sand.

.4 Calculate percentage bulking using formula: (D-S) x 100%/S = percentage bulking; where D = depth of damp sand, and S = depth of saturated sand.

.3 Increase volume of sand by percentage bulking shown in test.

3.3 PREPARATION OF MORTAR

.1 Lime Mortar:

.1 Prepare measuring boxes to ensure accurate proportioning of dry lime putty and sand.

.2 Mix dry lime and sand thoroughly in mortar mill, or spiral- blade mechanical mixer for minimum 3 maximum 10 minutes. Do not add water. No spots or streaks of lime to remain upon completion of mixing.

.3 Add water as required.

.2 Lime-Cement Mortar:

.1 Prepare measuring boxes to ensure accurate proportioning of dry lime putty and sand.

.2 Mix dry lime and sand thoroughly in mortar mill, or spiral- blade mechanical mixer for minimum 3 maximum 10 minutes. Do not add water. No spots or streaks of lime to remain upon completion of mixing.

.3 Add water as required.

.3 Lime Putty Mortar:

.1 Prepare lime putty from hydrated mason's lime by adding dry bagged hydrated lime to water. Stir and hoe the mass to form a thick cream.

.2 Seal containers.

.3 Label and date all containers.

.4 Keep prepared material from freezing. Discard frozen material.

3.3 PREPARATION OF MORTAR (Cont'd)

.3 Lime Putty Mortar:(Cont'd)

.5 Allow to stand at least 48 hours in covered containers before use, preferably longer.

.6 Take lime putty from bins, siphon off water by screening lime through muslin, or cheesecloth, to remove excess water. Rework lime without adding water until it regains its plasticity by beating, ramming and chopping.

.7 Adjust sand for bulking as described in article 3.2.

.8 Mix lime putty with sand as required.

3.4 PREPARATION OF LIME-SAND ROUGHAGE (COARSE STUFF)

.1 Store lime sand roughage in air-tight plastic bins.

.2 Keep prepared material from freezing. Discard frozen material.

.3 Maintain measuring containers for correct quantity of materials for use in batches.

.4 Thoroughly clean mortar boards, measuring boxes and mixers between batches.

3.5 MIXING

.1 General:

.1 Use batching box.

.2 Follow proper batching procedure.

.3 Monitor mixing time.

.2 Mortar:

.1 Mix Characteristics:

.1 Pointing mortar: slightly stiffer than bedding mortar with a consistency such that the mortar can be hand-formed into a stiff ball.

.2 Record amount of water required to reach this consistency and use for subsequent mixes.

.2 Prepare only enough mortar to be used within two hours. Do not retemper mortar beyond this time.

.3 Follow manufacturer instructions when premixed mortar is used.

.4 Contractor to appoint 1 individual to mix mortar for duration of project. If this individual must be changed, mortar mixing must

3.5 MIXING (Cont'd)

.4 (Cont'd)
cease until new individual is trained, and mortar mix is tested.

3.6 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA-A179 except where specified otherwise.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Remove droppings and splashings using clean sponge and water.

.4 Clean masonry with low pressure 100 to 300 kPa clean water and soft natural bristle brush.

.5 Obtain approval of Departmental Representative prior to using other cleaning methods for persistent stains.

.6 Waste Management: separate waste materials for recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION OF COMPLETED WORK

.1 Cover completed and partially completed work not enclosed or sheltered at end of each work day.

.2 Enclose and protect work using wetted burlap.

.3 Cover with waterproof tarps to prevent weather from eroding recently laid material.
.1 Maintain tarps in place for minimum of 1 week after laying.
.2 Ensure that bottoms of tarps permit airflow to reach mortar in joints.

.4 Anchor coverings securely in position.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 03 08 - Historic Mortaring.

.2 Section 04 05 00 - Common Work Results for Masonry.

.3 Section 04 21 13 - Brick Masonry.

.4 Section 07 11 13 - Bituminous Dampproofing.

.5 Section 31 00 00.01 - Earthwork - Short Form.

1.2 REFERENCES

.1 CSA Group
.1 CAN/CSA-A165 Series-14, CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.
.3 CAN/CSA-A371-14, Masonry Construction for Buildings.

.2 International Masonry Industry All-Weather Council (IMIAC)
.1 Recommended Practices and Guide Specification for Cold Weather Masonry Construction.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation meetings: comply with Section 01 31 19. Conduct pre-installation meeting one week prior to commencing work of this Section and on-site installations to:
.1 Verify project requirements.
.2 Verify substrate conditions.
.3 Co-ordinate products, installation methods and techniques.
.4 Sequence work of related sections.
.5 Co-ordinate with other building subtrades.
.6 Review manufacturer's installation instructions.
.7 Review masonry cutting operations, methods and tools and determine worker safety and protection from dust during cutting operations.
.8 Review warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Submit shop drawings detailing temporary bracing required, designed to resist wind pressure and lateral forces during installation.

.4 Samples:
.1 Provide samples as follows:
.1 2 cured, and coloured samples of mortar and grout, illustrating mortar colour and colour range, supplemented with specific requirements in Section 04 03 08
.2 2 of each type of masonry accessory and flashing specified, supplemented by specific requirements in Section 04 05 23
.3 2 of each type of masonry anchorage, reinforcement and connector proposed for use, supplemented by specific requirements in Section 04 05 19.
.4 Samples: used for testing and when accepted become standard for material used.

.5 Certificates: submit manufacturer's product certificates certifying materials comply with specified requirements.

.6 Test and Evaluation Reports:
.1 Test reports to certify compliance of masonry units and mortar ingredients with specified performance characteristics and physical properties.
.2 Submit data for masonry units, in addition to requirements set out in referenced CSA and ASTM Standards, indicating initial rates of absorption.

.7 Installer Instructions: provide manufacturer's installation instructions, including storage, handling, safety and cleaning.

1.4 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.8 Manufacturer's Reports: provide written reports prepared by manufacturer's on-site personnel to include:
.1 Verification of compliance of work with Contract.
.2 Site visit reports providing detailed review of installation of work, and installed work.

1.5 CLOSEOUT SUBMITTALS

.1 Submit manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 78 00.

1.6 EXTRA MATERIALS

.1 Submit manufacturer's instructions in accordance with Section 01 78 00 covering maintenance requirements and parts catalogue, with cuts and identifying numbers.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Keep materials dry until use except where wetting of bricks is specified.
.3 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.
.4 Replace defective or damaged materials with new.

1.8 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components when temperatures are above 4 degrees C.

1.8 SITE CONDITIONS (Cont'd)

.2 Weather Requirements: to CAN/CSA-A371 to IMIAC - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

.3 Cold weather requirements:

.1 To CAN/CSA-A371 with following requirements.

.1 Maintain temperature of mortar between 5 degrees C and 50 degrees C until batch is used or becomes stable.

.2 Maintain ambient temperature of masonry work and it's constituent materials between 5 degrees C and 50 degrees C and protect site from windchill.

.3 Maintain temperature of masonry above 0 degrees C for minimum of 28 days, after mortar is installed.

.4 Preheat unheated wall sections in enclosure for minimum 72 hours above 10 degrees C, before applying mortar.

.2 Hot weather requirements:

.1 Protect freshly laid masonry from drying too rapidly, by means of waterproof, non-staining coverings.

.2 Keep masonry dry using waterproof, non-staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until masonry work is completed and protected by flashings or other permanent construction.

.3 Spray mist for maximum of 3 days after. Spray mortar surface at intervals and keep moist.

1.9 WARRANTY

.1 For Work in this Section 04 05 00, 12 months warranty period is extended to 24 months.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Masonry materials are specified elsewhere in related Sections:
- .1 Section 04 03 07.
- .2 Section 04 03 08.
- .3 Section 04 05 19.
- .4 Section 04 05 23.

PART 3 - EXECUTION

3.1 INSTALLERS

.1 Experienced and qualified masons to carry out erection, assembly and installation of masonry work.

3.2 EXAMINATION

.1 Examine conditions, substrates and work to receive work of this Section.

.2 Examine openings to receive masonry units. Verify opening size, location, and that opening is square and plumb, and ready to receive work of this Section.
- .1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .2 Proceed with installation after unacceptable conditions have been remedied and after receipt of written approval from Departmental Representative.

.3 Verification of Conditions:
- .1 Verify that:
  - .1 Field conditions are acceptable and are ready to receive work.
  - .2 Built-in items are in proper location, and ready for roughing into masonry work.
- .2 Commencing installation means acceptance of existing substrates.

3.3 PREPARATION

.1 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations.

3.3 PREPARATION (Cont'd)

.2 Establish and protect lines, levels, and coursing.

.3 Protect adjacent materials from damage and disfiguration.

3.4 INSTALLATION

.1 Do masonry work in accordance with CAN/CSA-A371 except where specified otherwise.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment, respecting construction tolerances permitted by CAN/CSA-A371.

.3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.5 CONSTRUCTION

.1 Exposed masonry:
.1 Remove chipped, cracked, and otherwise damaged units, in accordance with CAN/CSA-A165, in exposed masonry and replace with undamaged units.

.2 Jointing:
.1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
.2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.
.3 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.3 Cutting:
.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
.2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In:
.1 Build in items required to be built into masonry.

3.5 CONSTRUCTION (Cont'd)

.4 Building-In:(Cont'd)
.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Wetting of bricks:
.1 Except in cold weather, wet bricks having initial rate of absorption exceeding 1 g/minute/1000 mm^2: wet to uniform degree of saturation, 3 to 24 hours before laying, and do not lay until surface dry.
.2 Wet tops of walls built of bricks qualifying for wetting, when recommencing work on such walls.

3.6 SITE TOLERANCES

.1 Tolerances in notes to CAN/CSA-A371 apply.

3.7 FIELD QUALITY CONTROL

.1 Site Tests, Inspection:
.1 Perform field inspection and testing in accordance with Section 01 45 00.
.2 Notify inspection agency minimum of 24 hours in advance of requirement for tests.

.2 Manufacturer's Services:
.1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, and protection of its products, and submit written reports in acceptable format 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 work as installation is about to begin.
.4 Schedule site visits to review work at stages listed:
.1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
.2 Twice during progress of work at 25% and 60% complete.
.3 Upon completion of work, after cleaning is carried out.

3.7 FIELD QUALITY CONTROL (Cont'd)

.2 Manufacturer's Services:(Cont'd)
.5 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

3.9 PROTECTION

.1 Temporary Bracing:
.1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
.2 Bracing approved by Departmental Representative .
.3 Brace masonry walls as necessary to resist wind pressure and lateral forces during construction.

.2 Moisture Protection:
.1 Keep masonry dry using waterproof, non staining coverings that extend over walls and down sides sufficient to protect walls from wind driven rain, until completed and protected by flashing or other permanent construction.
.2 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.
.3 Air Temperature Protection: protect completed masonry as recommended in 1.9, SITE CONDITIONS.

END

PART 1 - GENERAL

1.1 RELATED

.1 Section 04 03 08 - Historic Mortaring.

.2 Section 04 05 00 - Common Work Results for Masonry.

.3 Section 04 05 23 Masonry Accessories.

.4 Section 04 21 13 - Brick Masonry.

1.2 REFERENCES

.1 ASTM International

.1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.

.2 ASTM A82/A82M-07, Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

.3 ASTM A167-99(R2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.4 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

.5 ASTM A580/A580M-15, Standard Specification for Stainless Steel Wire.

.6 ASTM A641/A641M-09a, Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.

.7 ASTM A666-15, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

.2 CSA Group

.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-14, Mortar and Grout for Unit Masonry.

.3 CAN/CSA-A370-14, Connectors for Masonry.

.4 CAN/CSA-A371-14, Masonry Construction for Buildings.

.5 CSA G30.18-09(R2014), Carbon Steel Bars for Concrete Reinforcement.

.6 CSA S304.1-14, Design of Masonry Structures.

.7 CSA W186-M1990(R2012), Welding of Reinforcing Bars in Reinforced Concrete Construction.

1.2 REFERENCES (Cont'd)

.3 Reinforcing Steel Institute of Canada (RSIC)
.1 Reinforcing Steel Manual of Standard Practice, 2004.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for anchorage and reinforcing materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit 2 samples of: Sprial ties.

.4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 SITE MEASUREMENTS

.1 Make site measurements necessary to ensure proper fit of members.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect anchorage and reinforcing materials from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Connectors: to CAN/CSA-A370 and CSA S304.1.

.2 Corrosion protection: to CSA S304.1, galvanized to CSA S304.1 and CAN/CSA-A370.

.3 Fasteners: installed post-construction:
.1 Bolts and Screws: size and type to suit application, locate where indicated.
.2 Nails: case-hardened cut or spiral nails, size and type to suit fastening application.
.3 Powder-Driven Fasteners: pin styles and lengths to suit fastening application in accordance with manufacturers use, load and hold recommendations.
.4 Adhesives: epoxies, mastics and contact cements for fastening applications, use in accordance with manufacturers' recommendations.

.4 Anchors: to CAN/CSA-A370:
.1 Spiral Anchors: 8 mm stainless steel spiral anchors to Type 304.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.2 Fabricate connectors in accordance with CAN/CSA-A370.

.3 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on placing drawings.

2.2 FABRICATION (Cont'd)

.4 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Upon request, provide Departmental Representative with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum 5 weeks prior to commencing reinforcement work.

.2 Upon request inform Departmental Representative of proposed source of material to be supplied.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing mortar, obtain Departmental Representative's approval of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

3.3 BONDING AND TYING

.1 Bond walls of two or more wythes using metal connectors in accordance with CSA S304.1, CAN/CSA-A371 and as indicated.

.2 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA-A370 and CAN/CSA-A371 manufacturer's instructions.
.1 Bond walls of two or more wythes using metal connectors in accordance with CAN/CSA-A371 and as indicated.

3.4 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA S304.1, CAN/CSA-A371, and CAN/CSA-A179.

.3 Support and position reinforcing bars in accordance with CAN/CSA-A371.

3.5 GROUTING

.1 Grout masonry in accordance with CSA S304.1, CAN/CSA-A371 and CAN/CSA-A179 and as indicated.

3.6 ANCHORS

.1 Supply and install metal anchors in accordance with CAN/CSA-A370 and CAN/CSA-A371 as indicated.

3.7 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.8 MOVEMENT JOINTS

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

3.9 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Departmental Representative .

.2 When field bending is authorized, bend without heat, applying a slow and steady pressure.

3.9 FIELD BENDING (Cont'd)

.3 Replace bars and connectors which develop cracks or splits.

3.10 FIELD QUALITY CONTROL

.1 Site inspections in accordance with Section 04 05 00.

.2 Obtain Departmental Representative approval of placement of reinforcement and connectors, prior to placing mortar grout.

3.11 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.12 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 03 08 - Historic - Mortaring.

.2 Section 04 05 00 - Common Work Results for Masonry.

.3 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.4 Section 04 21 13 - Brick Masonry.

1.2 REFERENCES

.1 ASTM International
.1 ASTM D2240-05(2010), Standard Test Method for Rubber Property - Durometer Hardness.

.2 CSA Group
.1 CAN/CSA-A371-14, Masonry Construction for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit 2 samples of masonry accessories as follows:
.1 Materials: coloured samples, illustrating colour and colour range. Include:
.1 Movement joint filler.
.2 Lap adhesive.
.3 Reglets.
.4 Brick vents.
.2 Moisture control material samples, illustrating colour and colour range, size, and shape. Include:
.1 Weep hole vents.

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.3 Samples:(Cont'd)
.1 (Cont'd)
.3 Flashing material samples, illustrating colour and colour range, size, shape, and profile. Include as specified:
.1 Sheet metal flashings.

1.4 SITE MEASUREMENTS

.1 Make site measurements necessary to ensure proper fit of members.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect masonry accessories from nicks, scratches,and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Lap adhesive: recommended by masonry flashing manufacturer.

.2 Weep hole vents: PVC.

2.2 MOISTURE CONTROL

.1 Weep Hole Vents: PVC.

.2 Colour: gray.

2.3 FLASHINGS

.1 Plastic and Rubber Flashings:
.1 Ethylene Propylene Diene Monomer (EPDM): to CAN/CSA-A371, UV protected, minimum 1.2 mm thick for wall flashing, self adhering.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for masonry accessories installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION: MATERIALS

.1 Install continuous movement joint fillers in movement joints at locations indicated on drawings.

.2 Lap adhesive: apply adhesive to flashing lap joints.

.3 Mechanical fasteners: install fasteners to suit application and in accordance with manufacturer's written installation instructions.

.4 Reglets: install reglets at locations indicated on drawings.

.5 Brick vents: install brick vents at locations indicated on drawings.

3.3 INSTALLATION: MOISTURE CONTROL

.1 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of cavity wall and masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

3.4 INSTALLATION: FLASHINGS

.1 Build in flashings in masonry in accordance with CAN/CSA-A371.
.1 Install flashings under exterior masonry bearing on foundation walls, slabs, shelf angles, and steel angles over openings, and at

3.4 INSTALLATION: FLASHINGS (Cont'd)

.1 (Cont'd)
.1 (Cont'd)
base of cavity wall and where cavity is interrupted by horizontal members or supports and as shown on drawings. Install flashings under weep hole courses and as indicated.
.2 Lap joints 150 mm and seal with adhesive.

.2 Form flashing (end dams) at lintels, sills and wall ends to prevent water from travelling horizontally past flashing ends.

.3 Install vertical flashing where outer veneer returns at window or door jambs, to prevent contact of veneer with inner wall.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 03 45 00 - Precast Architectural Concrete.

.2 Section 04 03 08 - Historic - Mortaring.

.3 Section 04 05 00 - Common Work Results for Masonry.ry.

.4 Section 04 05 19 - Masonry Reinforcing and Anchorage.

.5 Section 04 05 23 - Masonry Accessories.

1.2 REFERENCES

.1 ASTM International
.1 ASTM C216-15, Standard Specification for, Facing Brick (Solid Masonry Units Made of Clay or Shale).

.2 Brick Industry Association (BIA)
.1 Technical Note No. 20-2006, Cleaning Brick Work.

.3 CSA Group
.1 CAN/CSA-A82-14, Fired Masonry Brick Made From Clay or Shale.
.2 CAN/CSA-A371-14, Masonry Construction for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for brick masonry and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

1.4 QUALITY ASSURANCE (Cont'd)

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect brick masonry from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 20.

1.6 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components only when temperature is above 4 degrees C.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

.1 Face brick:
.1 Fired clay brick: to CAN/CSA-A82.
.1 Type: X.
.2 Grade: EG.
.3 Size: Ontario.
.4 Colour and texture: to match approved sample.

.2 Back-up brick:

2.1 MANUFACTURED UNITS (Cont'd)

.2 Back-up brick:(Cont'd)
.1 Burned clay brick: to CAN/CSA-A82.
.1 Type: S.
.2 Grade: EG same as face brick.
.3 Size: same as face brick.
.4 Solid/hollow.

.3 Reinforcement:
.1 Reinforcement in accordance with Section 04 05 19.

.4 Connectors:
.1 Connectors in accordance with Section 04 05 19.

.5 Flashings:
.1 Flashing: in accordance with Section 04 05 23.

.6 Mortar Mixes:
.1 Mortar and mortar mixes in accordance with Section 04 03 08.

.7 Cleaning Compounds:
.1 Compatible with substrate and acceptable to masonry manufacturer for use on products.
.2 Cleaning compounds compatible with brick masonry units and in accordance with manufacturer's written recommendations and instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for brick masonry installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

.1 Construction to conform to CAN/CSA-A371.

.2 Bond: stretcher.

.3 Coursing height: as indicated.

.4 Jointing: concave where exposed or where paint or similar thin finish coating is specified.
.1 Mixing and blending: mix units within each pallet and with other pallets to ensure uniform blend of colour and texture.
.2 Clean unglazed clay masonry as work progresses.
.3 Reinforcement:
.1 Install reinforcing in accordance with Section 04 05 19.
.4 Connectors:
.1 Install connectors in accordance with Section 04 05 19.
.5 Flashings:
.1 Install flashings in accordance with Section 04 05 23.
.6 Mortar Placement:
.1 Place mortar in accordance with Section 04 03 08.
.7 Repair/Restoration:
.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.
.8 Field Quality Control:
.1 Site Tests, Inspection: in accordance with Section 04 05 00.
.9 Tolerances:
.1 To CAN/CSA-A371.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.3 Clean unglazed clay masonry as follows.

3.4 CLEANING (Cont'd)

.3 (Cont'd)

.1 Remove large particles with wood paddles without damaging surface. Saturate masonry with clean water and flush off loose mortar and dirt.

.2 Scrub with solution of 25 ml trisodium phosphate and 25 ml household detergent dissolved in 1 L of clean water using stiff fibre brushes, then clean off immediately with clean water using hose. Alternatively, use proprietary compound recommended by brick masonry manufacturer in accordance with manufacturer's directions.

.3 Repeat cleaning process as often as necessary to remove mortar and other stains.

.4 Use acid solution treatment for difficult to clean masonry as described in Technical Note No.20 by the Brick Industry Association.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.5 Waste Management: separate waste materials for recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Brace and protect brick masonry in accordance with Section 04 05 00.

END

PART 1 - GENERAL

1.1 REFERENCES

.1 ASTM International
.1 ASTM A307-14, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

.2 CSA International
.1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit two copies of WHMIS MSDS.
.1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.
.2 Construction Waste Management:
.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

1.3 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Storage and Handling Requirements:
.1 Store materials off ground in dry location.
.2 Replace defective or damaged materials with new.

1.4 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CSA G40.20/ G40.21, Grade 300W, minimum 30% recycled content.

.2 Bolts and anchor bolts: to ASTM A307.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Where possible, fit and shop assemble work, ready for erection.

2.3 FINISHES

.1 Painting to Section 09 97 19

2.4 SHOP PAINTING

.1 Apply one shop coat of primer to metal items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

2.5 ANGLE KICK PLATE

.1 Steel angles: sizes indicated for kick plates.

.2 Bolt angles to railing post as indicated.

.3 Finish: to Section 09 97 19.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install kick plates square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.2 Provide "U" shaped anchor bolts as indicated

.3 Exposed fastening devices to match finish and be compatible with material through which they pass.

.4 Make field connections with bolts as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 03 32 - Historic Wood Shingles and Shakes.

.2 Section 07 27 00.01 - Air Barriers.

.3 Section 07 46 23 - Wood Siding.

.4 Section 07 52 00 - Modified Bitumenous Membrane Roofing.

.5 Section 07 62 00 - Sheet Metal Flashing and Trim.

.6 Section 08 50 00 - Windows.

.7 Section 09 91 13 - Exterior Painting.

1.2 REFERENCES

.1 ASTM International
.1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.
.3 ASTM C578-15b, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
.4 ASTM C1289-16, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
.5 ASTM D1761-12, Standard Test Methods for Mechanical Fasteners in Wood.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-11.3-M87, Hardboard.
.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
.3 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction and amendment.
.4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

1.1 RELATED REQUIREMENTS (Cont'd)

.3 CSA International
.1 CAN/CSA-A123.2-03 (R2013), Asphalt Coated Roofing Sheets.
.2 CAN/CSA-A247-M86(R1996), Insulating Fiberboard.
.3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
.4 CSA O112.9-10(R2014), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
.5 CSA O121-08 (R2013), Douglas Fir Plywood..
.6 CSA O141-05(R2009), Softwood Lumber.
.7 CSA O151-09(R2014), Canadian Softwood Plywood.
.8 CSA O153-13, Poplar Plywood.
.9 CSA O325-07 (R2012), Construction Sheathing.
.10 CSA O437 Series-93(R2011), Standards on OSB and Waferboard.
.11 CSA Z809-16, Sustainable Forest Management.

.4 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-2012, FSC Principle and Criteria for Forest Stewardship.

.5 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2014.

.6 Sustainable Forestry Initiative (SFI)
.1 SFI-2010-2014 Standard.

.7 The Truss Plate Institute of Canada
.1 Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses 2007.

.8 Underwriters' Laboratories of Canada (ULC)
.1 CAN/ULC-S706-09, Standard for Wood Fibre Insulating Boards for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA and ANSI standards.

.3 Sustainable Standards Certification:
.1 Certified Wood: submit listing of wood products and materials used in accordance with CSA-Z809 or FSC or SFI.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wood from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Description:
.1 Sustainability Characteristics:
.1 Lumber, CSA-Z809 or FSC or SFI certified.
.2 Plywood. urea-formaldehyde free, CSA-Z809 or FSC or SFI certified.

.2 Lumber: to NLGA, species and grade category as follows:
.1 Stair stringers, timber treads, mid-rails, diagonals, caps, bottom rails, intermediate rails, centre rails, posts and intermediate posts: grading rule 124c. "No. 2" or better -

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS (Cont'd)

.2 Lumber:(Cont'd)
.1 (Cont'd)
STRUCTURAL LIGHT FRAMING AND STRUCTURAL JOISTS AND PLANKS, S4S.
.2 Softwood, S4S, (S-dry) moisture content 19% or less in accordance with:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 Framing and board lumber: in accordance with NBC.

.4 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
.1 S4S is acceptable for.
.2 Board sizes: "Standard" or better grade.
.3 Dimension sizes: "Standard" light framing or better grade.
.4 Post and timbers sizes: "Standard" or better grade.

.5 Plywood, OSB and wood based composite panels: to CSA O325.

.6 Douglas fir plywood (DFP): to CSA O121, standard construction.

.7 Canadian softwood plywood (CSP): to CSA O151, standard construction.

2.2 ACCESSORIES

.1 Exterior wall sheathing paper: to CAN/CGSB-51.32 spunbonded olefin type.

.2 Polyethylene film: to CAN/CGSB-51.34, Type 1, 0.15 mm thick.

.3 Roll roofing: to CAN/CSA A123.2, Type S.

.4 Air seal: closed cell polyurethane or polyethylene.

.5 Sealants: in accordance with Section 07 92 00.

.6 General purpose adhesive: to CSA O112.9.

.7 Nails, spikes and staples: to CSA B111.

.8 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

2.2 ACCESSORIES (Cont'd)

.9 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.10 Joist hangers: minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.11 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, fibre, formed to prevent dishing. Bell or cup shapes not acceptable.

.12 Fastener Finishes:
.1 Galvanizing: to ASTM A123/A123M, use galvanized fasteners for exterior work pressure-preservative treated lumber.
.2 Stainless steel: use stainless steel Type 304 alloy for bolts.

.13 Wood Preservative:
.1 Preservative: in accordance with manufacturer's recommendations for surface conditions

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on

3.2 PREPARATION (Cont'd)

.2 (Cont'd)
surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.4 Treat material as follows:
.1 Wood cants, fascia backing, curbs, nailers, sleepers on roof deck.

3.3 MATERIAL USAGE

.1 Roof sheathing:
.1 Plywood, DFP or CSP sheathing grade or PP standard sheathing grade, square edge, 19 mm thick.
.2 Construction sheathing product: end use mark 1R.

.2 Exterior wall sheathing:
.1 Plywood, DFP or CSP sheathing grade or PP standard sheathing grade, square edge, 13 mm thick.
.2 Construction sheathing product: end use mark W24.

3.4 INSTALLATION

.1 Install members true to line, levels and elevations, square and plumb.

.2 Construct continuous members from pieces of longest practical length.

.3 Install spanning members with "crown-edge" up.

.4 Select exposed framing for appearance. Install lumber and panel materials so that grade-marks and other defacing marks are concealed or are removed by sanding where materials are left exposed.

.5 Install subflooring with panel end-joints located on solid bearing, staggered at least 800 mm.
.1 In addition to mechanical fasteners, floor panels secure floor subflooring to floor joists using glue and screws. Place continuous adhesive bead in accordance with manufacturer's instructions, single-bead on each joist and double-bead on joists where panel ends butt.

3.4 INSTALLATION (Cont'd)

.6 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.

.7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
.1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.10 Install sleepers as indicated.

.11 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.12 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.13 Countersink bolts where necessary to provide clearance for other work.

.14 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.6 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 46 23 - Wood Siding.

.2 Section 07 27 00.01 - Air Barriers.

.3 Section 07 62 00 - Sheet Metal Flashing and Trim.

.4 Section 08 50 00 - Windows.

.5 Section 09 91 13 - Exterior Painting.

.6 Section 09 91 13.01 - Exterior Re-Painting.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
.1 ANSI/HPVA HP-1-10, American National Standard for Hardwood and Decorative Plywood.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
.1 Architectural Woodwork Quality Standards, 1st edition, 2009.

.3 ASTM International
.1 ASTM A123/A123M-15, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.4 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-11.3-M87, Hardboard.

.5 CSA International
.1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
.2 CSA O121-08 (R2013), Douglas Fir Plywood.
.3 CSA O141-05(R2014), Softwood Lumber.
.4 CSA O151-09 (R2014), Canadian Softwood Plywood.
.5 CSA O153-13, Poplar Plywood.
.6 CSA-Z809-08(R2013), Sustainable Forest Management.

.6 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

1.2 REFERENCES (Cont'd)

.7 National Lumber Grades Authority (NLGA)
.1 Standard Grading Rules for Canadian Lumber 2014.

.8 Sustainable Forestry Initiative (SFI)
.1 SFI-2010-2014 Standard.

.9 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S104-10, Standard Method for Fire Tests of Door Assemblies.
.2 CAN/ULC-S105-09, Standard Specification for Fire Door Frames.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit duplicate 300 x 300 mm samples of trims.

.3 Certifications: submit certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical properties.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of agency certified by Canadian Lumber Standards Accreditation Board (CLSAB).

.2 Sustainable Standards Certification:
.1 Certified Wood: submit listing of wood products and materials used in accordance with CSA-Z809 or FSC or SFI.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wood products from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Softwood lumber: S4S, moisture content 19% or less in accordance with following standards:
.1 CSA O141.
.2 CSA-Z809 or FSC or SFI certified.
.3 NLGA Standard Grading Rules for Canadian Lumber.
.4 Hardwood lumber: moisture content 12% or less in accordance:
.1 National Hardwood Lumber Association (NHLA).
.2 CSA-Z809 or FSC or SFI certified.

2.2 ACCESSORIES

.1 Nails and staples: to CSA B111; galvanized to ASTM A123/A123M for exterior work, interior humid areas and for treated lumber; stainless steel finish elsewhere.

.2 Wood screws: stainless steel , type and size to suit application.

.3 Adhesive and Sealants: in accordance with Section 07 92 00.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Do finish carpentry to Quality Standards of (AWMAC).

.2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.

.3 Form joints to conceal shrinkage.

3.3 CONSTRUCTION

.1 Fastening:
.1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
.2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
.3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
.4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.

3.3 CONSTRUCTION (Cont'd)

.2 Standing and running trim:
.1 Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
.2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
.3 Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
.4 Install door and window trim in single lengths without splicing.

.3 Interior and exterior frames:
.1 Set frames with plumb sides and level heads and sills and secure.

3.4 INSTALLATION OF TRIM

.1 Standing and running trim:
.1 Exterior:
.1 Grade: No. 1.
.2 Solid stock: SPF species.

3.5 INSTALLATION OF FRAMES

.1 Exterior frames:
.1 Grade: No. 1.
.2 Frames to be solid wood SPF species.
.3 Construction: as detailed.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by finish carpentry installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 07 62 00 - Sheet Metal Flashing and Trim.

.3 Section 09 91 13 - Exterior Painting.

.4 Section 09 91 13.01 - Exterior Re-Painting.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM B370-12, Standard Specification for Copper Sheet and Strip for Building Construction.

.2 Canadian Standards Association (CSA International)
.1 CSA A123.3-05(R21015), Asphalt Saturated Organic Roofing Felt.
.2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.3 National Building Code of Canada - 2015 (NBC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Shop Drawings:
.1 Provide shop drawings: in accordance with Section 01 33 00.
.2 Indicate details of flashing installation.

.3 Samples:
.1 Provide samples in accordance with Section 01 33 00.
.2 Provide duplicate full size shingles, of finish, profile and pattern specified.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store, handle and protect materials in accordance with Section 01 61 00.

.2 Provide a platform to prevent bundles or loose shingles/shakes coming in contact with ground.

.3 Use boards to cover top of pile to keep out rain and prevent over-drying of bundles or loose shingles/shakes in top layer.

.4 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.5 EXTENDED WARRANTY

.1 For work done of this Section, 12 month warranty period prescribed in Section 24, Subsection 32.1 of GC General Conditions "C" will be extended to 24 months.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Hand split or hand-rived shingles:
.1 Species: western red cedar.
.2 Grade: treated.
.3 Profile: 1.6 mm at point. 9.5 mm at butt.
.4 Widths: random widths 200 mm minimum - 350 mm maximum. Dimensions or fixed widths as indicated.
.5 Lengths: 457 mm.
.6 Grain: 100% edge - grain.
.7 Wood: free from inner heartwood all sapwood.
.8 Defects: clear for 250 mm measured from butt free from excessive grain sweeps or bad cross-grain.
.9 Preparation: hand-dressed corners of feather end diagonally trimmed.

.2 Shakes or boards:
.1 Species: western red cedar.
.2 Grade: No.1 taper split.
.3 Profile: hand split and resawn mm taper split 12.7-15.9 mm.
.4 Widths: random widths 100 minimum, 350 mm maximum dimension or fixed widths as indicated.
.5 Lengths: 457 mm.

2.1 MATERIALS (Cont'd)

.2 Shakes or boards:(Cont'd)
.6 Grain: taper split and straight-split 100% edge grain 10% of flat-grain in lineal millimeters of any bundle, maximum.
.7 Wood: 100% heartwood, free of bark and sapwood, except 3 mm of sapwood permitted on one edge.
.8 Defects: taper split and straight-split hand split-and-resawn.
.9 Preparation: hand-dressed.

.3 Tilting fillets, wooden rolls (for flashing), miscellaneous blocking: at eave gutters gable rakes to be SPF No. 1 or 2.

.4 Comb or ridge boards, corner boards, wooden rolls (exposed): to be SPF No. 1 or 2.

.5 Underlayment/eave protection:
.1 Building paper: asphalt saturated paper, breather type, weighing not less than 0.195 kg/m^2.
.2 Roofing felt: no.15 asphalt-saturated organic felt to CSA A123.3.

.6 Roofing battens:
.1 Nailing strips - SPF, #2, size:19 x mm 89 mm no greater than 1200 in length.
.2 Plastic matt.

.7 Flashing:
.1 Hot dipped galvanized to be at least 0.476 mm.
.2 Electroplated galvanized to be 0.476 mm.
.3 Stainless Steel sheet: steel No. 304, Terneplated .015 mm - .025 mm thickness: 80% lead and 20% tin, gauge No. 28.

.8 Flashing nails: to be of same material as sheet metal to CSA B111, flat head roofing nails of length and thickness suitable for metal flashing application.

.9 Shingle nails:
.1 Hand-wrought iron nails:
.1 Shingle: to Office of Ordnance List, 1812, Fine Shingle, Rose headed (broad facetted head), four sided tapering shank, sharp pointed, 51 mm of soft malleable iron.
.2 Machine-cut nails:

2.1 MATERIALS (Cont'd)

.9 Shingle nails:(Cont'd)

.2 Machine-cut nails:(Cont'd)

.1 Shingle: level stamped head a rectangular shank, tapered on two opposing sides, blunt pointed, 45 mm.

.2 Double coursing: level stamped head, a rectangular shank, tapered on two-opposing sides, blunt tapered on two-opposing sides, blunt pointed, 45 mm, hot-dipped, zinc coated.

.3 Wire nails:

.1 Shingle: to CSA B111, red cedar flat head, round shank, diamond point 32 mm hot-dipped, zinc coated.

.2 Double-coursing: to CSA B111, moulding finishing brad head, dimpled or plain, round-shank, diamond point 35 mm hot-dipped, zinc coated.

PART 3 - EXECUTION

3.1 STRIPPING OFF OF EXISTING FINISHES

.1 Remove existing roof finishes, flashings and underlay, and expose sheathing of roof.

.2 Withdraw existing shingle and flashing nails, setting those nails which break off. Leave surfaces free from dirt and loose material.

.3 Report to Departmental Representative unforeseen deficiencies and deterioration. Repair as directed.

3.2 ROOF DECK AND SIDEWALL PREPARATION

.1 Replace cut out portions of sheathing boards with boards of equal sectional dimensions, of specified grade.

.1 Seat each end of board on rafter, with 25 mm minimum bearing.

.2 Secure to rafter with nails.

.2 Spaced roof sheathing: sheathing members or 406 mm on centres same as shingle exposure. Lay one roof boards 250 mm in width along eaves to receive first courses of shingles. Lay similar amount at hips and ridges. Lay one board on each side of valleys. At chimneys, ventilators and skylights, board roof to first rafter on each side; lay additional boarding front and back (in addition to any chimney saddle).

3.2 ROOF DECK AND SIDEWALL PREPARATION (Cont'd)

.3 Solid roof sheathing: lay boards with tight joints.

.4 Combination: lay roof boards comprising solid deck tightly, sheathing members same as shingle exposure. Lay one roof board 250 mm in width each side of hips, ridges and valleys, around chimneys (including saddle) or other areas where flashing extends onto roof deck.

.5 Spaced wall sheathing: sheathing members on centres equal to shingle exposure.

.6 Tight wall sheathing: fit boards tightly.

.7 Inform Departmental Representative when work is completed and ready for inspection.

3.3 INSTALLATION OF FLASHINGS

.1 Valley flashings:
.1 Intersecting roof planes of equal pitch: valley sheets to extend from centreline of valley, up each side a distance of at least 300 mm.
.2 Intersecting roof planes of unequal pitch: valley sheets to extend from centreline of valley, up side of valley with steeper pitch at least 300 mm, and up side of valley with lower pitch a distance of 300 mm.

.2 Hip and ridge:
.1 Install hip and ridge flashing beneath last course of shingles. Flashing to extend on each side of ridge to depth of last course.

.3 Base:
.1 Flashings:
.1 Minimum height 230 mm.
.2 Minimum projection 200 mm out on roof.
.2 Where base flashing is stepped, ensure steps are equal, horizontal width between 230 and 300 mm and vertical height between 2 and 4 courses.
.3 On sloped intersections, ensure sheets are lapped minimum 75 mm.
.4 When run horizontally, ensure sheets are flat locked and soldered.
.5 Ensure lock seam joints at vertical corners of chimney.

3.3 INSTALLATION OF FLASHINGS (Cont'd)

.4 Cap flashings or counter flashings:
.1 Turn cap flashings down over base flashings to not less than 100 mm extend to within 25 mm of surface of finished roof.
.2 Extend building paper up under exterior coverings such as wood siding and shingles at least 50 mm above butt of second shingle course not less than 100 mm above butt of bottom course of shingles.
.3 Through wall: install in accordance with details and instructions on Drawings.
.4 Through wall: (wall) cap flashing extending entirely through masonry and turned up 50 mm inside, is taken down over base flashing. Outside edge is turned back on itself at least 13 mm.
.5 Reglet: (chimney or wall) cap flashing inserted not less than 50 mm and secured with lead plugs 25 mm wide, 200 mm apart or 19 mm by removing mortar, then filling over flashing with bituminous mastic is turned down over base flashing. Outside edge is turned back on itself at least 13 mm.

.5 Continuous flashings:
.1 Flashings:
.1 Minimum height: 150mm.
.2 Minimum projection out on roof: 100 mm
.2 Lap sheets minimum 100 mm and solder only on top.

3.4 ROOF AND SIDEWALL APPLICATION

.1 Install shingles over dry substrate.

.2 Spacing:
.1 Roof application:
.1 Shingles under 130 mm wide minimum 3 mm joints.
.2 Shingles over 130 mm wide 6-13 mm joints.

.3 Joints:
.1 Stagger side lap joints 38 mm with no joint lining up within three courses.

.4 Nailing:
.1 For concealed nailing, typical roof and single course sidewalls use 2 nails per shingle per shingle up to 200 mm wide 3 nails per shingle in excess of 200 mm wide. Space nails 25 mm from edge with additional nails 100 mm apart

3.4 ROOF AND SIDEWALL APPLICATION (Cont'd)

.4 Nailing:(Cont'd)

.1 (Cont'd)
across face of shingle and 50 mm above butt line of following course.

.2 For "butt nailing" double coursed side walling use 2 or more nails. Space nails 19 mm from each edge of shingle, and a third nail in centre of all shingles wider than 200 mm and 50 mm above butt line of following course.

.3 Bottom shingles of double starter course to have additional line of nailing 13 mm back from overhang. Spacing to be similar to that of typical roof course. Ensure nails not driven through eave boards if overhang does not have a soffit.

.4 Provide extra nailing to final course of shingles at ridge, 25 mm plus down from ridge if sawing off, or breaking off of extra shingle length, in situ, is required.

.5 Drive nails flush but do not crush shingles.

3.5 SHINGLE AND SHAKE ROOFING

.1 Eave protection:

.1 Provide eave protection as specified in NBC - Division B, Subsection 9.27.5.

.2 Use No. 30 perforated, asphalt-saturated organic felt laid as a continuous sheet without use of cement where and as specified in NBC, Division B, Subsection 9.27.5.

.3 Fasten bottom edge of eave protection with roofing nails not more than 300 mm on centre.

.4 Ensure eave protection projects minimum 40 mm behind hanging gutters.

.2 Underlayment:

.1 Install breather type, asphalt-saturated paper under shingle roof.

.2 Install parallel to eaves with head and end lap of not less than 50 mm.

.3 Top edge of each strip to be fastened with sufficient roofing nails to hold it in place until shingles are applied.

.4 Overlap eave protection by not less than 100 mm.

.5 After each course of shakes is applied, lay 450 mm wide strip of No. 30 perforated, asphalt-saturated organic roofing felt over top portion of shakes, extending onto sheathing, with bottom edge of felt positioned at minimum distance above butt equal to twice weather exposure.

3.5 SHINGLE AND SHAKE ROOFING (Cont'd)

.3 Hip and ridge protection:
.1 Apply strip of No. 30 perforated, asphalt-saturated organic felt 200 mm wide over crown of ridges.

.4 Starter course:
.1 Double shingles at eaves.
.2 Block up starter course sufficient to bring high points of all shingle courses into alignment.
.3 Project butts 25-40 mm from first sheathing board or face of crown moulding.

.5 Typical course:
.1 Install shingles with 150 mm weather exposure and having triple thickness of shingles at any given point.
.2 Lay shingles with grain perpendicular to eaves.
.3 In laying mixed flat and vertical grain shingles, avoid lining up joints with centrelines of "hearts" and never break a joint directly below centrelines of "hearts".
.4 Split flat grained shingles wider than 200 mm. Minimum width: 100 mm.
.5 Keep shingles 25 mm clear of any vertical flashing.

.6 Finishing gable rake:
.1 Place 150 mm tilting fillet of cedar bevel siding full length of each gable and with thick edge flush with sheathing edge.
.2 Butts of shingles which rest on tilting fillet to be cut back to produce slight slant.
.3 Upper corner of edge shingles to be clipped off.
.4 Edge protection of shingles over end rafters or barge boards and mouldings to be from 25-40 mm.

.7 Finishing close valleys:
.1 Do not lay shingles with grain parallel to centreline of valleys.
.2 Keep mitred edges of shingles laid each side of valley 13 mm apart.
.3 Use only unbroken joints into valleys.

.8 Finishing the hips:
.1 Modified "Boston" hip, site applied shingles:
.1 Select shingles of approximately same width and strictly vertical grain for use as hip shingles.

3.5 SHINGLE AND SHAKE ROOFING (Cont'd)

.8 Finishing the hips:(Cont'd)

.1 (Cont'd)

.2 Carry slope shingles of main roof up to centreline of hip.

.3 Lay lower edge of hip shingles to line 130 mm back from centreline of hip.

.4 Saw butts of doubled starter course parallel to butts of first course of slope shingles of main roof at eave line.

.5 Cut back on bevel, edge of shingles projecting over centre of hip.

.6 Apply shingles on opposite side, cutting back projecting edge to fit.

.7 Apply Shingles in following courses, alternately in reverse order.

.8 Weather exposure should be same as that used on main roof.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 03 07 - Historic - Masonry Repointing.

.2 Section 04 05 00 - Common Work Results for Masonry.

.3 Section 31 00 00.01 - Earthwork - Short Form.

.4 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-37.2-M88, Emulsified Asphalt, Mineral-Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings.
.2 CAN/CGSB-37.3-M89, Application of Emulsified Asphalts for Dampproofing or Waterproofing.
.3 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.
.4 CGSB 37-GP-6Ma-83, Asphalt, Cutback, Unfilled, for Dampproofing.
.5 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
.6 CGSB 37-GP-11M-76(R1984), Application of Cutback Asphalt Plastic Cement.
.7 CGSB 37-GP-12Ma-84, Application of Unfilled Cutback Asphalt for Dampproofing.
.8 CGSB 37-GP-15M-76(R1984), Application of Asphalt Primer for Asphalt Roofing, Dampproofing and Waterproofing.
.9 CAN/CGSB-37.16-M89, Filled, Cutback, Asphalt for Dampproofing and Waterproofing.
.10 CAN/CGSB-37.28-M89, Reinforced Mineral Colloid Type, Emulsified Asphalt for Roof Coatings and for Waterproofing.
.11 CGSB 37-GP-36M-76, Application of Filled Cutback Asphalts for Dampproofing and Waterproofing.
.12 CGSB 37-GP-37M-77, Application of Hot Asphalt for Dampproofing or Waterproofing.

.2 CSA International
.1 CAN/CSA-A123.4-04(R2013), Asphalt for Construction of Built-Up Roof Coverings and Waterproofing Systems.

1.2 REFERENCES (Cont'd)

.3 Health Canada
.1 Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMTITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for bituminous dampproofing application and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect dampproofing materials from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

.1 Ambient Conditions: temperature, relative humidity, moisture content.
.1 Apply dampproofing materials only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
.2 Do not proceed with Work when wind chill effect would tend to set bitumen before proper curing takes place.
.3 Maintain air temperature and substrate temperature at dampproofing installation area above 5 degrees C for 24 hours before, during and 24 hours after installation.
.4 Do not apply dampproofing in wet weather.

1.5 SITE CONDITIONS (Cont'd)

.2 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Asphalt:
.1 For application and curing at temperatures above 5 degrees C: to CAN/CGSB-37.2.
.1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range and final blowing temperature.
.2 For application and curing at temperatures above 0 degrees C but below 5 degrees C: to CGSB 37-GP-6Ma CAN/CGSB-37.16.
.1 Package label or bill of lading for bulk hot liquid asphalt must indicate type, flash point, equiviscous temperature range and final blowing temperature.

.2 Sealing compound: plastic cutback asphalt cement to CAN/CGSB-37.5.

.3 Asphalt primer: to CGSB 37-GP-9Ma CAN/CGSB-37.2.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for bituminous dampproofing application installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 WORKMANSHIP

.1 Keep hot asphalt:
.1 Below its flash point.
.2 At or below its final blowing temperature.
.3 Within its equiviscous temperature range at place of application.

3.3 PREPARATION

.1 Before applying dampproofing:
.1 Seal exterior joints between foundation walls and footings, joints between concrete floor slab and foundation and around penetrations through dampproofing with sealing compound.

3.4 APPLICATION

.1 Do dampproofing in accordance with CGSB 37-GP-37M.

.2 Do sealing work in accordance with CGSB 37-GP-11M.

.3 Do priming of surface in accordance with CGSB 37-GP-15M.

.4 Apply primer to CGSB primer standard.

.5 Apply dampproofing in accordance with applicable CGSB application standard.

Material		Application
CAN/CGSB-37.2	use	CAN/CGSB-37.3
CGSB 37-GP-6Ma	use	CGSB 37-GP-12M
CAN/CGSB-37.1 6	use	CGSB 37-GP-36M
CAN/CGSB-37.2 8	use	CAN/CGSB-37.3
CSA A123.4	use	CGSB 37-GP-37M

3.5 SCHEDULE

.1 Apply continuous, uniform coating to entire exterior faces of foundation walls from 50 mm below finished grade level to and including tops of foundation wall footings.

.2 Apply continuous, uniform coating to exterior side of foundation walls enclosing rooms below finished grade. Include exterior portion of

3.5 SCHEDULE (Cont'd)

.2 (Cont'd)
interior walls where floors in adjacent rooms are at different elevations.

.3 Apply two additional coats of dampproofing to vertical corners and construction joints for a minimum width of 230 mm on each side, and all around and for 230 mm along pipes passing through walls.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by dampproofing application.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 06 20 00 - Finish Carpenty.

.3 Section 07 46 23 - Wood Siding.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-19.13M-M87, Sealing Compound, One Component, Elastomeric Chemical Curing.
.2 CAN/CGSB-19.24M-M90, Multi-Component, Chemical Curing Sealing Compound.
.3 CGSB 19-GP-14M-84, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.2 Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00.
.1 Existing Substrate Condition: report deviations, as described in PART 3 -EXAMINATION in writing to Departmental Representative.
.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.4 QUALITY ASSURANCE

.1 Qualifications:
.1 Applicator: company specializing in performing work of this section with minimum 3 years experience with installation of air/vapour barrier systems.
.1 Completed installation must be approved by the material manufacturer.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.3 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.

.4 Clean spills and leave area as it was prior to spill.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.2 Place materials defined as hazardous or toxic waste in designated containers.

.3 Ensure emptied containers are sealed and stored safely for disposal away from children.

1.7 AMBIENT CONDITIONS

.1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.

.2 Ventilate enclosed spaces in accordance with Section 01 51 00.

.3 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.8 WARRANTY

.1 For sealant and sheet materials the 12 months warranty period is extended to 24 months.

PART 2 - PRODUCTS

2.1 SHEET MATERIALS

.1 Sheet Seal Type 2: thermofusable elastomeric bitumen membrane reinforced with a non-woven polyester.

2.2 SEALANTS

.1 Sealants in accordance with Section 07 92 00.

.2 Sealant Type B: CAN/CGSB-19.13M, single component, chemical curing, capable of continuous water immersion, non-sagging type, Shore "A" Hardness Range of 20 to 35 black colour.

.3 Polyurethane Sealant Type C: CAN/CGSB-19.24M,multi- component, chemical curing, non-sagging, Shore 'A' Hardness Range of 20 to 35, black colour.

.4 Silicone Sealant Type D: single component, solvent curing, non-sagging, Shore 'A' Hardness Range of 35 to 45, black colour.

.5 Primer: recommended by sealant manufacturer.

.6 Substrate Cleaner: non-corrosive compatible with adjacent materials.

2.3 ADHESIVES

.1 Mastic Adhesive Type 1: compatible with sheet seal and substrate, thick mastic of uniform knife grade consistency.

.2 Adhesive Type 2: compatible with sheet seal and substrate, permanently non-curing.

2.4 ACCESSORIES

.1 Thinner and cleaner for Sheet: as recommended by sheet material manufacturer.

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 datasheets.

3.2 GENERAL

.1 Perform Work in accordance with Sealant and Waterproofer's Institute - Sealant and Caulking Guide Specification requirements for materials and installation.

.2 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

.3 Perform Work in accordance with Canadian Urethane Foam Contractor's Association - Professional Contractor Quality Assurance Program and requirements for materials and installation.

3.3 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept work of this section.

.2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.

.3 Report unsatisfactory conditions to Departmental Representative in writing.

.4 Do not start work until deficiencies have been corrected.
.1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

.1 Remove loose or foreign matter, which might impair adhesion of materials.

.2 Ensure substrates are clean of oil or excess dust; masonry joints struck flush, and open joints filled; and concrete surfaces free of large voids, spalled areas or sharp protrusions.

3.4 PREPARATION (Cont'd)

.3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane and primer.

.4 Ensure metal closures are free of sharp edges and burrs.

.5 Prime substrate surfaces to receive adhesive and sealants in accordance with manufacturer's instructions.

3.5 INSTALLATION

.1 Install materials in accordance with manufacturer's instructions.

.2 Secure sheet seal materials with self-adhesive continuous metal bar with anchors.
.1 Caulk with sealant to ensure complete seal.
.2 Position lap seal over firm bearing.

.3 Lap sheet seal onto roof vapour retarder and seal with sealant.
.1 Caulk to ensure complete air seal.
.2 Position lap seal over firm bearing.

.4 Install sheet seal between window and door frames and adjacent wall seal materials with sealant or adhesive.
.1 Caulk to ensure complete seal.
.2 Position lap seal over firm bearing.

.5 Apply sealant within recommended application temperature ranges.
.1 Consult manufacturer when sealant cannot be applied within these temperature ranges.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field 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.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.8 PROTECTION OF WORK

.1 Protect finished work in accordance with Section 01 61 00.

.2 Do not permit adjacent work to damage work of this section.

.3 Ensure finished work is protected from climatic conditions.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 06 20 00 - Finish Carpentry.

.3 Section 07 27 00.01 - Air Barriers.

.4 Section 07 62 00 - Sheet Metal Flashing adn Trim.

.5 Section 09 03 61 - Historic - Repainting Exterior Surfaces.

.6 Section 09 91 13 - Exterior Painting.

.7 Section 09 91 13.01 - Exterior Re-painting.

1.2 REFERENCES

.1 American National Standards Institute (ANSI)
.1 ANSI A135.6-06, Hardboard Siding Standard.

.2 ASTM International
.1 ASTM D5116-10, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.

.4 CSA International
.1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
.2 CSA O121-08(R2013), Douglas Fir Plywood.
.3 CSA O151-09(R2014), Canadian Softwood Plywood.
.4 CSA-Z809-08 (R2013), Sustainable Forest Management.

.5 Environmental Choice Program (ECP)
.1 CCD-045-95, Sealants and Caulking Compounds.

.6 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

1.2 REFERENCES (Cont'd)

.7 National Lumber Grading Authority (NLGA)
.1 NLGA Standard Grading Rules for Canadian Lumber 2014.

.8 Sustainable Forestry Initiative (SFI)
.1 SFI-2010-2014 Standard.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for wood siding and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit duplicate 300 x 300 mm size profile specified.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect wood siding from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.5 DELIVERY, STORAGE AND HANDLING (Cont'd)

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Lumber siding: to NLGA Standard Grading Rules for Canadian Lumber.
.1 Bevel siding: western red cedar grade, factory primed , bevel pattern, 190 mm width.
.2 CSA-Z809 or FSC or SFI certified.

.2 Accessories: exposed trim, closures, cap pieces of manufacturer's standard, finish.

.3 Exterior wall sheathing paper: to CAN/CGSB-51.32 spunbonded olefin type coated as indicated.

.4 Fasteners: nails to CSA B111, aluminum , sized as required, smooth shank spiral or ring thread type with finishing head.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 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 sheets.

3.3 INSTALLATION

.1 Install hardboard to manufacturers' written instructions.

.2 Install one layer sheathing paper horizontally by nailing, lapping edges 100 mm.

.3 Install sill flashings, wood starter strips, inside corner flashings, edgings and flashings over openings.

.4 Fasten wood siding in straight, aligned lengths to sheathing at 406 mm on centre maximum using two nails at each fixing location. Stagger butt joints not less than 800 mm and distribute evenly over wall faces. Cut butt joints at 45 degrees. Seal cut surfaces.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.5 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by wood siding installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 61 10 00 - Rough Carpentry.

.2 Section 07 62 00 - Sheet Metal Flashing and Trim.

.3 Section 07 92 00 - Sealants.

1.2 REFERENCES

.1 ASTM International Inc.
.1 ASTM D41-11, Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
.2 ASTM D312-16, Standard Specification for Asphalt Used in Roofing.
.3 ASTM D6162-14, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
.4 ASTM D6163M-00(2015)e1, Standard Speciifcation for Styrene Butadiene Fibre Reinforcements.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
.2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
.3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA)
.1 CRCA Roofing Specifications Manual-1997.

.4 Canadian Standards Association (CSA International)
.1 CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
.2 CSA-A123.3-05 (R2015), Asphalt Saturated Organic Roofing Felt.
.3 CSA-A123.4-04 (R2013), Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
.4 CSA O121-08(R2013), Douglas Fir Plywood.

1.2 REFERENCES (Cont'd)

.4 (Cont'd)
.5 CSA O151-09(R2014),Canadian Softwood Plywood.

.5 Factory Mutual (FM Global)
.1 FM Approvals - Roofing Products.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.7 Underwriters Laboratories' of Canada (ULC)
.1 CAN/ULC-S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
.2 CAN/ULC-S702.2-10, Standard for Mineral Fibre Thermal Insulation for Buildings.
.3 CAN/ULC-S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
.4 CAN/ULC-S706-09, Standard for Wood Fibre Thermal Insulation for Buildings.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Departmental Representative in accordance with Section 01 32 16 to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer'sinstallation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.2 Product Data:(Cont'd)
.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29 and indicate VOC content for:
.1 Primers.
.2 Asphalt.
.3 Sealers.
.4 Filter fabric.

.3 Provide shop drawings:
.1 Indicate flashing, control joints, tapered insulation details.
.2 Provide layout for tapered insulation.

.4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.5 Test and Evaluation Reports: submit laboratory test reports certifying compliance of bitumens and roofing felts and membrane with specification requirements.

.6 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.7 Manufacturer's field report: in accordance with Section 01 45 00.

.8 Reports: indicate procedures followed, ambient temperatures and wind velocity during application

1.5 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years documented experience approved by manufacturer.

.2 Sustainability Standards Certification:

1.6 FIRE PROTECTION

.1 Fire Extinguishers:
.1 Maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle,
.2 ULC labelled for A, B and C class protection.
.3 Sizes 9 kg or as indicated on roof per torch applicator, within 6 m of torch applicator.

1.6 FIRE PROTECTION (Cont'd)

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions andSection 01 61 00.

.2 Storage and Handling Requirements:
.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
.2 Provide and maintain dry, off-ground weatherproof storage.
.3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
.4 Remove only in quantities required for same day use.
.5 Place plywood runways over completed Work to enable movement of material and other traffic.
.6 Store sealants at +5 degrees C minimum.
.7 Store insulation protected from daylight and weather and deleterious materials.

1.8 SITE CONDITIONS

.1 Ambient Conditions
.1 Do not install roofing when temperature remains below-5 degrees C to manufacturers' recommendations for mop application.
.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.9 WARRANTY

.1 For Work of this Section 07 52 00, 12 months warranty period is extended to 24 months.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance.

2.2 DECK PRIMER

.1 Asphalt primer: to CGSB 37-GP-9Ma.

2.3 VAPOUR RETARDER

.1 Base sheet vapour retarder: to CGSB 37-GP-56M Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, polyester reinforcement, weighing 180g/m^2.
.1 Top and bottom surfaces: Sanded/sanded.

.2 Self adhesive air/vapour barrier modified bitumen membrane.

2.4 MEMBRANE

.1 Base sheet: to CGSB 37-GP-56M polyester fibres.
.1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, polyester reinforcement, having nominal weight of 180 g/m^2.
.2 Type 1, fully adhered.
.3 Class A - granule surfaced.
.4 Grade 1 - standard service.
.5 Top and bottom surfaces:
.1 Sanded/sanded
.6 Base sheet membrane properties: to CGSB 37-GP-56M.
.1 Strain energy (longitudinal/transversal): 9.0/7.0 kN/m.
.2 Breaking strength (longitudinal/transversal): 17.0/18.0 N/5 cm.
.3 Ultimate elongation (longitudinal/transversal): 60/70%.
.4 Tear resistance: 60 N.
.5 Cold bending at -30 degrees C: no cracking.
.6 Softening point: 110 degrees C.

2.4 MEMBRANE (Cont'd)

.1 Base sheet:(Cont'd)
.6 Base sheet membrane properties:(Cont'd)
.7 Static puncture resistance: > 400.
.8 Dimensional Stability: -0.3 / 0.3%. .
.7 ULC certification: Class A.

.2 Cap sheet membrane: to CGSB 37-GP-56M polyester fibres.
.1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer , prefabricated sheet, polyester reinforcement, having nominal weight of 250 g/m^2.
.2 Type 1, fully adhered.
.3 Class A-granule surfaced.
.1 Colour for granular surface: black.
.4 Grade 1-standard service.
.5 Bottom surface sanded.
.6 Cap sheet membrane properties: to CGSB 37-GP-56M.
.1 Strain energy (longitudinal/transversal): 13.0/10.0 kN/m.
.2 Breaking strength (longitudinal/transversal): 25.0/16.0 kN/m.
.3 Ultimate elongation (longitudinal/transversal): 63/73%.
.4 Tear resistance: 80 N.
.5 Cold bending at -30 degrees C: No cracking.
.6 Softening point: 3 110 degrees C.
.7 Static puncture resistance: > 400.
.8 Dimensional Stability: -0.2 / 0.2 %.
.9.
.7 ULC certification: Class A.

2.5 ADHESIVE

.1 Adhesive for securing overlay board and insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive.

2.6 OVERLAY BOARD

.1 Overlay Board: 12.7 mm asphalt impregnated fiberboard .
.1 Install over insulation to provide torch safe surface.

2.7 BITUMEN

.1 Asphalt: to CSA A123.4, Type 2.

2.8 SEALERS

.1 Plastic cement: asphalt .

.2 Sealing compound: rubber asphalt type.

.3 Sealants: Caulking - see Section 07 92 00.

2.9 CARPENTRY

.1 Refer to Section 06 10 00.

2.10 CANT STRIPS

.1 Cut from pressure-treated wood 38 mm thick material, to measure 140 mm on slope.

2.11 FASTENERS

.1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.

.2 Insulation to deck: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer.

PART 3 - EXECUTION

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual Provincial Roofing Association Manual, particularly for fire safety precautions.

.2 Do priming in accordance with manufacturers written recommendations.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material sheet metal providing connection point for continuity of air barrier.

.4 Assembly, component and material connections will be made in consideration of appropriate

3.1 QUALITY OF WORK (Cont'd)

.4 (Cont'd)
design loads, with reversible mechanical attachments.

3.2 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions:
.1 Inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Evaluation and Assessment:
.1 Prior to beginning of work ensure:
.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
.2 Curbs have been built.
.3 Roof drains have been installed at proper elevations relative to finished roof surface.
.4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks , slopped roofs and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

3.3 PROTECTION OF IN-PLACE CONDITIONS (Cont'd)

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 PRIMING DECK

.1 Apply deck primer to wood roofing substrate at the rate recommended by manufacturer 0.15 L per m^2.

3.5 VAPOUR RETARDER (CONCRETE/GYPSUM BOARD/PLYWOOD DECK)

.1 Spread at rate of 1.2 kg/m^2 for glass asphalt. Embed one - ply of felts glass in hot bitumen.

.2 Modified bituminous vapour retarder sheet.

3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

.1 Overlay Board: adhesive application:
.1 Adhere overlay board to insulation with vulcanized adhesive at the rate of one litre per m^2.
.2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.
.3 Cut ends to suit and apply adhesive in continuous ribbons at 300 mm on centre.

.2 Base sheet application:
.1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
.2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, at 230 degrees C.
.3 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.
.4 Application to be free of blisters, wrinkles and fishmouths.

.3 Cap sheet application:
.1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
.2 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, EVT at point of contact.
.3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.

3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION (Cont'd)

.3 Cap sheet application:(Cont'd)
.4 Application to be free of blisters, fishmouths and wrinkles.
.5 Do membrane application in accordance with manufacturer's recommendations.

.4 Flashings:
.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
.2 Mop base and cap sheet onto substrate in 1 metre wide strips.
.3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.
.4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
.5 Provide 75 mm minimum side lap and seal.
.6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
.7 Do work in accordance with Section 07 62 00.

.5 Roof penetrations:
.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details and drawings.

3.7 CANTS

.1 Install wood cants wood insulation stops.

.2 Apply hot bitumen to receiving surface and embed cant firmly by hand.
.1 Fasten wood cants to wood insulation stops.

.3 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90 degrees.

3.8 FIELD QUALITY CONTROL

.1 Inspections:
.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
.2 Departmental Representative will pay for tests as specified in Section 01 45 00.

3.8 FIELD QUALITY CONTROL (Cont'd)

.1 Inspections:(Cont'd)

.3 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.

3.9 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

.4 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Place materials defined as hazardous or toxic in designated containers.

.2 Clearly label location of salvaged material's storage areas and provide barriers and security devices.

.3 Ensure emptied containers are sealed and stored safely.

.4 Unused coating material must be disposed of at official hazardous material collections site as reviewed by Departmental Representative.

.5 Unused adhesive, sealant and asphalt materials must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.6 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.

.7 Dispose of unused sealant material at official hazardous material collections site approved by Departmental Representative.

.8 Dispose of unused asphalt material at official hazardous material collections site approved by Departmental Representative.

.9 Divert unused gypsum materials from landfill to recycling facility as reviewed by Departmental Representative.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 03 07 - Historic - Masonry Repointing.

.2 Section 06 10 00 - Rough Carpentry.

.3 Section 06 20 00 - Finish Carpentry.

.4 Section 07 03 32 - Historic Wood Shingles and Shakes Roofing.

.5 Section 07 46 23 - Wood Siding.

.6 Section 07 52 00 - Modified Bituminous Membrane Roofing.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM).
.1 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A792/A792M-10(2015), Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
.3 ASTM B32-08(2014), Standard Specification for Solder Metal.
.4 ASTM D523-14, Standard Test Method for Specular Gloss.

.2 Canadian Roofing Contractors Association (CRCA)
.1 Roofing Specifications Manual 2012.

.3 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
.2 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

.4 Canadian Standards Association (CSA International)
.1 CSA A123.3-05(R2015), Asphalt Saturated Organic Roofing Felt.
.2 AAMA/WDMA/CSA 101/I.S.2/A440-07(R2012), Standard/Specification for Windows, Doors, and Unit Skylights.
.3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

1.2 REFERENCES (Cont'd)

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

.4 Quality assurance submittals: submit following in accordance with Section 01 45 00.
.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
.2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative and Departmental Representative in accordance with Section 01 32 16 to:
.1 Verify project requirements.
.2 Review installation and substrate conditions.
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

PART 2 - PRODUCTS

2.1 SHEET METAL MATERIALS

.1 Prefinished steel with factory applied polyvinyl chhloride.
.1 Class F1S.
.2 Colour to be selected by Departmental Representative from manufacturer's standard range.
.3 Specular gloss: 30 units +/- in accordance with ASTM D523.
.4 Coating Thickness: not less than 200 micrometres.
.5 Resistance to accellerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
.1 Outdoor exposure period 5000 hours.
.2 Humidity resistance exposure period 5000 hours.

2.2 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.

.4 Sealants: Section 07 92 00.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Touch-up paint: as recommended by prefinished material manufacturer.

2.3 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details as indicated.

.2 Form pieces in 2400 mm maximum lengths.
.1 Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm.
.1 Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.4 METAL FLASHINGS

.1 Form flashings, copings and fascias to profiles indicated of 0.476 mm thick prefinished galvanized steel sheet.

2.5 REGLETS AND CAP FLASHINGS

.1 Form recessed surface mounted reglets metal cap flashing of 0.476 mm thick sheet metal to be built-in brick masonry work for base flashings as detailed.
.1 Provide slotted fixing holes and steel/plastic washer fasteners.
.2 Cover face and ends with plastic tape.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

.1 Install sheet metal work as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal.
.1 Secure in place and lap joints 100 mm.

3.2 INSTALLATION (Cont'd)

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.
.1 Flash joints using S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

.6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.7 Insert metal flashing into reglets under cap flashing to form weather tight junction.

.8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25 mm. Lead wedge flashing securely into joint.

.9 Caulk flashing at reglet cap flashing with sealant.

.10 Install pans, where shown around items projecting through roof membrane.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 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.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Materials, preparation and application for caulking and sealants.

.2 Text to complete other various Sections containing sealant or caulking specifications, including Section 07 52 00.

1.2 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 06 20 00 - Finish Carpentry.

.3 Section 07 27 00.01 - Air Barriers.

.4 Section 07 62 00 - Sheet Metal Flashing and Trim.

.5 Section 08 50 00 - Windows.

.6 Section 08 50 20 - Wood Window Repair and Restoration.

.7 Section 08 80 50 - Glazing.

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.
.2 ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants.

.2 Canadian General Standards Board (CGSB)
.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
.2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
.3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
.4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
.5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

1.3 REFERENCES (Cont'd)

.3 Department of Justice Canada (Jus)
.1 Canadian Environmental Protection Act, 1999 (CEPA).

.4 General Services Administration (GSA) - Federal Specifications (FS)
.1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.6 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.4 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00.

.2 Manufacturer's product to describe.
.1 Caulking compound.
.2 Primers.
.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit samples in accordance with Section 01 33 00.

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00.
.1 Instructions to include installation instructions for each product used.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.6 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.7 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.

.8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.9 Fold up metal banding, flatten, and place in designated area for recycling.

1.7 PROJECT CONDITIONS

.1 Environmental Limitations:
.1 Do not proceed with installation of joint sealants under following conditions:
.1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4°C.
.2 When joint substrates are wet.

.2 Joint-Width Conditions:
.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

1.7 PROJECT CONDITIONS (Cont'd)

.3 Joint-Substrate Conditions:
.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 ENVIRONMENTAL REQUIREMENTS

.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 Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Urethanes Two Part.
.1 Non-Sag to CAN/CGSB-19.24, Type 2, Class B, colour to be selected by departmental representative.

.2 Silicones One Part.
.1 To CAN/CGSB-19.13, primerless, Type S, Grade NS, Class 25, SWRI validated.

.3 Acrylics One Part.
.1 To CGSB 19-GP-5M.

2.2 SEALANT MATERIAL DESIGNATIONS (Cont'd)

.4 Acrylic Latex One Part.
.1 To CAN/CGSB-19.17.

.5 Preformed Compressible and Non-Compressible back-up materials.
.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
.1 Extruded open or closed cell foam backer rod.
.2 Size: oversize 30 to 50%.
.2 Neoprene or Butyl Rubber.
.1 Round solid rod, Shore A hardness 70.
.3 High Density Foam.
.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.
.4 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry) Sealant type: 2.

.2 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: 2.

.3 Coping joints and coping-to facade joints: Sealant type: 2.

.4 Cornice and wash (or horizontal surface joints): Sealant type: 2.

.5 Exterior joints in horizontal wearing surfaces (as itemized): Sealant type: 1.

.6 Exterior joints in wood siding/trim (vertical) to be painted: Sealant type: 4.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 SURFACE PREPARATION

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant.
.1 Apply sealant in accordance with manufacturer's written instructions.
.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
.3 Apply sealant in continuous beads.
.4 Apply sealant using gun with proper size nozzle.
.5 Use sufficient pressure to fill voids and joints solid.
.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
.7 Tool exposed surfaces before skinning begins to give slightly concave shape.
.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.
.1 Cure sealants in accordance with sealant manufacturer's instructions.
.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.
.1 Clean adjacent surfaces immediately and leave Work neat and clean.
.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 06 20 00 - Finish Carpentry.

.3 Section 07 92 00 - Joint Sealants.

1.2 REFERENCES

.1 Aluminum Association (AA)
.1 AA DAF 45-03(R2009), Designation System for Aluminum Finishes.

.2 ASTM International
.1 ASTM E1748-95(2009), Standard Test Method for Evaluating the Engagement Between Windows and Insect Screens as an Integral System.

.3 CSA Group
.1 AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
.2 CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
.3 CSA-A440.4-07(R2012), Window, Door, and Skylight Installation
.4 CSA-A440.2-14/A440.3-14, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
.5 CSA-Z91-02(R2013), Health and Safety Code for Suspended Equipment Operations.
.6 CSA-Z809-08(R2013), Sustainable Forest Management.

.4 Forest Stewardship Council (FSC)
.1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.

.5 Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - current edition.
.1 MPI #79, Primer, Alkyd, Anti-Corrosive for Metal.

.6 Sustainable Forestry Initiative (SFI)
.1 SFI-2010-2014 Standard.

1.2 REFERENCES (Cont'd)

.7 Screen Manufacturers Association (SMA)
.1 SMA 1201R-2002 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for windows and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim elevations of unit, anchorage details,location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

.4 Test and Evaluation Reports:
.1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications.
.2 All test reports that reference the NAFS must include, on the first page, a summary of the results including, at minimum:
.1 The product manufacturer.
.2 The type of product.
.3 The model number/series number.
.4 The primary product designation.
.5 The secondary product designation.
.1 Positive design pressure.
.2 Negative design pressure.
.3 Water penetration resistance test pressure.
.4 Canadian air infiltration and exfiltration levels.
.6 The test completion date.
.3 The report will also contain the following information:
.1 Test dates.
.2 Report preparation dates.
.3 Test information retention period.
.4 Location of testing facilities.

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.4 Test and Evaluation Reports:(Cont'd)
.3 (Cont'd)
.5 Full description of test samples, including:
.1 Finish, weathering characteristics.
.2 Condensation resistance.
.3 Safety drop - vertical sliding windows only.
.4 Block operation - sliding windows only.
.5 Sash pull-off - vinyl windows.
.6 Forced entry resistance.
.7 Mullion deflection - combination and composite windows.
.6 Complete description of amendments, as applicable.
.7 Conclusion.
.8 Drawings signed by the testing laboratory, if provided.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for windows for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect windows from nicks, scratches, and blemishes.

1.6 DELIVERY, STORAGE AND HANDLING (Cont'd)

.3 Storage and Handling Requirements:(Cont'd)
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Materials: to AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 All windows by same manufacturer.

.3 Sash: vinyl.

.4 Main frame: vinyl thermally broken.

.5 Glass: in accordance with Section 08 80 50.

.6 Screens: to ASTM E1748 on the ventilating portion of the windows.
.1 Insect screening mesh: count 18 x 14.
.2 Fasteners: tamper proof.
.3 Screen frames: vinyl colour to match window frames.
.4 Mount screen frames for interior replacement.

.7 Isolation coating: alkali resistant bituminous paint.

.8 Sealants:
.1 VOC limit 250 g/L maximum to SCAQMD Rule 1168.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Product types:
.1 VS - Vertical sliding window.

.2 Classification rating: to AAMA/WDMA/CSA 101/I.S.2/A440.
.1 Primary designation:
.1 Performance classes: R.
.2 Performance categories: 40.
.2 Secondary designation:
.1 Positive design pressure: 4080 PA.
.2 Negative design pressure: 1920 Pa.
.3 Water penetration resistance test pressure: 730 PA.
.4 Canadian air infiltration and exfiltration levels: A3 .

2.2 WINDOW TYPE AND CLASSIFICATION (Cont'd)

.2 Classification rating:(Cont'd)
.3 Surface condensation control: compliant with standard CAN/CSA-A440.2/A440.3.
.4 Forced Entry: F1.
.5 Ancillary properties (Energy rating).
.1 Overall coefficient of heat transfer (U-factor) 0.29 W/(m^2.K).
.2 Solar heat gain coefficient (SHGC) 0.50.
.3 Visible transmittance (VT) 0.57.
.4 Specific Energy Rating (ERS)32.
.5 Energy rating (ER) 32.

2.3 FABRICATION

.1 Fabricate in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 supplemented as follows:

.2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.

.3 Face dimensions detailed are maximum permissible sizes.

.4 Brace frames to maintain squareness and rigidity during shipment and installation.

.5 Finish steel clips and reinforcement with shop coat primer to MPI #79 380 g/m^2 zinc coating to ASTM A123/A123M.

2.4 VINYL FINISHES

.1 Vinyl finishes: in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, including appendices, supplemented as follows:
.1 White colour to match existing.

2.5 ISOLATION COATING

.1 Primers: in accordance with manufacturer's recommendations for surface conditions.
.1 Primer: VOC limit 100 g/L maximum to GS-11 SCAQMD Rule 1113.
.2 Coating: VOC limit 275 g/L maximum to GS-11SCAQMD Rule 1113.
.3 Paint: VOC limit 150 g/L maximum to GS-11 SCAQMD Rule 1113.

2.5 ISOLATION COATING (Cont'd)

.2 Isolate aluminum from following components, by means of isolation coating:
.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
.2 Concrete, mortar and masonry.
.3 Wood.

2.6 GLAZING

.1 Glaze windows in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.

2.7 HARDWARE

.1 Hardware: stainless steel or white bronze sash locks and aluminum handles to provide security and permit easy operation of units.

.2 Locks: provide operating sash with spring loading locking device, to provide automatic locking in closed position.

2.8 AIR BARRIER AND VAPOUR RETARDER

.1 Equip window frames with factory installed air barrier and vapour retarder material for sealing to building air barrier and vapour retarder as follows:
.1 Material: identical to, or compatible with, building air barrier and vapour retarder materials to provide required air tightness and vapour diffusion control throughout exterior envelope assembly.
.2 Material width: adequate to provide required air tightness and vapour diffusion control to building air barrier and vapour retarder from interior.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.1 EXAMINATION (Cont'd)

.1 (Cont'd)
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Window installation:
.1 Install in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
.2 Arrange components to prevent abrupt variation in colour.

.2 Caulking:
.1 Seal joints between windows and window sills with sealant. Bed sill expansion joint cover plates and drip deflectors in bedding compound. Caulk between sill upstand and window-frame. Caulk butt joints in continuous sills.
.2 Apply sealant in accordance with Section 07 92 00. Conceal sealant within window units except where exposed use is permitted by Departmental Representative.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.4 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by window installation.

END

PART 1 - GENERAL

1.1 WORK INCLUDED

.1 Provide for the repair and restoration of exterior wood windows and frames as shown on the Drawings and specified herein.

.2 The intent is to strip paint from exterior exposed wood surfaces of windows and window frames, which includes for removal of interior stops on operable sash to be able to strip and repaint exterior side of these units completely including track area. Provide weatherproof closures at removed sash openings. Remove and replace existing putty at glazing. For operating window units: remove and replace sash cords, replace sash counterweights where they cannot be retrieved from jamb space. Repaint windows and frames. The interior side of windows are painted; repair any damage to components and finish caused by the Work. The work also includes the complete removal and replacement of sealant at perimeter of window frames.

PART 2 - PRODUCTS

2.1 Materials

.1 Paste filler epoxy equal to be Low-Density Epoxy fairing/surfacing filler.

.2 Sealants: in accordance with Section 07 92 00, colour as selected by Departmental Representative.

.3 Paint: in accordance with Section 09 91 13.

.4 Glazing Putty: Furnish good quality glazing putty.

2.2 Hardware

.1 Hardware: Existing finish hardware is to be removed and salvaged for re-installation.

PART 3 - EXECUTION

3.1 Restoration of Elements

.1 General

.1 Remove operable sash where practical when interior areas are unoccupied and provide weather resistant closure panels in sash areas until they are replaced. Physical size of window units may not allow for removals. Building must be secure at all times.

.2 Store disassembled elements in a manner that they can be easily sorted and found for reuse at time of reassembly. Protect glazing from breakage during removal, during repair and during storage period.

.3 As disassembly proceeds, number all components removed with indelible pen in areas hidden from view in final installation. As much as possible of the original window components shall be reused in the restoration work.

.2 Removal

.1 Carefully remove window stops and trim by means of scoring along paint line and easing trim and stops away from casing by putty knife or chisel. Take care not to snap trim or stops.

.2 Remove operable lower sash only, and disconnect and tie-off sash cords.

.3 Remove sash weight covers from casing and then refix them temporarily in their locations prior to installation of new sash cord.

.4 Remove, clean and free-up sash cord pulleys and apply oil to each shaft to ensure free operation. Reinstall in original locations as soon as this work is complete.

.3 Inspection

.1 Upon completion of removal of all sash, advise Departmental Representative to visit site to assist in inventory of the work of restoration of sash, frames and sills beyond that included in the Base Bid work noted in Article 1.1. The scope of repair for each sash will then be assessed on a window-by-window basis. An estimate will be required for the proposed additional work.

.2 Stripping

.1 Strip all existing painted surfaces by hand scraping, chemical peeling mechanical sanding with propert protective equipment.

3.1 Restoration of Elements (Cont'd)

.3 (Cont'd)

.2 (Cont'd)

.2 Ensure wood substrates are not gouged or damaged.

.3 Sand wood substrates ready for paint system.

.4 Remove existing putty and replace with new material.

.5 Protect exposed wood from weather with removable closures.

.6 Some damaged or rotted wood elements will be capable of being restored without requiring replacement. It is expected that the bulk of damaged stiles and rails will be restored in this fashion. This work will be paid for from the Contingency Allowance. Furnish interior air-tight closures so that the work does not affect building occupants (fumes and odours). Restore these components, as directed, using epoxy fillers as follows:

.1 Follow manufacturer's safety instructions for using epoxy products strictly. Ensure that all workers use proper skin protection (gloves) and that work area is properly ventilated prior to commencing.

.2 Scrape loose wood and brush out dust and fine particles from area to be repaired.

.3 Remove and replace rotted wood with wood matching existing species and form. Treat damaged areas with a liberal brushing of zinc napthenate preservative. Allow to dry for a minimum of 24 hours before proceeding with next stage.

.4 Consolidate damaged wood with penetration and impregnation epoxy as per manufacturer's instructions by brushing into damaged areas. Allow material to set.

.5 Once wood has been consolidated, spread epoxy paste filler into element and fair piece back to original profile. Allow epoxy to cure.

.6 Exterior window sills shall be restored under this section using epoxy technique noted above or will be replaced with new wood as noteed on the drawings or as determined by the Departmental Representative.

3.2 Installation

.1 Prior to final installation, pre-paint operable sash and frame in accordance with Section 09 91 13.01 on all exterior exposed and hidden areas.

.2 Set operable sash in restored openings plumb, square and level, free from warp, twist or superimposed loads. Install sash cords to windows and counterweights.

.3 Secure stops adequately and accurately in required position, in manner not restricting normal movement of wood windows.

.4 Re-install sash weight covers. Adjust opening sash and hardware to operate smoothly.

3.3 Caulking

.1 Seal joints between frame members and perimeter masonry. Seal joints between fixed window units as required. Refer to Section 07 92 00.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 08 50 00 - Windows.

1.2 REFERENCES

.1 ASTM International
- .1 ASTM C542-05, Standard Specification for Lock-Strip Gaskets.
- .2 ASTM D790-15e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .3 ASTM D1003-13, Standard Test Method for Haze and Luminous Transmittance of Plastics.
- .4 ASTM D 1929-16e1, Standard Test Method for Determining Ignition Temperature of Plastics.
- .5 ASTM D2240-15, Standard Test Method for Rubber Property - Durometer Hardness.
- .6 ASTM E84-15b, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .7 ASTM E330-14, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .8 ASTM F1233-08(2013), Standard Test Method for Security Glazing Materials and Systems.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.3 Glass Association of North American (GANA)
- .1 GANA Glazing Manual - 2008.
- .2 GANA Laminated Glazing Reference Manual - 2009.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19 to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.

1.3 ADMINISTRATIVE REQUIREMENTS (Cont'd)

.1 (Cont'd)
.1 (Cont'd)
.3 Co-ordination with other building subtrades.
.4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit duplicate 100mm size samples of and sealant material.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.6 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect glazing from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

1.8 AMBIENT CONDITIONS

.1 Ambient Requirements:
.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Design Criteria:
.1 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:
.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
.2 Size glass to withstand wind loads, dead loads and positive and negative live loads to ASTM E330.
.3 Limit glass deflection to 1/200 flexural limit of glass with full recovery of glazing materials.

2.1 MATERIALS (Cont'd)

.2 Flat Glass:
.1 Safety glass: to CAN/CGSB-12.1, transparent, 4 mm thick.
.1 Type 2-tempered.
.2 Edge treatment.

.3 Sealant: in accordance with Section 07 92 00.

2.2 ACCESSORIES

.1 Setting blocks: neoprene, 80-90 Shore A durometer hardness to ASTM D2240, length of 25 mm for each square meter of glazing minimum 100 mm x width of glazing rabbet space minus 1.5 mm x height to suit glazing method, glass light weight and area.

.2 Spacer shims: neoprene , 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:
.1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; black colour.

.4 Glazing clips: manufacturer's standard type.

.5 Lock-strip gaskets: to ASTM C542.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.
.1 Verify that openings for glazing are correctly sized and within tolerance.
.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
.3 Visually inspect substrate in presence of Departmental Representative.
.4 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

3.1 EXAMINATION (Cont'd)

.1 (Cont'd)

.5 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: EXTERIOR - DRY METHOD (PREFORMED GLAZING)

.1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.3 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant.

.4 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

.6 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.

.7 Trim protruding tape edge.

3.4 INSTALLATION: EXTERIOR WET/DRY METHOD (PREFORMED TAPE AND SEALANT)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, 6 mm below sight line. Seal corners by butting tape and dabbing with sealant.

.3 Apply heel bead of sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapour seal.

.4 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.5 Rest glazing on setting blocks and push against tape and heel head of sealant with sufficient pressure to attain full contact at perimeter of light or glass unit.

.6 Install removable stops with spacer strips inserted between glazing and applied stops 6 mm below sight line. Place glazing tape on glazing light or unit with tape flush with 16 mm below sight line.

.7 Fill gap between glazing and stop with sealant to depth equal to bite of frame on glazing, maximum 9 mm below sight line.

.8 Apply cap head of sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

INTERIOR - DRY METHOD (TAPE AND TAPE) (Cont'd)

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
- .1 Leave Work area clean at end of each day.
  - .1 Remove traces of primer, caulking.
  - .2 Remove glazing materials from finish surfaces.
  - .3 Remove labels.
  - .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.7 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 83 10 - Lead Base Paint Abatement.

.2 Section 07 46 23 - Wood Siding.

1.2 REFERENCES

.1 Definitions:
.1 Exterior surfaces: refers to surfaces of a historic structure which is exposed to exterior weather including wet conditions of rain, sleet or snow, high temperatures and sunlight as well as temperatures below the freezing point.

.2 Reference Standards:
.1 Environmental Protection Agency (EPA)
.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).
.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).
.3 Master Painters Institute (MPI)
.1 Maintenance Repainting Manual current edition, Master Painters Institute (MPI) including Identifiers, Evaluation, Systems, Preparation and Approved Products List.
.4 National Fire Code of Canada, 2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for paints and coating products and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.

.3 Samples:
.1 Submit full range of coating colour sample matches for review and selection.
.2 Submit 2 one-litre samples of each paint delivered to site:
.1 1 sample from manufacturer's containers; and,

1.3 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.3 Samples:(Cont'd)
.2 (Cont'd)
.2 1 sample from painter's pot.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for paints and coatings for incorporation into manual.
.1 Provide records of products used. List products in relation to finish system and include following:
.1 Product name, type and use (e.g. materials and location).
.2 Manufacturer's product number.
.3 Colour code numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's Material Safety Data Sheets.

.3 Submit maintenance record of painting work.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:
.1 colour of finish coating. Identify type Submit one, 4 litre can of each type and and colour in accordance with established colour schedule and finish system.

1.6 QUALITY ASSURANCE

.1 Regulatory Agency Sustainability Approvals:
.1 Compliance Report indicating requirement to purchase energy efficient and environmentally friendly products.
.2 Conform to applicable standards and requirements for exterior repainting work including cleaning, preparation and priming.
.3 Retain purchase orders, invoices and other documents and produce when requested by Departmental Representative.

.2 Qualifications:
.1 Contractor: minimum of 5 years proven satisfactory experience with historic structures painting. When requested, provide list of last 3 comparable jobs including, job name and

1.6 QUALITY ASSURANCE (Cont'd)

.2 Qualifications:(Cont'd)
.1 Contractor:(Cont'd)
location, specifying authority, and project manager.
.2 Qualified journeypersons: as identified by local jurisdiction.
.3 Apprentices: work under direct supervision of qualified journeyperson in accordance with applicable trade regulations.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.1 Labels: to indicate:
.1 Type of paint or coating.
.2 Compliance with applicable standard.
.3 Colour number in accordance with established colour schedule.

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect paints and coatings.
.3 Keep areas for storage, cleaning and preparation, clean and orderly.
.4 Remove paint materials from storage in quantities required for same day use.
.5 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.
.6 Store materials and equipment within temperature range between 7 degrees C to 30 degrees C.
.7 Store materials and supplies away from heat generating devices and sensitive materials above minimum temperature as recommended by manufacturer.
.8 Replace defective or damaged materials with new.

.4 Fire Safety Requirements:
.1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous

1.7 DELIVERY, STORAGE AND HANDLING (Cont'd)

.4 Fire Safety Requirements:(Cont'd)
.2 (Cont'd)
combustion in ULC approved, sealed containers and remove from site daily.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.8 AMBIENT CONDITIONS

.1 Substrate and ambient temperatures: in accordance with limits prescribed in paint standard by manufacturer.

.2 Apply paint finish in areas where:
.1 Dust is no longer being generated by related construction operations.
.2 Wind conditions are such that airborne particles will not affect quality of finished surface.

.3 Substrate and ambient air temperature, humidity and moisture content levels:
.1 Do not perform repainting work when:
.1 Ambient air and substrate temperatures are below 10 degrees C.
.2 Substrate temperature is over 32 degrees C, unless paint is specifically formulated for application at high temperatures.
.3 Substrate and ambient air temperatures are expected to fall outside paint manufacturer's MPI prescribed limits.
.4 Substrate is wet, damp or frosted.
.5 Maximum moisture content of substrate exceeds: 12% for concrete and unit masonry.
.6 Maximum moisture content of substrate exceeds: 15% for wood.
.7 Maximum moisture content of substrate exceeds: 12% for stucco.
.8 Relative humidity is above 85%.
.9 Dew point is less than 3 degrees C variance between air/surface temperature.
.10 Precipitation is forecast to occur before paint has thoroughly cured.
.11 It is foggy, misty, raining, icing or snowing at site.
.2 Damp and cold weather conditions:
.1 Provide and maintain cover for paint finish.

1.8 AMBIENT CONDITIONS (Cont'd)

.3 (Cont'd)
.2 (Cont'd)
.2 Heat substrates and surrounding air to comply with temperature and humidity conditions required.
.3 Protect until paint is dry.
.4 Protect until weather conditions are suitable.

.4 Perform work on surfaces exposed to direct, intense sunlight in early morning.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, and solvents: in accordance with MPI.
.1 Each product from a single manufacturer.

.2 Linseed oil, shellac, and turpentine: highest quality product of an approved manufacturer.
.1 Compatible with other coating materials as required.

.3 Paint materials listed in MPI Approved Product List.

.4 Liquid paint remover: proprietary liquid paint remover of known performance.

.5 Only qualified products with MPI "Environmentally Friendly" rating are acceptable for use on this project.

2.2 EXTERIOR PAINTING SYSTEMS

.1 REX 5.1 - Structural Steel and Metal Fabrications: (columns, beams, and joists).

.2 REX 6.2 - Dimensional Lumber: (columns, beams, exposed joists, underside of decking, siding, and fencing).

.3 REX 6.3 - Dressed Lumber: (doors, door and window frames, casings, battens, and smooth fascias).

.4 REX 6.6 - Wood Shingle and Shake Siding.

2.3 PERFORMANCE CRITERIA

.1 Environmental Performance Requirements:
.1 Provide Paint products meeting legislated VOC content levels.

2.4 COLOURS

.1 Colour Schedule: provided by Departmental Representative.

.2 Colour Schedule:
.1 Existing and new exterior wood siding colour White, Gloss Level G5 to match existing.
.2 New exterior wood shingles colour Red, Gloss Level G5 to match existing.
.3 Existing exterior wood doors and window frames colour Red, Gloss Level G5 to match exisitng.
.4 Metal Railing and lantern (exterior to colour Red, Gloss Level G5 to match existing.
.5 Metal Lantern interior colour Red, Gloss Level G5 to match existing.

.3 Obtain written approval from Departmental Representative for change in Colour Schedule.

.4 First coat in two coat repaint system: tinted slightly lighter colour than top coat to show visible difference between coats.

2.5 MIXING AND TINTING

.1 Pigment to MPI standards.

.2 Vehicle to MPI standards.

.3 Colouring matter to standards.

.4 Perform colour tinting operations prior to delivery of paint to site.

.5 Obtain Departmental Representative's written approval for on-site tinting of paint materials.

.6 Reproduce historic paint colour and gloss level using compatible materials meeting current standards.

.7 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.8 Where thinner is used, addition not to exceed paint manufacturer's recommendations.

2.5 MIXING AND TINTING (Cont'd)

.9 Do not use kerosene or other organic solvents to thin water-based paints.

.10 Thin paint for brush or roller application in accordance with paint manufacturer's recommendations.
.1 Obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.11 Re-mix paint in containers prior to and during application. Ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.6 GLOSS/SHEEN RATINGS

.1 Paint gloss: in accordance with following MPI Gloss/Sheen ratings:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	Maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	Minimum 85
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified and as noted on Finish Schedule.

2.7 ACCESSORIES

.1 Obtain approval of Departmental Representative for use of power tools.

.2 Use tools that do not damage adjacent materials.

.3 Spray equipment: capable of atomizing paint, equipped with pressure regulators and gauges.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for painting in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Ensure workers are kept safe in accordance with Reviewed Safety Plan.

.2 Implement safety measures as required in preparation for implementing work.

.3 Place safety devices and signage in locations as required by Reviewed Safety Plan.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Protect existing building surfaces and adjacent structures with non-staining covers masking against paint spatters, markings and other damage.

.2 Protect items permanently attached to surfaces: Fire Labels on doors and frames, Historical Sites and Monuments Board (HS&MB) Plaques.

.3 Protect factory finished products and equipment.

.4 Remove and safely secure and store light fixtures, surface hardware on doors, and surface mounted equipment, fittings and fastenings prior to undertaking painting operations.

.5 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting progresses.

3.3 PROTECTION OF IN-PLACE CONDITIONS (Cont'd)

.6 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas.

3.4 SURFACE PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Requirements except where specified otherwise.

.2 Clean and prepare exterior surfaces in accordance with MPI Maintenance Repainting Manual requirements. Refer to manual for specific requirements as follows:
.1 Remove dust, dirt, and surface debris by brushing, wiping with dry, clean cloths or compressed air.
.2 Wash surfaces with ion neutral biodegradable detergent and bleach and clean warm water using a stiff bristle brush. Remove dirt, oil and surface contaminants. Ensure existing substrate is not damaged by process.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Use trigger operated spray nozzles for water hoses.
.5 Allow surfaces to drain completely and dry thoroughly.
.6 Use water-based cleaners for surfaces to be repainted using water based paints.

.3 Where noted on Contract Drawings, pressure wash exterior surfaces in accordance with MPI standards for type of surfaces and in accordance with recommended pressures.
.1 Ensure complete removal of loose paint, stains, dirt, and foreign matter.
.2 Stop work immediately and report to Departmental Representative damage occurring from this process.
.3 Use of water hose as spray equipment not permitted.
.4 Allow sufficient drying time.
.5 Test surfaces with electronic moisture meter before commencing work.

.4 Clean metal surfaces: remove rust, dirt, oil, grease and foreign substances in accordance with MPI requirements.
.1 Remove contaminates from surfaces, pockets and corners: brush with clean brushes blow with

3.4 SURFACE PREPARATION (Cont'd)

.4 Clean metal surfaces:(Cont'd)
.1 (Cont'd)
clean dry compressed air brush vacuum as required.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before priming.

.6 Touch-up, spot prime, and apply primer, paint, or pre-treatment immediately after cleaning.

.7 Obtain written approval of prepared surfaces byDepartmental Representative before applying paint.

3.5 APPLICATION

.1 Special Techniques:
.1 Apply coating in manner that replicates texture of existing paint coating.

.2 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

.3 Apply paint materials in accordance with paint manufacturer's written application instructions.
.1 Apply paint:
.1 To adequately prepared surfaces and within moisture limits.
.2 When previous coat of paint is dry and adequately cured.
.3 In accordance with manufacturer's written instructions.

.4 Apply paint with brush or roller.
.1 Obtain Departmental Representative's approval of application method before commencing work.

.5 Brush and Roller Application:
.1 Apply paint in a uniform layer using brush and or roller suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Brush and roll out runs and sags, and overlap marks.
.4 Eliminate roller tracking and stipple by finishing with a brush. Maintain historic appearance.

3.5 APPLICATION (Cont'd)

.5 Brush and Roller Application:(Cont'd)
.5 Remove runs and sags from finished work and repaint.
.6 Apply final coat of paint with brush.

3.6 FIELD QUALITY CONTROL

.1 Standard of acceptance:
.1 When viewed using natural prevailing sunlight at peak period of day (mid-day) on surface viewed, surfaces to indicate following:
.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
.2 Soffits: no defects visible from grade at 45 degrees to surface.
.3 Final coat: to exhibit uniformity of colour and sheen across full surface.

.2 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved by Departmental Representative.

.3 Co-operate with Paint Inspection Agency and provide access to areas of work.

.4 Manufacturer's Field Services:
.1 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.

.5 Test painted concrete, masonry and plaster surfaces for alkalinity as required.

.6 Conduct moisture tests on substrates.
.1 Use calibrated electronic moisture meter.
.2 Test existing painted concrete floors using simple "Cover patch test" on failed areas.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.

.2 Reinstall and clean removed items after painting is completed.

3.7 CLEANING (Cont'd)

.3 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.
.1 Clean and restore as directed by Departmental Representative.

.4 Wipe spills and spots immediately with a damp cloth.

.5 Minimize use of kerosene and organic solvents to clean up water-based paints.

.6 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.7 Waste Management: separate waste materials for recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
.2 Separate coating products waste in accordance with Waste Management Plan and place in designated areas for recycling and disposal.
.3 Place materials defined as hazardous or toxic waste in designated containers.
.4 Seal and store emptied containers safely away from children for disposal.
.5 Dispose of surplus chemical and finishing materials in accordance with Federal, Provincial and Municipal regulations.
.6 Treat non-reusable materials as hazardous waste and dispose of legally off site.
.7 Place excess cleaners, thinners, solvents and paint in designated containers and dispose of legally off site.
.8 Reduce the amount of contaminants entering waterways, sanitary/storm drain systems and into the ground. Adhere to following procedures:
.1 Retain cleaning water for water-based materials. Allow sediments to be filtered out. Do not use free-draining water to clean equipment.
.2 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
.3 Dry empty paint cans prior to disposal or recycling.
.4 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store product in

3.7 CLEANING (Cont'd)

.7 Waste Management:(Cont'd)

.8 (Cont'd)

well-ventilated fire-safe area at moderate temperature.

.9 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling facility.

.10 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials, and debris.

.11 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with Federal, Provincial and Municipal regulations.

.12 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials, paints, thinners, paint removers/strippers in accordance with Federal, Provincial and Municipal regulations.

.13 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Recycle sediment remaining from cleaning operations in accordance with Federal, Provincial and Municipal regulations.

3.8 HARDWARE RE-INSTALLATION

.1 Clean and re-install hardware items removed and stored previous to commencement of the Work.

.2 Re-install hardware items in original locations.

3.9 PROTECTION

.1 Protect freshly completed surfaces from paint droppings and dust. Avoid scuffing newly applied paint.

.2 Remove paint splashings on exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.

.3 Protect completed work from paint droppings. Use non-staining coverings.

.4 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

3.9 PROTECTION (Cont'd)

.5 Remove protective coverings and warning signs as soon as practical after operations cease.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 - Rough Carpentry.

.2 Section 06 20 00 - Finish Carpentry.

.3 Section 07 03 32 - Historic Shingles and Shakes Roofing.

.4 Section 07 46 23 - Wood Siding.

.5 Section 08 50 20 - Wood Window Repair and Restoration.

1.2 REFERENCES

.1 Environmental Protection Agency (EPA)
.1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings).

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.3 The Master Painters Institute (MPI)
.1 Architectural Painting Specification Manual - February 2004.
.2 Standard GPS-1-05, MPI Green Performance Standard for Painting and Coatings.

.4 National Fire Code of Canada 2015.

.5 Society for Protective Coatings (SSPC)
.1 Systems and Specifications, SSPC Painting Manual 2005.

1.3 QUALITY ASSURANCE

.1 Qualifications:
.1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
.3 Apprentices: may be employed provided they work under direct supervision of qualified

1.3 QUALITY

.1 Qualifications:(Cont'd)

journeyperson in accordance with trade regulations.

.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.6 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.

.7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.8 Standard of Acceptance:

.1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Soffits: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 PERFORMANCE REQUIREMENTS

.1 Environmental Performance Requirements:

.1 Provide paint products meeting MPI "Environmentally Friendly" E1 ratings based on VOC (EPA Method 24) content levels.

.2 Green Performance in accordance with MPI Standard GPS-1.

1.5 SCHEDULING

.1 Submit work schedule for various stages of painting to Departmental Representativefor approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about building.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit WHMIS MSDS - Material Safety Data Sheets for all products.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Provide samples in accordance with Section 01 33 00.
.1 Submit duplicate 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:
.1 13 mm birch plywood for finishes over wood surfaces.
.2 10 mm cedar, siding for finishes over wood surfaces.
.2 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
.3 Submit full range of available colours where colour availability is restricted.

1.7 QUALITY CONTROL

.1 When requested by Departmental Representative or Paint Inspection Agency, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall

1.7 QUALITY CONTROL (Cont'd)

.1 (Cont'd)
become acceptable standard of finish quality and workmanship for similar on-site work.

1.8 MAINTENANCE

.1 Extra Materials:
.1 Submit maintenance materials in accordance with Section 01 78 00.

.2 Submit one, four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.9 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00, supplemented as follows:
.1 Deliver and store materials in original containers, sealed, with labels intact.
.2 Labels: to indicate:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.
.3 Remove damaged, opened and rejected materials from site.
.4 Provide and maintain dry, temperature controlled, secure storage.
.5 Observe manufacturer's recommendations for storage and handling.
.6 Store materials and supplies away from heat generating devices.
.7 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.
.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.
.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.
.10 Remove paint materials from storage only in quantities required for same day use.
.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

1.9 DELIVERY, xxxxxxxxxxxxx STORAGE AND HANDLING (Cont'd)

.1 (Cont'd)

.12 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

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

1.10 AMBIENT CONDITIONS

.1 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.

.4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.2 Perform no painting work when maximum moisture content of substrate exceeds:

.1 19% for wood.

.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".

.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.2 Surface and Environmental Conditions:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or

1.10 AMBIENT .2 (Cont'd)

ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems: to be products of single manufacturer.

.3 Use only MPI listed L rated materials.

2.2 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract award.

.2 Selection of colours will be from manufacturers full range of colours.

.3 Where specific products are available in restricted range of colours, selection will be based on limited range.

.4 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

2.3 MIXING AND TINTING (Cont'd)

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

2.5 EXTERIOR PAINTING SYSTEMS

.1 Dimension Lumber: Stair stringers, timber treads, mid-rails, diagonals, caps, bottom rails, intermediate rails, centre rails, posts and intermediate posts, columns, beams, exposed joists, underside of decking, siding, fencing, etc.
.1 EXT 6.2C - Alkyd G6 gloss level finish.

.2 Dressed Lumber: doors, door and window frames, casings, battens, smooth facias, etc.
.1 EXT 6.3B - Alkyd G6 gloss level finish do not use flat finish on doors.

.3 Wood Shingle and Shake Siding:
.1 EXT 6.6C - Solid colour stain finish.

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 datasheets.

3.2 EXAMINATION

.1 Exterior painting work: inspect surfaces to be painted by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project painting specification and Finish Schedule.

.2 Exterior surfaces requiring painting: inspect surfaces to be painted by both painting contractor and Paint Inspection Agency who will notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

.4 Obtain and pay for all Paint Inspection Agency services.

3.3 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Architectural Painting Specification Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be painted in accordance with MPI Architectural Painting Specification Manual requirements. Refer to the MPI Manual in regard to specific requirements.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer,

3.3 PREPARATION (Cont'd)

.4 (Cont'd)
paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.4 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
.1 Wood: 19%.

3.5 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants and general public in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking

3.5 PROTECTION (Cont'd)

.5 (Cont'd)
painting operations.Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.6 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Apply paint by brush, roller or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray Application:
.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
.4 Brush out immediately runs and sags.

3.6 APPLICATION (Cont'd)

.3 Spray Application:(Cont'd)
.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.9 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.7 FIELD QUALITY CONTROL

.1 Inspection:
.1 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
.2 Co-operate with inspection agency and Departmental Representive to provide access to areas of work.

.2 Manufacturer's Field Services:
.1 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.

3.8 CLEANING

.1 Proceed in accordance with Section 01 74 11.
.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using

3.8 CLEANING (Cont'd)

.1 (Cont'd)
.1 (Cont'd)
means and materials that are not detrimental to affected surfaces.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 83 10 - Lead Base Paint Abatement.

.2 Section 06 20 00 - Finish Carpentry.

.3 Section 07 03 32 - Historic Wood Shingles and shakes.

.4 Section 07 46 23 - Wood Siding.

1.2 REFERENCES

.1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Material Safety Data Sheets (MSDS).

.2 The Master Painters Institute (MPI)
.1 Maintenance Repainting Manual 2004, Master Painters Institute (MPI), including Identifiers, Evaluation, Systems, Preparation and Approved Product List.

.3 National Fire Code of Canada 2015.

.4 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) of the Environmental Protection Agency (EPA).

1.3 QUALITY ASSURANCE

.1 Qualifications:
.1 Contractor: to have a minimum of five years proven satisfactory experience. When requested, provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
.2 Qualified journeypersons as defined by local jurisdiction to be engaged in painting work.
.3 Apprentices: may be employed provided they work under direct supervision of qualified journeypersons in accordance with applicable trade regulations.

.2 Conform to latest MPI requirements for exterior repainting work including cleaning, preparation and priming.

1.3 QUALITY ASSURANCE (Cont'd)

.3 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, and solvents) to be in accordance with the latest edition of the MPI Approved Product List and to be from a single manufacturer for each system used.

.4 Paint materials such as linseed oil, shellac, and turpentine, to be the highest quality product of an approved manufacturer listed in MPI Maintenance Repainting Manual and shall be compatible with other coating materials as required.

.5 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

1.4 SCHEDULING

.1 Submit work schedule for various stages of painting to Departmental Representative for approval review. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule repainting operations to prevent disruption by other trades if applicable and by occupants in and about building.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 00.

.2 Provide samples in accordance with Section 01 33 00.
.1 Submit full range colour sample chips for review and selection. Indicate where colour availability is restricted.

.3 Provide product data and manufacturer's installation/application instructions for paints and coating products to be used.

.4 Quality Assurance Submittals:
.1 Manufacturer's Instructions: manufacturer's installation instructions.

1.5 ACTION AND INFORMATIONAL SUBMITTALS (Cont'd)

.5 Closeout Submittals:
.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00.
.2 Provide records of products used. List products in relation to finish system and include following:
.1 Product name, type and use (i.e. materials and location).
.2 Manufacturer's product number.
.3 Colour code numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's Material Safety Data Sheets.

1.6 MAINTENANCE

.1 Extra Materials:
.1 Provide maintenance materials in accordance with Section 01 78 00.
.2 Provide one -four litre can of each type and colour of finish coating. Identify type and colour in relation to established colour schedule and finish system.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section 01 61 00, supplemented as follows:
.1 Deliver and store materials in original containers, sealed, with labels intact.
.2 Labels to indicate:
.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.
.3 Remove damaged, opened and rejected materials from site.
.4 Store and handle in accordance with manufacturer's recommendations.
.5 Store materials and equipment in secure, dry, well-ventilated area with temperature range between 7 degrees C to 30 degrees C. Store materials and supplies away from heat generating devices and sensitive products above minimum temperature as recommended by manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING (Cont'd)

.1 (Cont'd)

.1 (Cont'd)

.6 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. Upon completion of operations, return areas to clean condition to approval of Departmental Representative.

.7 Remove paint materials from storage in quantities required for same day use.

.8 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.9 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site daily.

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

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.2 Paint, stain and wood preservative finishes and related materials are hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.3 Materials that cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into the ground the following procedures shall be strictly adhered to:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.

1.7 DELIVERY, STORAGE AND HANDLING (Cont'd)

.2 Waste Management and Disposal:(Cont'd)

.5 (Cont'd)

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

.6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.7 Set aside and protect surplus and uncontaminated finish materials: as directed.

1.8 AMBIENT CONDITIONS

.1 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer.

.2 Do not perform repainting work when:

.1 Ambient air and substrate temperatures are below 10 degreesC.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are expected to fall outside paint manufacturer's prescribed limits.

.4 Relative humidity is above 85% or when dew point is less than 3 degrees C variance between air/surface temperature.

.5 Rain or snow is forecast to occur before paint has thoroughly cured.

.6 It is foggy, misty, raining or snowing at site.

.3 Conduct moisture tests using properly calibrated electronic Moisture Meter.

1.8 AMBIENT CONDITIONS (Cont'd)

.1 (Cont'd)

.4 Do not perform repainting work when maximum moisture content of substrate exceeds:

.1 15% for wood.

.2 Application Requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind conditions are such that airborne particles will affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits noted.

.3 Apply paint when previous coat of paint is dry or adequately cured, unless otherwise pre-approved by specific coating manufacturer.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.

.3 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule repainting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.

.2 Where required by authorities having jurisdiction, paints and coatings to provide fire resistant rating.

.3 Paint materials for repaint systems: products of single manufacturer.

.4 Only qualified products with MPI "Environmentally Friendly" rating are acceptable for use on this project.

.5 Use only MPI listed L rated materials.

.6 Paints, coatings, thinners, solvents, cleaners and other fluids used in repaintingto be as follows:
.1 Not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
.2 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
.3 Be manufactured without compounds which contribute to smog in lower atmosphere.
.4 Be manufactured where matter generating 'Biochemical Oxygen Demand' (BOD) in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
.5 Be manufactured where total suspended solids (TSS) content in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment facility not exceed 15 mg/L.

.7 Paints and coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.8 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated

2.1 MATERIALS (Cont'd)

.8 (Cont'd)
solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract award.

.2 Selection of colours will be from manufacturers full range of colours.

.3 Where specific products are available in restricted range of colours, selection will be based on limited range.

.4 First coat in two coat (Premium) repaint system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed with Departmental Representative's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following MPI gloss/sheen standard values:

Gloss Level Category	Units @ 60 Degrees	Units @ 85 Degrees
G1 - matte finish	0 to 5	maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	minimum 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

.2 Gloss level ratings of repainted surfaces as specified and as noted on Drawings.

2.5 EXTERIOR PAINTING SYSTEMS

.1 REX 6.2 - Dimension Lumber: (columns, beams, exposed joists, underside of decking, siding, and fencing).
.1 REX 6.2C - Alkyd - G5, DSD 3, Premium Grade.

.2 REX 6.3 - Dressed Lumber: (doors, door and window frames, casings, battens, and smooth fascias).
.1 REX 6.3B - Alkyd - G5, DSD 3, Premium Grade.

.3 REX 6.6 - Wood Shingle and Shake Siding.
.1 REX 6.6C - Shingle Stain.

.4 Refer to Clause 3.4.4 for DSD descriptions.

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 datasheets.

3.2 EXAMINATION

.1 Exterior repainting work: inspect surfaces to berepainted by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule (as well as plans and elevation drawings if available).

.2 Exterior surfaces requiring repainting: inspect surfaces to be repainted by both painting contractor and Paint Inspection Agency who will notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

.3 Where an assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.

.4 Obtain and pay for all Paint Inspection Agency services.

3.3 PREPARATION

.1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting requirements except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

.3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance

3.3 PREPARATION (Cont'd)

.3 (Cont'd)
Repainting Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
.1 Remove dust, dirt, and surface debris by brushing, wiping with dry, clean cloths or compressed air.
.2 Wash surfaces with a biodegradable detergent (and bleach where applicable) and clean warm water using a stiff bristle brush to remove dirt, oil and surface contaminants.
.3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
.4 Use trigger operated spray nozzles for water hoses.
.5 Allow surfaces to drain completely and to dry thoroughly.
.6 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water based paints.
.7 Many water-based paints cannot be removed with water once dried. However, minimize the use of kerosene or such organic solvents to clean up water-based paints.

.4 Where required, pressure wash exterior surfaces prior to repainting in accordance with MPI standards for type of surfaces and recommended pressures to ensure complete removal of loose paint, stains, dirt, and foreign matter. This work to be carried out by qualified workers experienced in pressure water cleaning. Use of spray equipment such as water hose cleaning will not be considered satisfactory unless specified. Allow sufficient drying time and test surfaces using an electronic moisture meter before commencing work.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.

.6 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects from previously painting (e.g.

3.3 PREPARATION (Cont'd)

.7 (Cont'd)
runs, and sags) that are visible from distance up to 1000 mm.

3.4 EXISTING CONDITIONS

.1 Prior to commencing work, examine site conditions and existing exterior substrates to be repainted and report in writing to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions of surfaces that will adversely affect this work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative. Maximum moisture content not to exceed specified limits.

.3 No repainting work to commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.

.4 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in the MPI Maintenance Repainting Manual. MPI DSD ratings and descriptions are as follows:

Condition n	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes and scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or

3.4 EXISTING CONDITIONS (Cont'd)

.4 (Cont'd)

replacement of surface required).

.5 Existing surfaces to be repainted have lead based paint. Carry out abatement to Section 02 83 10.

3.5 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect general public and building occupants in and about the building.

.5 Removal of light fixtures, surface hardware on doors, and surface mounted equipment, fittings and fastenings to be done prior to undertaking painting operations. Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

3.6 APPLICATION

.1 Apply paint by method that is best suited for substrate being repainted using brush roller air sprayer and/or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise. In each case method of

3.6 APPLICATION (Cont'd)

.1 (Cont'd)
application to be as pre-approved by Departmental Representative before commencing work.

.2 Brush and Roller Application:
.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
.2 Work paint into cracks, crevices and corners.
.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces to be free of roller tracking and heavy stipple unless approved by Departmental Representative.
.5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray Application:
.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
.2 Keep paint ingredients properly mixed in containers during paint application either by by intermittent agitation as frequently necessary.
.3 Apply paint in uniform layer, with overlapping at edges of spray pattern.
.4 Back roll spray applications and brush out runs and sags immediately.
.5 Use brushes to work paint into cracks, crevices and places that are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.5 Apply paint coats in a continuous manner and allow surfaces to dry and cure between coats for minimum time period as recommended by manufacturer. Minimum dry film thickness of coats not less than that recommended by manufacturer. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Sand and dust between coats to remove visible defects.

3.6 APPLICATION (Cont'd)

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.8 Finish to doors include all edges including top and bottom edges. Surfaces concealed by door hardware be repainted unless otherwise pre-approved.

3.7 MECHANICAL / ELECTRICAL EQUIPMENT

.1 Unless otherwise noted, repainting to include exposed to view/previously painted exterior mechanical and electrical equipment and components (panels, conduits, piping, hangers, and ductwork).

.2 Touch up scratches and marks and repaint such mechanical and electrical equipment and components with colour and finish to match existing finish unless otherwise noted or scheduled.

.3 Do not paint over name plates or instruction labels.

.4 Standard of Acceptance: when viewed using natural prevailing sunlight at peak period of the day (mid-day) on surface viewed, surfaces to indicate following:
.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
.2 Soffits: no defects visible from grade at 45 degrees to surface.
.3 Final coat to exhibit uniformity of colour and sheen across full surface area.

.5 Repaint existing metal surfaces to Section 09 97 19.

3.8 FIELD QUALITY CONTROL

.1 Advise Departmental Representative and Paint Inspection Agency when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.2 Co-operate with Paint Inspection Agency and provide access to areas of work.

3.8 FIELD QUALITY CONTROL (Cont'd)

.3 Manufacturer's Field Services:
.1 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.

.4 Obtain and pay for Paint Inspection Agency servies.

3.9 CLEANING

.1 Proceed in accordance with Section 01 74 11.

.2 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

.3 Keep work area free from unnecessary accumulation of tools, equipment, surplus materials and debris.

.4 Remove combustible rubbish materials and empty paint cans each day and safely dispose of same in accordance with requirements of authorities having jurisdiction.

.5 Clean equipment and dispose of wash water used for water borne materials, solvents used for oil based materials as well as cleaning and protective materials (e.g. rags, drop cloths, and masking papers), paints, thinners, paint removers/strippers in accordance with the safety requirements of authorities having jurisdiction and as specified.

.6 Clean painting equipment in leak-proof containers that will permit particulate matter to settle out and be collected. Sediment remaining from cleaning operations to be disposed of in manner acceptable to authorities having jurisdiction.

.7 Recycle paint and coatings in excess of repainting requirements as specified.

3.10 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

3.10 RESTORATION (Cont'd)

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on affected exposed surfaces. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 02 83 10 - Lead - Base Paint Abatement.

.2 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCES

.1 The Master Painters Institute (MPI)
.1 Exterior Structural Steel and Metal Fabrications, 07.
.1 EXT 5.1G, Polyurethane, Pigmented (over epoxy zinc rich primer and high build epoxy).

.2 Environmental Choice Program (ECP)
.1 CCD-047-98(R2005), Architectural Surface Coatings.
.2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.

.3 Federal Standard (FS)
.1 FED-STD-595B-89, Colours Used in Government Procurement.

.4 The Society for Protective Coatings (SSPC)
.1 SSPC-SP 1-82(R2004), Solvent Cleaning.
.2 SSPC-SP 2-82(R2004), Hand Tool Cleaning.
.3 SSPC-SP 3-82(R2004), Power Tool Cleaning.
.4 SSPC-SP 6/NACE No. 3-07, Commercial Blast Cleaning.
.5 SSPC-SP 7/NACE No. 4-07, Brush-off Blast Cleaning.
.6 SSPC-Vis-1-89, Visual Standard for Abrasive Blast Cleaned Steel (Standard Reference Photographs) Editorial Changes September 1, 2000 (Steel Structures Painting Manual, Chapter 2 - Surface Preparation Specs.).
.7 SSPC-SP 10/NACE No. 2-07, Near White Blast Cleaning.
.8 SSPC-PA 204, Measurement of Dry Coat Thickness with Magnetic Gauges.
.9 SSPC Good Painting Practices, Volume 1, 4th Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for painting exterior metal surfaces and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.

.3 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Upon request, Departmental Representative will furnish qualified products list of paints.
.4 Paints that do not appear on MPI Approved Products List must be approved by Departmental Representative before use on project. When it is proposed to use non-qualified paint, submit 1 L sample of paint to Departmental Representative at least 4 weeks prior to commencement of painting for analysis and acceptance. Mark samples with name of project, its location, paint manufacturer's name and address, name of paint, MPI standard number and manufacturers paint code number.
.5 Enable Departmental Representative to take 1 L samples of each paint delivered to site, one sample from manufacturer's containers and one sample from painters' pot.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports:
.1 Submit test reports showing compliance with specified performance characteristics and physical properties and in accordance with Section 01 45 00.

1.4 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 and with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Develop Construction Waste Management Plan related to Work of this Section in accordance with Section 01 74 20.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in latest edition of MPI Approved Product List (APL) are acceptable for use on this project.

.2 Where required by authorities having jurisdiction, paints and coatings to provide fire resistant rating.

.3 Paint materials for repaint systems: products of single manufacturer.

.4 Only qualified products with MPI "Environmentally Friendly" rating are acceptable for use on this project.

.5 Use only MPI listed L rated materials.

.6 Paints, coatings, thinners, solvents, cleaners and other fluids used in repaintingto be as follows:
.1 Not contain methylene chloride, chlorinated hydrocarbons, toxic metal pigments.
.2 Be manufactured without compounds which contribute to ozone depletion in upper atmosphere.
.3 Be manufactured without compounds which contribute to smog in lower atmosphere.
.4 Be manufactured where matter generating 'Biochemical Oxygen Demand' (BOD) in undiluted production plant effluent discharged to natural watercourse or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L.
.5 Be manufactured where total suspended solids (TSS) content in undiluted production plant effluent discharged to natural watercourse

2.1 MATERIALS (Cont'd)

.6 (Cont'd)
.5 (Cont'd)
or sewage treatment facility lacking secondary treatment does not exceed 15 mg/L..

.7 Paints and coatings must be manufactured and transported in a manner that steps of processes, including disposal of waste products, will meet requirements of applicable governmental acts, by-laws and regulations including, for facilities located in Canada, Fisheries Act and Canadian Environmental Protection Act (CEPA).

.8 Paints and coatings must not be formulated or manufactured with formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium or their compounds.

2.2 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract award.

.2 Selection of colours will be from manufacturers full range of colours.

.3 Where specific products are available in restricted range of colours, selection will be based on limited range.

.4 First coat in two coat (Premium) repaint system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed with Departmental Representative's written permission.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Where thinner is used, addition not to exceed paint manufacturer's recommendations. Do not use kerosene or such organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in

2.3 MIXING AND TINTING (Cont'd)

.4 (Cont'd)
writing from manufacturer and provide copy of instructions to Departmental Representative.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following MPI gloss/sheen standard values:

Gloss Level Category	Units @ 60 Degrees	Units @ 85 Degrees
G1 - matte finish	0 to 5	maximum 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	minimum 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

.2 Gloss level ratings of repainted surfaces as specified and as noted on Drawings.

2.5 PAINTING SYSTEMS

.1 New metal surfaces:
.1 EXT 5.1G - G6.

.2 Existing metal surfaces:
.1 REX 5.1G - G6, DSD 3, Premium Grade.

.3 Finish Coat: Colour to be selected by Departmental Representative.

.4 Sand for sandblasting: to SSPC (Steel Structures Painting Council).

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Metal painting work: inspect surfaces to be repainted by MPI Accredited Paint Inspection Agency (inspector) acceptable to specifying authority and local Painting Contractor's Association. Painting contractor to notify Paint Inspection Agency minimum of one week prior to commencement of work and provide copy of project repainting specification and Finish Schedule (as well as plans and elevation drawings if available).

.2 Metal surfaces requiring repainting: inspect surfaces to be repainted by both painting contractor and Paint Inspection Agency who will notify Departmental Representative in writing of defects or problems, prior to commencing repainting work, or after surface preparation if unseen substrate damage is discovered.

.3 Where an assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.

.4 Obtain and pay for all Paint Inspection Agency services.

.5 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for painting exterior metal surfaces installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Lead based paint is present on existing metal surfaces.
.3 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.4 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 EXISTING CONDITIONS

.1 Prior to commencing work, examine site conditions and existing exterior substrates to be repainted and report in writing to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions of surfaces that will adversely affect this work.

.2 No repainting work to commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.

.3 Degree of surface deterioration (DSD) to be assessed using MPI Identifiers and Assessment criteria indicated in the MPI Maintenance Repainting Manual. Refer to MPI DSD ratings and descriptions found in Section 09 91 13.01, Clause 3.4.4.

.4 Existing surfaces to be repainted have lead based paint. Carry out abatement to Section 02 83 10.

3.3 PREPARATION

.1 Remove existing loose and rusted paint from exterior metal surfaces.

.2 New metal surfaces:
.1 Clean surfaces of new metal to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and foreign substances in accordance with the following:
.1 Commercial blast cleaning: to SSPC-SP 6.

.3 Metal surfaces to be repainted:
.1 Clean surfaces by removing loose, cracked, brittle or non-adherent paint, rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with following.
.1 Commercial blast cleaning: to SSPC-SP 6.
.2 Commercial blast clean rusted and bare metal surfaces where existing paint system has failed.

.4 Compressed air to be free of water and oil before reaching nozzle.

.5 Remove traces of blast products from surfaces, pockets and corners to be painted by brushing

3.3 PREPARATION (Cont'd)

.5 (Cont'd)
with clean brushes, by blowing with clean dry compressed air, or by vacuum cleaning.

.6 Apply paint after prepared surfaces have been accepted by Departmental Representative.

.7 Prior to starting paint application ensure degree of cleanliness of surfaces is to SSPC-Vis 1.
.1 Apply primer, paint, or pretreatment after surface has been cleaned and before deterioration of surface occurs.
.2 Clean surfaces again if rusting occurs after completion of surface preparation.

.8 Mixing paint:
.1 Do not dilute or thin paint for brush application.
.2 Mix ingredients in container before and during use and ensure breaking up of lumps, complete dispersion of settled pigment, and uniform composition.
.3 Do not mix or keep paint in suspension by means of air bubbling through paint.
.4 Thin paint for spraying according to manufacturer's written instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.9 Number of paint coats:
.1 New metal surfaces.
.1 Shop: 2 primer coats to minimum dry film thickness of 35 microns per coat.
.2 Field: 2 top coats to minimum dry film thickness of 25 microns per coat.
.2 Repainting existing metal surfaces.
.1 One primer coat to minimum dry film thickness of 35 microns to bare and commercial sand blasted areas.
.2 Two top coats to minimum dry film thickness of 25 microns per coat.

3.4 APPLICATION

.1 Manufacturer's Instructions: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.4 APPLICATION (Cont'd)

.2 Apply paint by spraying, brushing, or combination of both. Use sheepskins or daubers when no other method is practical in places of difficult access.

.3 Use dipping or roller coating method of application when specifically authorized by Departmental Representative in writing.

.4 Caulk open seams at contact surfaces of built up members with material approved by Departmental Representative , before second undercoat of primer is applied.

.5 Where surface to be painted is not under cover, do not apply paint when:
.1 Air temperature is below 5 degrees C or when temperature is expected to drop to 0 degrees C before paint has dried.
.2 Temperature of surface is over 50 degrees C unless paint is specifically formulated for application at high temperatures.
.3 Fog or mist occur at site; it is raining or snowing; there is danger of rain or snow; relative humidity is above 85%.
.4 Surface to be painted is wet, damp or frosted.
.5 Previous coat is not dry.

.6 Supply cover when paint must be applied in damp or cold weather. Supply, shelter, or heat surface and surrounding air to comply with temperature and humidity conditions specified. Protect until paint is dry or until weather conditions are suitable.

.7 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.8 Apply each coat of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.9 Brush application:
.1 Work paint into cracks, crevices and corners and paint surfaces not accessible to brushes by spray, daubers or sheepskins.
.2 Brush out runs and sags.
.3 Remove runs, sags and brush marks from finished work and repaint.

3.4 APPLICATION (Cont'd)

.10 Spray application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Provide traps or separators to remove oil and water from compressed air and drain periodically during operations.

.3 Keep paint ingredients properly mixed in spray pots or containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.4 Apply paint in uniform layer, with overlapping at edges of spray pattern.

.5 Brush out immediately runs and sags.

.6 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray. In areas not accessible to spray gun, use brushes, daubers or sheepskins.

.7 Remove runs, sags and brush marks from finished work and repaint.

.11 Field painting:

.1 Paint steel structures as soon as practical after erection.

.2 Touch up metal which has been shop coated with same type of paint and to same thickness as shop coat. This touch-up to include cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas.

.3 Field paint surfaces (other than joint contact surfaces) which are accessible before erection but which are not to be accessible after erection.

.4 Apply final coat of paint after concrete work is completed or as directed by Departmental Representative. If concreting or other operations damage paint, clean and repaint damaged area. Remove concrete spatter and droppings before paint is applied.

.5 Where painting does not meet with requirements of specifications, and when so directed by Departmental Representative remove defective paint, thoroughly clean affected surfaces and repaint in accordance with these specifications.

.12 Handling painted metal:

3.4 APPLICATION (Cont'd)

.12 Handling painted metal:(Cont'd)
.1 Handle painted metal after paint has dried, or when necessary for handling for painting or stacking for drying.
.2 Scrape off and touch up paint which is damaged in handling, with same number of coats and kinds of paint as were previously applied to metal.

3.5 FIELD QUALITY CONTROL

.1 Advise Departmental Representative and Paint Inspection Agency when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.2 Upon completion of the painting procedures test for dry film reading and evaluate the results as per SSPC-PA 2.

.3 Co-operate with Paint Inspection Agency and provide access to areas of work.

.4 Manufacturer's Field Services:
.1 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.

.5 Obtain and pay for Paint Inspection Agency servies.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

3.7 PROTECTION

.1 Protect painted surfaces from damage during construction.

.2 Protection of surfaces:
.1 Protect surfaces not to receive paint.
.2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, corrosive chemicals, grease, oil and solvents before prime coat is

3.7 PROTECTION (Cont'd)

.2 Protection of surfaces:(Cont'd)

.2 (Cont'd)

applied and between applications of remaining coats of paint. Remove contaminants from surface and apply paint immediately.

.3 Protect cleaned and freshly painted surfaces from dust to approval of Departmental Representative.

.3 Repair damage to adjacent materials caused by painting exterior metal surface application installation.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 03 07 - Historic - Masonry Repointing.

.2 Section 04 03 08 - Historic - Mortaring.

.3 Section 04 05 00 - Common Work Results for Masonry.

.4 Section 07 11 13 - Bituminous Damproofing.

.5 Section 31 05 10 - Corrected Maximum Dry Density.

.6 Section 31 05 16 - Aggregate Materials.

.7 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

.8 Section 32 92 19.13 - Mechanical Seeding.

1.2 REFERENCES

.1 ASTM International
.1 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft^3) (600kN-m/m^3).

.2 CSA International
.1 CSA A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
.2 CSA A3000-13, Cementitious Materials Compendium.

.3 Ontario Provincial Standard Specifications (OPSS)/Ontario Ministry of Transportation
.1 OPSS 1004-12, Material Specification for Aggregates - Miscellaneous.
.2 OPSS 1010-13, Material Specification for Aggregates - Base, Subbase, Select Subgrade, and Backfill Material.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Co-ordination: arrange with authority having jurisdiction for relocation of buried services that interfere with execution of work.
.1 Pay costs of relocating services.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Site Quality Control Submittals: submit in accordance with Section 01 45 00.
.1 Submit condition survey of existing conditions as described in EXISTING CONDITIONS article.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Granular A, B Type I, to OPSS 1010. Sand to OPSS 1004.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Evaluation and Assessment:
.1 Before commencing work establish locations of buried services on and adjacent to site.

3.2 PREPARATION

.1 Temporary erosion and sedimentation control:

.2 Protection of in-place conditions:
.1 Protect excavations from freezing.
.2 Keep excavations clean, free of standing water, and loose soil.
.3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to Departmental Representative's approval.
.4 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.
.5 Protect buried services that are required to remain undisturbed.

3.2 PREPARATION (Cont'd)

.3 Removal:
.1 Remove trees, stumps, logs, brush, shrubs, bushes, vines, undergrowth, rotten wood, dead plant material, exposed boulders and debris within areas designated on drawings.
.2 Remove stumps and tree roots below footings, slabs, and paving, and to 600 mm below finished grade elsewhere.
.3 Remove obsolete buried services within 2 m of foundations: cap cut-offs.

3.3 EXCAVATION

.1 Shore and brace excavations, protect slopes and banks and perform work in accordance with Provincial and Municipal regulations whichever is more stringent.

.2 Strip topsoil over areas to be covered by new construction, over areas where grade changes are required, and so that excavated material may be stockpiled without covering topsoil.
.1 Stockpile topsoil on site for later use.

.3 Excavate as required to carry out work.
.1 Do not disturb soil or rock below bearing surfaces.
.2 Notify Departmental Representative when excavations are complete.
.3 If bearings are unsatisfactory, additional excavation will be authorized in writing and paid for as additional work.
.4 Excavation taken below depths shown without Departmental Representative's written authorization to be filled with concrete of same strength as for footings at Contractor's expense.

.4 Excavate trenches to provide uniform continuous bearing and support for 150 mm thickness of pipe bedding material on solid and undisturbed ground.
.1 Trench widths below point 150 mm above pipe not to exceed diameter of pipe plus 600 mm.

3.4 FIELD QUALITY CONTROL

.1 Testing of materials and compaction of backfill and fill will be carried out by testing laboratory designated by Departmental Representative.

3.4 FIELD QUALITY CONTROL (Cont'd)

.2 Not later than 1 week minimum before backfilling or filling, submit to designated testing agency, samples of backfill as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Do not begin backfilling or filling operations until material has been approved for use by Departmental Representative.

.4 Not later than 48 hours before backfilling or filling with approved material, notify Departmental Representative to allow compaction tests to be carried out by designated testing agency.

3.5 BACKFILLING

.1 Remove snow, ice, construction debris, organic soil and standing water from spaces to be filled.

.2 Lateral support: maintain even levels of backfill around structures as work progresses, to equalize earth pressures.

.3 Compaction of subgrade: compact existing subgrade under walks, paving, and slabs on grade, to same compaction as fill.
.1 Fill excavated areas with gravel and sand compacted as specified for fill.

.4 Placing:
.1 Place backfill, fill and base course material in 150 mm lifts: add water as required to achieve specified density.

.5 Compaction: compact each layer of material to following densities for material to ASTM D698:
.1 To underside of base courses: 95%.
.2 Base courses: 100%.
.3 Elsewhere: 90%.

.6 In trenches:
.1 Up to 300 mm above pipe or conduit: sand placed by hand.
.2 Over 300 mm above pipe or conduit: native material approved by Departmental Representative.

.7 Under seeded and sodded areas: use site excavated material to bottom of topsoil except in trenches and within 600 mm of foundations.

3.5 BACKFILLING (Cont'd)

.8 Against foundations (except as applicable to trenches and under slabs and paving): excavated material or imported material with no stones larger than 200 mm diameter within 600 mm of structures.

3.6 GRADING

.1 Grade so that water will drain away from buildings, walls and paved areas, to catch basins and other disposal areas approved by Departmental Representative.
.1 Grade to be gradual between finished spot elevations shown on drawings.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.
.2 Dispose of cleared and grubbed material off site daily.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Waste Management: separate waste materials for reuse and recycling and organics in accordance with Section 01 74 20.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 00.01 - Earthwork - Short Form.

.2 Section 31 05 16 - Aggregate Materials.

.3 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 REFERENCES

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

.1 ASTM C127-15, Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate.

.2 ASTM D698-12ae1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).

.3 ASTM D1557-12e1, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).

.4 ASTM D4253-16, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 DEFINITIONS

.1 Corrected maximum dry density is defined as:

.1 D = (D1xD2) / ((F1 x D2) + (F2 x D1))

.2 Where: D = corrected maximum dry density kg/m^3.

.1 F1 = fraction (decimal) of total field sample passing 19 mm sieve

.2 F2 = fraction (decimal) of total field sample retained on 19 mm sieve (equal to 1.00 - F1)

.3 D1 = maximum dry density, kg/m^3 of material passing 19 mm sieve determined in accordance with Method A of ASTM D 698.

.4 D2 = bulk density, kg/m^3, of material retained on 19 mm sieve, equal to 1000G where G is bulk specific gravity (dry basis) of material when tested to ASTM C 127.

.3 For free draining aggregates, determine D1 (maximum dry density) to ASTM D 4253 dry method when directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED .1 Not Used.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 00.01 - Earthwork - Short Form.

.2 Section 31 05 10 - Corrected Maximum Dry Density for Fill.

.3 Section 31 05 16 - Aggregate Materials.

.4 Section 31 23 33.01 - Excavating Trenching and Backfilling.

1.2 REFERENCES

.1 ASTM International
.1 ASTM D 4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

.2 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit 2 samples.
.2 Provide Departmental Representative with access to source and processed material for sampling.
.3 Supply new or clean sample bags or containers according appropriate to aggregate materials.
.4 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.

.2 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.

.2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
.1 Greatest dimension to exceed 5 times least dimension.

.3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
.1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
.2 Reclaimed asphalt pavement.
.3 Reclaimed concrete material.

.4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
.1 Crushed rock.
.2 Gravel and crushed gravel composed of naturally formed particles of stone.

2.2 SOURCE QUALITY CONTROL

.1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.

.2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.

2.2 SOURCE QUALITY CONTROL (Cont'd)

.3 Advise Departmental Representative 4 weeks minimum in advance of proposed change of material source.

.4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions are acceptable for topsoil stripping.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with topsoil stripping. only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Topsoil stripping:
.1 Do not handle topsoil while in wet or frozen condition or in any manner in which soil structure is adversely affected.
.2 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.
.3 Strip topsoil to depths as indicated as directed by Departmental Representative. Avoid mixing topsoil with subsoil.
.4 Stockpile in locations as directed by Departmental Representative. Stockpile height not to exceed 2 m.
.5 Dispose of topsoil as directed by Departmental Representative.

.2 Aggregate source preparation:
.1 Prior to excavating materials for aggregate production, clear and grub area to be worked, and strip unsuitable surface materials. Dispose of cleared, grubbed and unsuitable materials as directed by Departmental Representative approved by authority having jurisdiction.

3.2 PREPARATION (Cont'd)

.2 Aggregate source preparation:(Cont'd)

.2 Where clearing is required, leave screen of trees between cleared area and roadways as directed.

.3 Clear, grub and strip area ahead of quarrying or excavating operation sufficient to prevent contamination of aggregate by deleterious materials.

.4 When excavation is completed dress sides of excavation to nominal 1.5:1 slope, and provide drains or ditches as required to prevent surface standing water.

.5 Trim off and dress slopes of waste material piles and leave site in neat condition.

.6 Provide silt fence or other means to prevent contamination of existing watercourse or natural wetland features.

.3 Processing:

.1 Process aggregate uniformly using methods that prevent contamination, segregation and degradation.

.2 Blend aggregates, as required, including reclaimed materials that meet physical requirements of specification is permitted in order to satisfy gradation requirements for material and, percentage of crushed particles, or particle shapes specified.

.1 Use methods and equipment approved in writing by Departmental Representative.

.4 When operating in stratified deposits use excavation equipment and methods that produce uniform, homogeneous aggregate gradation.

.5 Where necessary, screen, crush, wash, classify and process aggregates with suitable equipment to meet requirements.

.1 Use only equipment approved in writing by Departmental Representative.

.6 Stockpiling:

.1 Stockpile aggregates on site in locations as indicated unless directed otherwise by Departmental Representative. Do not stockpile on completed pavement surfaces.

.2 Stockpile aggregates in sufficient quantities to meet project schedules.

.3 Stockpiling sites to be level, well drained, and of adequate bearing capacity and stability to support stockpiled materials and handling equipment.

3.2 PREPARATION (Cont'd)

.6 Stockpiling:(Cont'd)

.4 Except where stockpiled on acceptably stabilized areas, provide compacted sand base not less than 300 mm in depth to prevent contamination of aggregate. Stockpile aggregates on ground but do not incorporate bottom 300 mm of pile into Work.

.5 Separate different aggregates by strong, full depth bulkheads, or stockpile far enough apart to prevent intermixing.

.6 Do not use intermixed or contaminated materials. Remove and dispose of rejected materials as directed by Departmental Representative within 48 hours of rejection.

.7 Stockpile materials in uniform layers of thickness as follows:

.1 Maximum 1.5 m for coarse aggregate and base course materials.

.2 Maximum 1.5 m for fine aggregate and sub-base materials.

.3 Maximum 1.5 m for other materials.

.8 Uniformly spot-dump aggregates delivered to stockpile in trucks and build up stockpile as specified.

.9 Do not cone piles or spill material over edges of piles.

.10 Do not use conveying stackers.

.11 During winter operations, prevent ice and snow from becoming mixed into stockpile or in material being removed from stockpile.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.

.3 Leave aggregate stockpile site in tidy, well drained condition, free of standing surface water.

.4 Leave any unused aggregates in neat compact stockpiles as directed by Departmental Representative.

3.3 CLEANING (Cont'd)

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

.6 For temporary or permanent abandonment of aggregate source, restore source to condition meeting requirements of authority having jurisdiction.

.7 Restrict public access to temporary or permanently abandoned stockpiles by means acceptable to Departmental Representative.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 11 13 - Bituminous Dampproofing.

.2 Section 31 05 10 - Corrected Maximum Dry Density.

.3 Section 31 05 16 - Aggregate Materials.

.4 Section 31 00 00.01 - Earthwork - Short Form.

.5 Section 32 92 19.13 - Mechanical Seeding.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM C117-13, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
.2 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM D422-632007e2, Standard Test Method for Particle-Size Analysis of Soils.
.4 ASTM D698-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ^{3}) (600 kN-m/m ^{3}).
.5 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ^{3}) (2,700 kN-m/m ^{3}).
.6 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
.2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

.3 Canadian Standards Association (CSA International)
.1 CAN/CSA-A3000-13, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).
.1 CSA-A3001-13, Cementitious Materials for Use in Concrete.

1.2 REFERENCES (Cont'd)

.3 (Cont'd)
.2 CSA-A23.1-14/A23.2-14, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.4 U.S. Environmental Protection Agency (EPA)/Office of Water
.1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 DEFINITIONS

.1 Unclassified excavation: excavation of deposits of whatever character encountered in Work.

.2 Topsoil:
.1 Material capable of supporting good vegetative growth and suitable for use in top dressing, landscaping and seeding.
.2 Material reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and free from cobbles, stumps, roots, and other objectionable material larger than 25 millimeters in any dimension.

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

.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 D 4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136: Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.
.2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45

.3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Make submittals in accordance with Section 01 33 00.

.2 Preconstruction Submittals:
.1 Submit records of underground utility locates, indicating: location plan of existing utilities as found in field clearance record from utility authority location plan of relocated and abandoned services, as required.

1.5 QUALITY ASSURANCE

.1 Health and Safety Requirements:
.1 Do construction occupational health and safety in accordance with Section 01 35 29.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 20.

1.7 EXISTING CONDITIONS

.1 Buried services:
.1 Before commencing work establish 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 utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
.5 Prior to beginning excavation Work, notify applicable Departmental Representative and authorities having jurisdiction establish location and state of use of buried utilities and structures. Departmental Representative and authorities having jurisdiction to clearly mark such locations to prevent disturbance during Work.
.6 Confirm locations of buried utilities by careful test excavations.
.7 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
.8 Where utility lines or structures exist in area of excavation, obtain direction of Departmental Representative before re-routing.

1.7 EXISTING .1 (Cont'd)

Costs for such Work to be paid by Departmental Representative.

.9 Record location of maintained, re-routed and abandoned underground lines.

.10 Confirm locations of recent excavations adjacent to area of excavation.

.2 Existing buildings and surface features:

.1 Conduct, with Departmental Representative, condition survey of existing buildings, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.

.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.

.3 Where required for excavation, cut roots or branches as directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS .1 Type 1 and Type 2 fill: properties to Section 31 05 16 and the following requirements:

.1 Crushed, pit run or screened stone, gravel or sand.

.2 Gradations to be within limits specified when tested to ASTM C136 and ASTM C117 . Sieve sizes to CAN/CGSB-8.1 CAN/CGSB-8.2.

.3 Table: Sieve % Passing Designation Type 1

Type 2 75 mm - 100 50 mm - - 37.5 mm - - 25 mm 100 - 19 mm 75-100 - 12.5 mm

-

- 9.5 mm 50-100 - 4.75 mm 30-70 22-85 2.00 mm 20-45 - 0.425 mm 10-25 5-30 0.180 mm - - 0.075 mm 3-8 0-10

.2 Type 3 fill: selected material from excavation or other sources, approved by Departmental Representative for use intended, unfrozen and free from rocks larger than 75 mm, cinders, ashes, sods, refuse or other deleterious materials.

PART 3 - EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.2 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 SITE PREPARATION

.1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.

.2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.

3.3 PREPARATION/ PROTECTION

.1 Keep excavations clean, 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.

3.4 STRIPPING OF TOPSOIL

.1 Begin topsoil stripping of areas as indicated after area has been cleared of brush, weeds and grasses and removed from site.

.2 Strip topsoil to depths as indicated.
  .1 Do not mix topsoil with subsoil.

3.4 STRIPPING OF TOPSOIL (Cont'd)

.3 Stockpile in locations as directed by Departmental Representative.
.1 Stockpile height not to exceed 2 m and should be protected from erosion.

.4 Dispose of unused topsoil as directed by Departmental Representative.

3.5 STOCKPILING

.1 Stockpile fill materials in areas designated by Departmental Representative.
.1 Stockpile granular materials in manner to prevent segregation.

.2 Protect fill materials from contamination.

.3 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.6 COFFERDAMS, SHORING, BRACING AND UNDERPINNING

.1 Maintain sides and slopes of excavations in safe condition by appropriate methods and in accordance with Section 01 35 29.
.1 Where conditions are unstable, Departmental Representative to verify and advise methods.

.2 Construct temporary Works to depths, heights and locations as indicated.

.3 During backfill operation:
.1 Unless otherwise indicated or directed by Departmental Representative, remove sheeting and shoring from excavations.
.2 Do not remove bracing until backfilling has reached respective levels of such bracing.
.3 Pull sheeting in increments that will ensure compacted backfill is maintained at elevation at least 500 mm above toe of sheeting.

.4 When sheeting is required to remain in place, cut off tops at elevations as indicated.

.5 Upon completion of substructure construction:
.1 Remove cofferdams, shoring and bracing.
.2 Remove excess materials from site and restore watercourses as indicated and as directed by Departmental Representative.

3.7 DEWATERING AND HEAVE PREVENTION

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

.2 Provide for Departmental Representative review details of proposed dewatering or heave prevention methods, including dikes, well points, and sheet pile cut-offs.

.3 Avoid excavation below groundwater table if quick condition or heave is likely to occur.
.1 Prevent piping or bottom heave of excavations by groundwater lowering, sheet pile cut-offs, or other means.

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

.5 Dispose of water in accordance with Section 01 35 43 to approved runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
.1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.

3.8 EXCAVATION

.1 Excavate to lines, grades, elevations and dimensions as indicated.

.2 Excavation must not interfere with bearing capacity of adjacent foundations.

.3 Do not disturb soil within branch spread of trees or shrubs that are to remain.
.1 If excavating through roots, excavate by hand and cut roots with sharp axe or saw.

.4 For trench excavation, unless otherwise authorized by Departmental Representative in writing, do not excavate more than 30 m of trench in advance of installation operations and do not leave open more than 15 m at end of day's operation.

.5 Keep excavated and stockpiled materials safe distance away from edge of trench as directed by Departmental Representative.

.6 Restrict vehicle operations directly adjacent to open trenches.

3.8 EXCAVATION (Cont'd)

.7 Dispose of surplus and unsuitable excavated material in approved location on site.

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

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

.10 Notify Departmental Representative when bottom of excavation is reached.

.11 Obtain Departmental Representative approval of completed excavation.

.12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed by Departmental Representative.

.13 Correct unauthorized over-excavation as follows:
.1 Fill under bearing surfaces and footings with concrete specified for footings fill concrete Type 2 fill compacted to not less than 100% of corrected Standard Proctor maximum dry density in accordance with Section 31 05 10 - Corrected Maximum Dry Density for Fill.
.2 Fill under other areas with Type 2 fill compacted to not less than 95 % of corrected Standard Proctor maximum dry density in accordance with Section 31 05 10.

.14 Hand trim, make firm and remove loose material and debris from excavations.
.1 Where material at bottom of excavation is disturbed, compact foundation soil to density at least equal to undisturbed soil.
.2 Clean out rock seams and fill with concrete mortar or grout to approval of Departmental Representative.

3.9 FILL TYPES AND COMPACTION

.1 Use types of fill as indicated or specified below. Compaction densities are percentages of maximum densities obtained from ASTM D698in accordance with Section 31 05 10.
.1 Exterior side of perimeter walls: use Type 3 fill to subgrade level. Compact to 95% of corrected maximum dry density.

3.10 BEDDING AND SURROUND OF UNDERGROUND SERVICES

.1 Place bedding and surround material in unfrozen condition.

3.11 BACKFILLING

.1 Do not proceed with backfilling operations until completion of following:
.1 Departmental Representative has inspected and approved installations.
.2 Departmental Representative has inspected and approved of construction below finish grade.
.3 Inspection, testing, approval, and recording location of underground utilities.
.4 Removal of concrete formwork.
.5 Removal of shoring and bracing; backfilling of voids with satisfactory soil material.

.2 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.

.3 Do not use backfill material which is frozen or contains ice, snow or debris.

.4 Place backfill material in uniform layers not exceeding 150 mm compacted thickness up to grades indicated. Compact each layer before placing succeeding layer.

.5 Backfilling around installations:
.1 Place bedding and surround material as specified elsewhere.

.6 Install drainage system in backfill as indicated.

3.12 RESTORATION

.1 Upon completion of Work, remove waste materials and debris in accordance to Section 01 74 21, trim slopes, and correct defects as directed by Departmental Representative.

.2 Replace topsoil as indicated.

.3 Reinstate lawns to elevation which existed before excavation.

.4 Reinstate pavements and sidewalks disturbed by excavation to thickness, structure and elevation which existed before excavation.

3.12 RESTORATION (Cont'd)

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

.6 Use temporary plating to support traffic loads over unshrinkable fill for initial 24 hours.

.7 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.

END

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 31 00 00.01 - Earthwork - Short Form.

.2 Section 31 23 33.01 - Excavating, Trenching and Backfilling.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for seed, and fertilizer.
.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29 and 01 35 43.

.3 Samples:
.1 Submit 0.5 kg container of each type of fertilizer used.

.4 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:
.1 Labelled bags of fertilizer identifying mass in kg, mix components and percentages, date of bagging, supplier's name and lot number.
.2 Fertilizer must be dry.

.2 Storage and Handling Requirements:
.1 Store fertilizer in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

1.4 DELIVERY, STORAGE AND HANDLING (Cont'd)

.2 Storage and Handling Requirements:(Cont'd)
.2 Replace defective or damaged materials with new.

.3 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with Section 01 74 20.

1.5 WARRANTY

.1 For seeding, 12 months warranty period is extended to 1 full growing season.

.2 Contractor hereby warrants that seeding will remain free of defects in accordance with General Conditions CCDC GC 12.3, but for 1 full growing season.

.3 End-of-warranty inspection will be conducted by Departmental Representative.

PART 2 - PRODUCTS

2.1 GRASS SEED

.1 Canada "Certified" seed, "Canada No. 1 Lawn Grass Mixture" in accordance with Government of Canada "Seeds Act" and "Seeds Regulations".

.2 In packages individually labelled in accordance with "Seeds Regulations" and indicating name of supplier.

2.2 WATER

.1 Free of impurities that would inhibit germination and growth.

.2 Supplied by Departmental Representative at designated source.

.3 Water for required irrigation will be supplied via hydrant or hose bib.

2.3 FERTILIZER

.1 To Canada "Fertilizers Act" and Regulations.

.2 Complete synthetic fertilizer with guaranteed minimum analysis as specified.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts are acceptable for mechanical seeding installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 SEED BED PREPARATION

.1 Do not perform work under adverse field conditions as determined by Departmental Representative.

.2 Remove and dispose of weeds; debris; stones 50 mm in diameter and larger; soil contaminated by oil, gasoline and other deleterious materials; in location as directed by Departmental Representative in accordance with Section 01 74 20.

.3 Verify that grades are correct. If discrepancies occur, notify Departmental Representative and commence work when instructed by Departmental Representative.

.4 Fine grade surface free of humps and hollows to smooth, even grade, to contours and elevations indicated to tolerance of plus or minus 15 mm, surface draining naturally.

.5 Cultivate fine graded surface approved by Departmental Representative to 25 mm depth immediately prior to seeding.

3.3 SEED PLACEMENT

.1 Ensure seed is placed under supervision of certified Landscape Planting Supervisor.

3.3 SEED PLACEMENT (Cont'd)

.2 For manual seeding:
.1 Use manually operated drop seeder ("Cyclone" type or equivalent).
.2 Use manually operated, water ballast, landscaping type, smooth steel drum roller. Ballast as directed by Departmental Representative.
.3 Use equipment and method acceptable to Departmental Representative.

.3 On cultivated surfaces, sow seed uniformly at rate of:
.1 0.03 kg/m^2 lawn grass mixture.

.4 Blend applications 150 mm into adjacent grass areas to form uniform surfaces.

.5 Sow half of required amount of seed in one direction and remainder at right angles as applicable.

.6 Incorporate seed by light raking in cross directions.

.7 Consolidate mechanically seeded areas by rolling area if soil conditions warrant or if directed by Departmental Representative with equipment approved by Departmental Representative immediately after seeding.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11.
.1 Leave Work area clean at end of each day.
.2 Keep pavement and area adjacent to site clean and free from mud, dirt, and debris at all times.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11.
.1 Clean and reinstate areas affected by Work.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 CLEANING (Cont'd)

.3 Waste Management:(Cont'd)
.2 Divert unused fertilizer from landfill to official hazardous material collections site approved by Departmental Representative.

3.5 PROTECTION

.1 Erect plastic snow fence around newly seeded areas sufficient to protect against deterioration due to pedestrian or other traffic.

3.6 FERTILIZING PROGRAM

.1 Fertilize at rate of 0.3 kg per hectare during establishment and warranty periods to following program:

3.7 MAINTENANCE DURING ESTABLISHMENT PERIOD

.1 Ensure maintenance is curried out under supervision of certified Landscape Maintenance Supervisor.

.2 Perform following operations from time of seed application until acceptance by Departmental Representative:
.1 Water seeded area to maintain optimum soil moisture level for germination and continued growth of grass. Control watering to prevent washouts.
.2 Repair and reseed dead or bare spots to allow establishment of seed prior to acceptance.
.3 Cut grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother grass as directed by Departmental Representative.
.4 Fertilize seeded areas after first cutting in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
.5 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.
.6 Adjust protection barrier as necessary to protect against deterioration due to pedestrian or other traffic as needed.

3.8 FINAL ACCEPTANCE

.1 Seeded areas will be accepted by Departmental Representative provided that:
.1 Areas are uniformly established free of rutted, eroded, bare or dead spots and extent of weeds apparent in grass is acceptable.
.2 Areas have been cut at least twice.
.3 Areas have been fertilized.

.2 Areas seeded in fall will be accepted in following spring, one month after start of growing season provided acceptance conditions are fulfilled.

3.9 MAINTENANCE DURING WARRANTY PERIOD

.1 Perform following operations from time of acceptance until end of warranty period.
.1 Water seeded area to maintain optimum soil moisture level for continued growth of grass. Control watering to prevent washouts.
.2 Repair and reseed dead or bare spots to satisfaction of Departmental Representative.
.3 Cut grass to 50 mm whenever it reaches height of 70 mm. Remove clippings which will smother grass as directed by Departmental Representative.
.4 Fertilize seeded areas in accordance with fertilizing program. Spread half of required amount of fertilizer in one direction and remainder at right angles and water in well.
.5 Control weeds by mechanical or chemical means utilizing acceptable integrated pest management practices.

END

END

DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS SURVEY

MISSISSAGI STRAIT LIGHTSTATION MANITOULIN ISLAND, ON

PWGSC project n° R.079578.001
WSP project n° 151-12211-00

Prepared for:
Public Works and Government Services Canada on behalf of Department of Fisheries and Oceans

Date: March 1, 2016

Prepared by:

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March 1, 2016

Ms. Maegan Harrison
Senior Environmental Specialist
Environmental Services
Public Works & Government Services Canada
4900 Yonge Street, 11th Floor
Toronto, Ontario M2N 6A6

Subject: Report for the Designated Substances and Hazardous Materials Survey (DSHMS) for the Mississagi Strait Lightstation on Manitoulin Island, ON

Dear Ms. Harrison,

This report documents relevant background information, methodologies utilized, work undertaken and the findings of the Designated Substances and Hazardous Materials Survey (DSHMS) of the buildings and structures at the Mississagi Strait Lightstation, on the western tip of Manitoulin Island, ON, conducted by WSP in November 2015.

Please do not hesitate to contact the undersigned if you have any questions.

Yours truly,

WSP Canada Inc.

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EXECUTIVE SUMMARY

WSP Canada Inc. was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans (DFO) to conduct a Designated Substances and Hazardous Materials Survey (DSHMS) of the buildings and structures (the subject buildings) at the Mississagi Strait Lightstation (the subject property) located on the western tip of Manitoulin Island, Ontario.

The objectives of this survey were as follows:

- To identify Designated Substances and/or hazardous materials that may be present in the buildings and structures on the subject property;
- To prepare a report documenting the identities, usages and locations of any Designated Substances and hazardous materials identified at the subject property; and,
- To provide PWGSC and DFO with applicable management considerations in support of the maintenance and possible repairs of the buildings and structures, and potential divestiture of the property.

The survey was conducted by WSP on November 25, 2015. The primary findings of this survey are summarized below:

SUBSTANCE/ MATERIAL	SURVEY FINDINGS
Asbestos	Bulk samples were collected from suspected asbestos-containing materials observed during the survey. Independent laboratory analysis of the bulk samples collected identified or confirmed the following materials and components as asbestos-containing materials (ACM): → Vinyl Floor Tiles → Transite Cement Panels → Mechanical Insulation ("Air-Cell")
Lead	Bulk paint samples were collected from each distinct colour of paint observed at the subject property and submitted for analysis of lead content. A number of the paints observed/sampled were identified as "lead-containing" paints in accordance with the federal *Hazardous Products Act* (*Surface Coating Materials Regulation*). Twenty-seven (27) of the sampled paints at the subject property were confirmed to have lead concentrations greater than 90ppm. Also, lead-containing solder on pipe joints is suspected to be present throughout the subject buildings, on piping and plumbing fixtures.
Silica	Building/construction materials known to contain silica such as glass, concrete, masonry, stone and mortar were observed at the property.
Mercury	Liquid mercury-containing thermostats were observed within the subject buildings. Potential impacts from the historic widespread use of mercury within lighthouse's and lighthouse lanterns in general were also considered during this assessment. Analytical results indicate a trace amount of mercury on various surfaces within the lighthouse.
PCBs	Polychlorinated Biphenyls (PCBs) may be present within the pole-mounted transformer located in the centre of the subject property.

SUBSTANCE/ MATERIAL	SURVEY FINDINGS
ODS	Refrigerants within the refrigerators, air conditioning units and fire extinguishers in the subject building may contain ozone-depleting substances (ODS). At least four (4) refrigerator units were observed at the time of the survey.
Mould	Water damaged and/or mould-contaminated building materials were observed within the subject buildings at the time of the survey, particularly within the Assistant Lighthouse Keeper's Dwelling.
Benzene	Benzene is likely a component of the Diesel and Fuel Oil which was historically used on the subject property. An empty concrete tank nest was observed adjacent to the Fog Alarm Building, indicating that fuel storage tanks had previously been removed from the property. In addition, small fuel jugs and canisters were observed within storage sheds at the time of the survey.
Other (Designated Substances & Materials)	No other Designated Substances or Hazardous Materials were observed or identified during the survey.

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1 INTRODUCTION

1.1 SITE DESCRIPTION

WSP Canada Inc. was retained by Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans (DFO) to conduct a Designated Substances and Hazardous Materials Survey (DSHMS) of the buildings and structures (the subject buildings) at the Mississagi Strait Lightstation (the subject property) located on the western tip of Manitoulin Island, Ontario.

The subject property is located at the western end of Manitoulin Island, which is along the north shore of Lake Huron in Ontario. The municipal address is generally given as Meldrum Bay, although the site is located approximately 12 km by road to the west of Meldrum Bay. The area of the property is 878,160 square metres (87.8160 hectares).

Table 1 List of Surveyed Buildings at the Subject Property

BUILDING NAME	DESCRIPTION
Mississagi Strait Lighthouse and Dwelling	The light tower and attached dwelling were built in 1873. The light tower is a tapered low-height tower appended to a one-storey gale-roofed dwelling. Alterations include the removal of early attached sheds, changing the lantern and rebuilding the platform. The building is currently a museum and is no longer used as an aid to navigation.
Fog Alarm Building (Restaurant)	The Fog Alarm Building is a large two storey rectangular structure with a storage garage located back. It is located in the southern portion of the property.
Assistant Lighthouse Keeper's Dwelling (Cottage)	The Assistant Lighthouse Keeper's Dwelling is a single-storey structure with a basement. It is located in the northeast portion of the property.
Storage Shed (Antique Barn)	The Storage Shed is a single-storey wooden structure. It is located in the central portion of the property.
Garage (Wood Shed)	The Garage is a single-storey wooden structure. It is located in the southeast portion of the property.
Kerosene Shed	The Kerosene Shed is a single-storey wooden structure. It is located in the northern portion of the property.
Generator Shed	The Generator Shed is a single-storey wooden structure. It is located in the central portion of the property.
Outhouse	The Outhouse is single-storey wooden structure. It is located in the eastern portion of the property.

1.2 SURVEY OBJECTIVES

This survey was requested in order to satisfy a building owner's requirements under Section 30 of the *Ontario Occupational Health & Safety Act (OHSA)* which requires building owners to determine if there are any Designated Substances present, prior to commencement of a project, which may involve construction or demolition related activities. This information allows workers to take appropriate steps to prevent accidental exposure to these harmful substances.

The DSHMS was completed in advance of proposed repairs to the subject buildings, and its objectives included the following:

- To identify Designated Substances and/or hazardous materials that may be present in the buildings and structures on the subject property;
- To prepare a report documenting the identities, usages and locations of any Designated Substances and hazardous materials identified at the subject property; and,
- To provide PWGSC and DFO with applicable management considerations in support of the maintenance and possible repairs of the buildings and structures, and potential divestiture of the property.

1.3 SCOPE OF WORK

The scope of work and the areas and components inspected as part of this project were completed in accordance with PWGSC's Statement of Work for this project dated October 2015.

WSP's scope of work for this project included a thorough and intrusive, but not destructive, DSHMS survey of subject buildings, which consisted of:

- A review of existing environmental reports (i.e. those pertaining to asbestos, Designated Substances and Hazardous Materials) and other relevant site specific information which were provided by the PWGSC Project Manager;
- A thorough visual inspection of the Subject Buildings and structures for Designated Substances and Hazardous Materials;
- Collection of bulk samples of materials suspected to contain asbestos according to the requirements stipulated in *O. Reg. 278/05*;
- Collection of a representative number of bulk paint samples by scraping the paint down to the base structure in order to determine the lead concentration in all paint layers present;
- Visually-evident sources of mercury being inventoried (e.g. thermostats);
- Suspected or visually obvious signs of mould being recorded and quantified;
- Other hazardous materials, including equipment containing ODS, fuel, oil and/or waste oil storage, chemical storage, UFFI and/or radioactive materials being inventoried by recording name plate/label information and quantities, where they were observed.

1.4 REGULATORY CONTEXT

Since the subject property is considered a federal site, the Canada Labour Code applies, in addition to the standards set by provincial and federal regulations.

1.4.1 DESIGNATED SUBSTANCES

Section 30 of the *Occupational Health and Safety Act* (the Act) stipulates that prior to the commencement of a project a list shall be prepared of all Designated Substances that are present at the project site (i.e. a Designated Substances survey). In accordance with the Act, the locations of Designated Substances must be identified in writing to all prospective constructors, contractors and sub-contractors who may work, disturb or come into contact with this type of material, at the same time as, or prior to, project tendering.

The term "Designated Substance" refers to the eleven chemical or physical agents specifically identified within the Act. Each of these substances is governed by a consolidated regulation, *Designated Substances - Ontario Regulation 490/09* (*O. Reg. 490/09*) that defines the minimum health and safety requirements for assuring safe worker-substance interaction as well as the obligations of employers and workers in workplaces containing these substances. *O. Reg. 490/09* further stipulates the maximum concentrations of each of the respective substance to which a worker may be exposed, according to short-term exposure values and time-weighted average exposure values.

The following Table lists the eleven chemical/physical agents identified in the Act as well as their respective regulations and corresponding amendments.

Table 2 Ontario Occupational Health & Safety Regulations for Designated Substances

DESIGNATED SUBSTANCE	APPLICABLE REGULATION	MOST RECENT AMENDMENT
Acrylonitrile	O. Reg. 490/09	O. Reg. 148/12
Arsenic	O. Reg. 490/09	O. Reg. 148/12
Asbestos	O. Reg. 490/09	O. Reg. 148/12
Asbestos *(on Construction Projects and in Buildings and Repair Operations)*	O. Reg. 278/05	O. Reg. 479/10
Benzene	O. Reg. 490/09	O. Reg. 148/12
Coke Oven Emissions	O. Reg. 490/09	O. Reg. 148/12
Ethylene Oxide	O. Reg. 490/09	O. Reg. 148/12
Isocyanates	O. Reg. 490/09	O. Reg. 148/12
Lead	O. Reg. 490/09	O. Reg. 148/12
Mercury	O. Reg. 490/09	O. Reg. 148/12
Silica	O. Reg. 490/09	O. Reg. 148/12
Vinyl Chloride	O. Reg. 490/09	O. Reg. 148/12

1.4.2 ADDITIONAL REGULATORY REQUIREMENTS FOR ASBESTOS

Among the Designated Substances, asbestos is unique in that it is governed by two regulations under the Act - one for the general mining and processing operations of asbestos and one for asbestos on construction projects and in buildings and repair operations.

Ontario Regulation 278/05 (O. Reg. 278/05), made under the Act, entitled "Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations" came into effect on November 1st, 2005, with some sections contained therein becoming effective on November 1st, 2007. This regulation revoked and replaced the previous asbestos regulation, *O. Reg. 838/90*.

O. Reg. 278/05 introduced significant changes to how asbestos management is regulated in Ontario. Many of the regulatory changes adopted by *O. Reg. 278/05* were already in wide use in industry as part of best management practices. Noteworthy regulatory changes included modifications to

asbestos survey requirements, the management of asbestos on-site, abatement operations and procedures (i.e. Type 1, 2 and 3), the use of personal protective equipment (PPE) and air monitoring requirements.

1.4.3 ADDITIONAL REGULATORY REQUIREMENTS FOR LEAD

In April 2005, the Federal *Surface Coating Materials Regulation (SOR/2005-109)* limited the allowable concentration of total lead present in a surface coating material (with some exceptions) to 600 mg/kg (600 ppm).

In December 2010, the Federal Government lowered the total lead limit in surface coating materials from 600 mg/kg to 90 mg/kg under subsections 4(1) and 5(1) and section 8 of the *Surface Coatings Materials Regulations (SOR/2005-109)*. The lowering of this limit aligns Canada with the United States in respect of total lead levels in surface coating materials and certain products with surface coating materials applied to them.

Therefore using this revised threshold limit, surface coating materials with lead concentrations that exceed 90 ppm (0.009% by weight) are considered to be lead-containing according to the *Surface Coatings Materials Regulations*.

In the absence of specific regulatory limits or guidance for total lead concentrations allowable in existing paint applications in buildings, and for the purposes of worker protection, WSP considers paints with lead concentrations that are equal to, or exceed, 90 ppm as “lead-containing”. WSP further recommends that appropriate lead exposure precautions, in accordance with the Ministry of Labour guidelines, be implemented prior to the disturbance of these materials.

1.4.4 ADDITIONAL REGULATORY REQUIREMENTS FOR WASTE MANAGEMENT

The disposal of Designated Substances is regulated under the Ontario *Environmental Protection Act*, specifically *R.R.O. 1990, Regulation 347*, *General – Waste Management* (most recently amended by *O. Reg. 334/13*). The regulation details the minimum requirements for the appropriate transport and disposal of wastes.

In addition to the EPA waste management requirements, the *Canada Wide Standards on Fluorescent Lamps Containing Mercury* requires that quantities of fluorescent light tubes destined for waste in excess of 25 tubes are to be considered hazardous waste and thus must be disposed of in a manner that is compliant with *Regulation 347*.

1.4.5 CANADA LABOUR CODE

In addition to the regulatory requirements established by the provincial and federal regulations mentioned above, since the subject property is considered a federal site, and will be accessed by federal employees, the *Canada Labour Code (Part II)* (the Code) also applies. The Code governs the health and safety of employees working in federally-regulated industries and organizations which includes the federal government and crown corporations. Similar to the *Occupational Health and Safety Act* the Code establishes responsibilities and requirements of employers, managers and supervisors who act on behalf of the employer and employees, in order to maintain safe workplaces and working environments.

2 METHODOLOGY

2.1 GENERAL SURVEY METHODOLOGY

WSP's survey sought to identify those substances defined as Designated Substances under the *Ontario Occupational Health and Safety Act* including: **asbestos** (friable and non-friable), **lead**, **mercury**, **silica**, **benzene**, **acrylonitrile**, **arsenic**, **coke oven emissions**, **ethylene oxide**, **isocyanates**, and **vinyl chloride**. In addition, other hazardous materials, such as PCBs, ozone-depleting substances (ODS), urea-formaldehyde foam insulation (UFFI) and other stored chemicals and wastes were included in the survey scope.

WSP's surveyors performed a systematic survey of the subject buildings and structures for the purposes of identifying Designated Substances and hazardous materials and documenting observations made about their locations, estimated quantities and respective conditions. These observations form the basis for developing the recommendations provided within this report.

Survey procedures specific to asbestos and lead are documented in the following sections of this report.

2.2 ASBESTOS SURVEY METHODOLOGY

The surveyors inspected the subject buildings and structures for the presence of friable and non-friable asbestos-containing materials (ACM). Examples of ACM commonly found in buildings include:

- Sprayed insulation
- Acoustic/texture plaster
- Drywall joint compound
- Mechanical insulation
- Asbestos cement
- Piping
- Acoustic ceiling tiles
- Vinyl floor tiles and vinyl sheet flooring
- Plaster

It should be noted that not all the above listed materials were necessarily observed during this survey.

Bulk samples were collected from suspect materials (i.e. materials known as having the potential to be asbestos-containing) and analyzed to identify or confirm the presence/absence of asbestos.

The number of bulk samples required, in order to establish whether a material is asbestos-containing according *O. Reg. 278/05,* is summarized in the following Table.

A homogeneous sampling area is defined by the US EPA as containing material that is uniform in texture and appearance, was installed at one time and is unlikely to consist of more than one type or formulation of material.

Table 3 Minimum Number of Bulk Samples to be Collected Under O. Reg. 278/05 According to Material Area, Application and Friability

TYPE OF MATERIAL	SIZE OF HOMOGENEOUS MATERIAL	MINIMUM NUMBER OF BULK SAMPLES
Surfacing material, including without limitation material that is applied to surfaces by spraying, by trowelling or otherwise, such as acoustical plaster on ceilings, fireproofing materials on structural members and plaster	Less than $90m^2$	3
	$90m^2$ or more, but less than $450m^2$	5
	$450m^2$ or more	7
Thermal insulation, except as described below	Any size	3
Thermal insulation patch	Less than 2m or $0.5m^2$	1
Other material	Any size	3

Samples were collected from discrete locations with every attempt to minimize damage. The following procedures for collection of samples were followed:

- The surface of the material was wetted with amended water using a spray bottle. In situations where the material could not be wetted, a plastic bag or other containment device was placed around the sampling device.
- A sample was obtained by one of two methods:
  - A sampling device was slowly pushed into the material with a twisting motion until the entire thickness was penetrated, followed by extraction of the sampling device, or;
  - A knife was cleaned and then used to excise a piece of the material.
- Each sample was placed in a clear bag with a tight closure, labelled appropriately and placed in a second, similar bag. Debris was cleaned with wet paper towels and discarded into a plastic bag.
- Damage to the material sampled was repaired with duct tape and/or filler material as needed.
- A chain of custody form was completed for all samples collected on-site and accompanied samples in transit.

The bulk samples collected were then submitted to an accredited, independent laboratory for analysis (accompanied by a chain of custody form) of asbestos content via US EPA Method *EPA/600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials* in accordance with the requirements of *O. Reg. 278/05*.

2.3 LEAD SURVEY METHODOLOGY

Bulk paint samples (paint chips) were collected from each distinct colour of paint observed within the subject buildings and structures. Samples were collected with the aid of a thin-bladed knife, which was cleaned prior to each sampling event. WSP's surveyors selected sample locations where it

appeared that the paint application was most representative of all areas on which it was applied. Each paint chip sample was placed in a clear bag with a tight closure, uniquely labelled and then placed in a second, similar bag. A chain of custody form was completed and accompanied the bulk samples to an accredited, independent laboratory for analysis of lead content. Lead analysis was performed following ASTM Method, ASTM D3335-85A "*Standard Method to Test for Low Concentrations of Lead in Paint by Atomic Absorption Spectrophotometry*".

2.4 SILICA

The surveyors inspected the subject buildings for the presence of materials known to contain silica. Silica is present in materials such as glass, concrete, masonry, stone and mortar which are prevalent materials in building construction.

2.5 MERCURY

The surveyors inspected the subject buildings for equipment which is likely to contain mercury. Pertinent information of the suspected equipment including: manufacturer, dates, model and serial numbers, and quantities were recorded when available.

The possible impacts from the historic and widespread use of mercury within lighthouses were also investigated as part of this survey. Potential mercury impacts within the subject buildings were measured by obtaining surface wipes from various surfaces and submitting them for mercury concentration analysis. A thorough visual inspection was also conducted within the lighthouse in order to determine whether or not mercury may have had any physical impacts on the interior structure and/or building materials.

2.6 POLYCHLORINATED BIPHENYLS (PCB)

The surveyors inspected the subject buildings for equipment which may contain PCBs. Equipment that is generally suspected of containing PCBs includes lamp ballasts, transformers, hydraulic fluid, compressors, switchgears, capacitors and other electric equipment. Pertinent information of the suspected equipment including: manufacturer, dates, model and serial numbers, and quantities were recorded when available

2.7 OZONE-DEPLETING SUBSTANCES (ODS)

The surveyors inspected the subject buildings for equipment which may contain ODS. Information on the type of equipment, manufacturer, type and quantity of refrigerants used was recorded, where available. Pertinent information of the suspected equipment including: manufacturer, dates, model and serial numbers, and quantities were recorded when available

2.8 MOULD

The surveyors inspected the subject buildings for the presence of mould. This included a non-intrusive visual assessment of exterior and interior building material surfaces and components for evidence of obvious visible mould, and/or areas demonstrating significant moisture and water damage.

3 OBSERVATIONS AND RESULTS

Relevant site photographs taken during the survey are presented in **Appendix A** of this report. Laboratory Certificates of Analysis are provided in **Appendix B**.

It should be noted that asbestos-containing materials (ACM), Designated Substances or hazardous materials may be concealed by existing building finishes, components or fixtures. If demolition or construction activities uncover materials suspected to contain asbestos, lead, other Designated Substances or hazardous materials, all work must stop prior to the disturbance of these materials, and the suspect materials should either be sampled by a qualified person, or presumed to contain the suspected substance. Whether the suspect material(s) are confirmed, or presumed, to contain these substances, they must be handled and disposed of in accordance with the appropriate and applicable guidelines and regulations including, but not limited to: *O. Reg. 278/05*, *O. Reg. 490/09* and *R.R.O. 1990, Regulation 347 (*as amended).

3.1 DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

3.1.1 ASBESTOS-CONTAINING MATERIALS

In accordance with the requirements of *O. Reg. 278/05*, homogenous materials (i.e. materials uniform in color and texture) must be considered to be asbestos-containing, if any sample which is collected from that homogeneous material, is identified to have an asbestos concentration of 0.5% or greater, by weight.

A total of ninety-four (94) bulk material samples were collected from suspected asbestos-containing materials observed in the subject buildings. The table below summarizes only those materials which were subsequently identified or presumed to be asbestos-containing materials and are presented along with recommended remedial actions for each respective material.

Recommended actions for management, repair or removal of these materials, are based on the requirements and procedures specified by *O. Reg. 278/05* and have been suggested based on the type of disturbance which is anticipated or likely. Alternate handling, repair and removal procedures must comply with the requirements of *O. Reg. 278/05* (as amended).

Table 4 Asbestos-Containing Materials

Material	Location/ Description	Assessment[1]	Action[2]	Photo[3]
Vinyl Floor Tile	**Lighthouse Dwelling** 9”x9” Pink Vinyl Floor Tile Approximately 120 square feet (13 square metres) of VFT-4 (9”x9”; pink) located in	- ***Sample ID***: LHD-VFT-04A - ***Concentration***: *2% Chrysotile* - ***Material:*** Non-Friable - ***Accessibility***: A *(Areas of the building within reach, from ground level, of all building users. Activities of the building*	**Action 7** **Surveillance of ACM in good condition (when practicable)** Prior to the disturbance or removal of this material, follow **Type 1** abatement procedures – if the material is wetted and the work is done using non-powered hand	4

Material	Location/ Description	Assessment[1]	Action[2]	Photo[3]
	the first floor bedroom area.	*users may result in disturbance of ACM.)* - ***Condition***: Good/Fair	tools. Follow **Type 3** abatement procedures if removed via power tools.	
"Air-Cell" Mechanical Insulation	**Fog Alarm Building** Remnant "Air-cell" debris within the attic space Observed in a large pile (50 square feet) of debris loose on the floor of the attic space, as well a number of loose pieces throughout the attic space.	- ***Sample ID***: FAB-AIR-12A - ***Concentration***: *20% Chrysotile* - ***Material:*** Friable - ***Accessibility***: B - *(Frequently-entered maintenance areas within reach of maintenance staff, without the need for a ladder.)* - ***Condition***: Poor	**Action 2** **Type 2 Precautions for Entry into Areas with ACM DEBRIS** Remove this material and clean area following: ***Type 3*** abatement procedures.	5 & 6
Transite Cement Panels	**Assistant Lighthouse Keeper's Dwelling** Grey cement siding panels on exterior walls. Approximately 1,500 square feet (160 square metres) of Transite cement material.	- ***Sample ID***: ALKD-TRANS-17A - ***Concentration***: *10% Chrysotile* - ***Material:*** Non-Friable - ***Accessibility***: A *(Areas of the building within reach, from ground level, of all building users. Activities of the building users may result in disturbance of ACM.)* - ***Condition***: Good	**Action 7** **Surveillance of ACM in good condition (when practicable)** Prior to the disturbance or removal of this material, follow **Type 1** abatement procedures – if the material is wetted and the work is done using non-powered hand tools. Follow **Type 3** abatement procedures if removed via power tools.	7 & 8

1. For sample ID and concentration levels refer to **Appendix B** – Laboratory Certificates of Analysis.
2. Actions recommended are in accordance with *O. Reg. 278/05*. Refer to **Appendix C** for Action definitions. Refer to *O. Reg. 278/05* for Type 1, 2 & 3 procedures.
3. For photographs taken during the survey refer to **Appendix A** – Project Photographs.

3.1.2 SUMMARY OF BULK SAMPLES IDENTIFIED AS "NON-ASBESTOS"

The table below summarizes the results of bulk material samples collected from suspect materials, which had either no detectable concentrations of asbestos, or had asbestos concentrations less than the regulated threshold limit of 0.5% (by weight), and therefore can be considered as "non-asbestos" in accordance with *O. Reg. 278/05*.

Table 5 Summary of Bulk Samples Identified as "Non-Asbestos"

Building	Material	Description	Sample ID[1]
Generator Shed	Window Caulking	White/black/tan, windows throughout	GS-CLK-01A to C*
Lighthouse Dwelling	Tar Paper	Black, beneath exterior siding	LHD-TP-02A to C
	Vinyl Floor Tile	12"x12" white, in kitchen	LHD-VFT-03A to C
	Mastic Adhesive	Associated with 12"x12" white vinyl floor tile	LHD-VFT-03A to C (layer)
	Mastic Adhesive	Associated with 9"x9" pink vinyl floor tile	LHD-VFT-04A to C (layer)
	Drywall Joint Compound	Walls/ceilings throughout	LHD-DWJ-05A to G
	Window Caulking	White, windows throughout	LHD-CLK-06A to C
	Plaster	Walls/ceilings in bathroom & bedroom	LHD-PLAS-07A to G
	Mastic Adhesive	Associated with vinyl floor tile (VFT4)	LHD-VFT-08A to C
	Drywall Joint Compound	Patch in bathroom	LHD-DWJC-09A to E
	Mortar	At pipe penetration (1st Floor)	LHD-MTR-10A to G
	Roof Shingle	Black	LHD-SHINGLE-11A to C
Fog Alarm Building	Tar Paper	Walls	FAB-TAR-13A to C
	Drywall Joint Compound	Walls/ceilings throughout	FAB-DWJC-14A to G
	Vinyl Sheet Flooring	Brick pattern	FAB-VFS-15A to C
	Mastic Adhesive	Associated with vinyl sheet flooring	FAB-VFS-15A to C (layer)
	Window Caulking	White/grey, windows throughout	FAB-CLK-16A to C
	Vinyl Sheet Flooring	Beneath brick pattern vinyl sheet flooring	FAB-VFS2-17A to C
	Mastic Adhesive	Associated with vinyl sheet flooring	FAB-VFS2-17A to C (layer)
Assistant Lighthouse Keeper's Dwelling	Tar Paper	Black, beneath exterior siding	ALKD-TAR-18A to C
	Drywall Joint Compound	Walls/ceilings throughout	ALKD-DWJC-19A to G
	Window Caulking	Tan/white/grey, windows throughout	ALKD-CLK-20A to C*
	Vinyl Sheet Flooring	Bathroom	ALKD-VFS-21A to C
	Mastic Adhesive	Associated with vinyl sheet flooring	ALKD-VFS-21A to C (layer)
Kerosene Shed	Tar Paper	Black, beneath exterior siding	KS-TP-22A to C
	Roof Shingle	Black	KS-SHINGLE-23A to C

1. For sample IDs and associated concentrations refer to **Appendix B** – Laboratory Certificates of Analysis.
* Indicates sample contains trace amounts of asbestos (i.e. <0.5%), but is considered "non-asbestos" according to *O. Reg. 278/05*.

3.1.3 SUMMARY OF LEAD CONCENTRATIONS IN BULK PAINT SAMPLES

A total of twenty-eight (28) bulk paint (paint chip) samples were collected from distinct paint colours/applications observed within the subject areas. Paint and surface coating applications with lead concentrations greater than or equal to 90 ppm (0.009%) by weight are being considered "lead-containing" based on the Federal *Surface Coating Materials Regulation (SOR/2005-109)*.

The table below summarizes the results of laboratory analyses for the bulk paint and surface coating samples collected during the survey.

Table 6 Summary of Lead Concentrations in Bulk Paint Samples

Building	Material	Location	Assessment[1]	Action[2]
Generator Shed	White Paint	Exterior of all buildings	- ***Sample ID***: GS-Pb-01 - ***Concentration***: *15,000 ppm* - ***Condition***: Poor	See Below
	Brown Paint	Trim	- ***Sample ID***: GS-Pb-02 - ***Concentration***: *56,000 ppm* - ***Condition***: Good	
	Red Paint	Exterior	- ***Sample ID***: GS-Pb-03 - ***Concentration***: *170,000 ppm* - ***Condition***: Good	
	Grey Paint	Door	- ***Sample ID***: GS-Pb-04 - ***Concentration***: *38,000 ppm* - ***Condition***: Good	
	Blue Paint	Interior, Ceiling	- ***Sample ID***: GS-Pb-05 - ***Concentration***: *140 ppm* - ***Condition***: Good	
Lighthouse Dwelling	White Paint	Interior	- ***Sample ID***: LHD-Pb-06 - ***Concentration***: *57,000 ppm* - ***Condition***: Good/Fair	
	Teal Paint	Interior	- ***Sample ID***: LHD-Pb-07 - ***Concentration***: *49,000 ppm* - ***Condition***: Good	
	Grey Paint	Interior	- ***Sample ID***: LHD-Pb-08 - ***Concentration***: *25,000 ppm* - ***Condition***: Good/Fair	
	Dark Green Paint	Interior, Undercoat on Walls	- ***Sample ID***: LHD-Pb-09 - ***Concentration***: *68,000 ppm* - ***Condition***: Good	
	Red Paint	Turret	- ***Sample ID***: LHD-Pb-10 - ***Concentration***: *120,000 ppm* - ***Condition***: Poor	
	White Paint	Turret	- ***Sample ID***: LHD-Pb-11 - ***Concentration***: *99,000 ppm* - ***Condition***: Poor	

Building	Material	Location	Assessment[1]	Action[2]
	Pink Paint	Interior, Bathroom & Bedroom Walls	- ***Sample ID***: LHD-Pb-12 - ***Concentration***: *3,800 ppm* - ***Condition***: Good/Fair	Institute routine surveillance of the paint. It is recommended that areas of lead-containing paints observed to be in fair condition (minor cracking/chipping/flaking), be encapsulated with a fresh coat of paint in order to reduce the likelihood of inhalation, ingestion, and dermal absorption of lead. It is recommended that areas of lead-containing paints observed to be in poor condition (severe cracking/chipping/flaking and debris), be removed by a professional environmental contractor. In general, the following procedures are recommended when removing lead-containing materials, coatings and paint applications: - Follow ***Type 1*** – if the coating is to be removed with a chemical gel or paste; - Follow ***Type 2a*** – if the coating is to be removed by scraping or sanding using non-powered hand tools, or manual demolition of lead-painted building components by striking with sledgehammer or similar tool; - Follow ***Type 3a*** – if the coating is to be removed using power tools; or, Follow ***Type 3b*** – if the coating is to be removed by abrasive blasting.
	Pink Paint	Interior, West Room Walls	- ***Sample ID***: LHD-Pb-13 - ***Concentration***: *9,100 ppm* - ***Condition***: Good/Fair	
Fog Alarm Building	Grey Paint	Metal Cladding, Stairs & Wall	- ***Sample ID***: FAB-Pb-13 - ***Concentration***: *210,000 ppm* - ***Condition***: Good	
	Silver Paint	Metal Cladding	- ***Sample ID***: FAB-Pb-14 - ***Concentration***: *9,100 ppm* - ***Condition***: Good	
	Grey Paint	Interior, Wall	- ***Sample ID***: FAB-Pb-15 - ***Concentration***: *8,100 ppm* - ***Condition***: Good	
	Red Paint	Interior	- ***Sample ID***: FAB-Pb-16 - ***Concentration***: *1,100 ppm* - ***Condition***: Good	
	Black Paint	Stairs & Window Frames	- ***Sample ID***: FAB-Pb-17 - ***Concentration***: *120,000 ppm* - ***Condition***: Good	
	White Paint	Interior, Walls & Ceilings	- ***Sample ID***: FAB-Pb-18 - ***Concentration***: *140,000 ppm* - ***Condition***: Good	
	Grey Paint	Floor, Kitchen	- ***Sample ID***: FAB-Pb-19 - ***Concentration***: *810 ppm* - ***Condition***: Fair	
	Silver Paint	Fog Horn Tank	- ***Sample ID***: FAB-Pb-20 - ***Concentration***: *28,000 ppm* - ***Condition***: Good	
	Light Grey Paint	Interior, 2nd Floor Walls	- ***Sample ID***: FAB-Pb-21 - ***Concentration***: *230,000 ppm* - ***Condition***: Fair	
	Grey Paint	Interior, 2nd Floor	- ***Sample ID***: FAB-Pb-22 - ***Concentration***: *7,800 ppm* - ***Condition***: Fair	
	Grey Paint	Floor, Fog Horn Room	- ***Sample ID***: FAB-Pb-23 - ***Concentration***: *1,900 ppm* - ***Condition***: Good	
	Beige Paint	Wall	- ***Sample ID***: FAB-Pb-24 - ***Concentration***: *18,000 ppm* - ***Condition***: Good	

Building	Material	Location	Assessment[1]	Action[2]
	Green Paint	Door	- ***Sample ID***: FAB-Pb-25 - ***Concentration***: *44,000 ppm* - ***Condition***: Fair	See Above
Outhouse	Silver Paint	Door	- ***Sample ID***: OH-Pb-27 - ***Concentration***: *200,000 ppm* - ***Condition***: Good	
Assistant Light Keeper's Dwelling	White Paint	Undercoat throughout	- ***Sample ID***: ALKB-Pb-26 - ***Concentration***: *<90 ppm* - ***Condition***: Good	No Action Required

1. For sample ID and concentration levels refer to **Appendix B** – Laboratory Certificates of Analysis.
2. Removal procedures based on the Ontario Ministry of Labor's "*Guideline for Lead on Construction Projects*", published September 2004, and Revised in April 2011.

Lead-containing soldered pipe joints were also observed and are expected to be present throughout the wall cavities of the subject buildings.

Work that will disrupt and/or pulverize (including drilling, cutting, grinding or abrading) lead-containing materials must follow the recommendations provided in the *Ministry of Labour Guideline for Lead on Construction Projects*, dated September 2004 (Revised April 2011). In addition, the aforementioned lead-containing materials should be handled with appropriate health and safety precautions so as to comply with requirements of the Designated Substances regulation, *O. Reg. 490/09*, and disposal of these materials must also comply with the requirements of *O. Reg. 347 – General – Waste Management*.

3.1.4 MERCURY

LAMPS

Various types of fluorescent lamps/tubes are known to contain mercury vapour. Fluorescent lamps were not observed within the buildings at the time of the survey. However, mercury-containing thermostats were observed within the Assistant Lighthouse Keeper's Dwelling *(Photograph 9)*.

Removal and disposal of mercury-containing equipment is required prior to demolition activities that may disturb the equipment. The handling, transport, and disposal of mercury-containing equipment must follow all applicable provincial and federal regulations and guidelines pertaining to Mercury, including the requirements of *O. Reg. 490/09* and the requirements of *O. Reg. 347 – General – Waste Management*.

MERCURY IMPACTS

No visible signs of physical mercury (liquid mercury) were observed on surfaces, equipment or building materials within the lighthouse tower.

Surface wipes were obtained from various surfaces and levels within the lighthouse tower and submitted to EMSL Analytical Inc. for analysis of mercury content. Surface samples were collected using specialized wipes, and wiping a surface area of approximately 100 cm^2 (15 in^2). The wipes were then sealed within centrifuge tubes and submitted for analysis. The following table summarizes

mercury concentrations identified of surface wipes of various materials and surfaces within the lighthouse tower.

Table 7 Summary of Mercury Concentrations in Surface Wipe Samples

Sample ID	Location	Surface Description	Base Material	Concentration (μg/100cm^2*)
M-1	Light Tower (2nd/3rd Level)	Stairs	Wood	0.059
M-2	Light Tower (Turret)	Light Mounting Base	Steel	0.17

1. For sample IDs and associated concentrations refer to **Appendix B** – Laboratory Certificates of Analysis.
* Micrograms of mercury per 100 square centimetres of surface area.

According to Health Canada, in addition to inhalation, mercury can enter the body through the skin by absorption or through the stomach if ingested. Although, Health Canada does establish a limit for mercury concentrations for drinking water (0.001 mg/litre, Health Canada, Guidelines for Drinking Water Quality) there is no regulatory framework or established exposure limits for the ingestion or absorption of mercury by other means (i.e. skin contact with a material surface). Additionally, if an individual is in contact with a trace amount of mercury on a material surface, the amount of mercury actually absorbed by the body is only a fraction of the actual concentration present.

Mercury concentrations from surface wipes collected within the lighthouse ranged from 0.059 to 0.17 μg/100cm^2 (micrograms of mercury per 100 square centimetres of a material's surface area). Although trace amounts of mercury were identified within the surface wipes collected, we do not feel that any remedial actions are warranted at this time. However, it is recommended that if personnel begin to frequent the site, stay for extended periods of time, or begin handling the building materials, the use of appropriate PPE (i.e. gloves) is recommended.

3.1.5 OTHER DESIGNATED SUBSTANCES AND HAZARDOUS MATERIALS

The following table summarizes other Designated Substances and hazardous materials which were also included in the survey. Identification of these materials and substances were based on visual observations only, and where appropriate, recommendations and necessary actions have been provided.

Table 8 Summary of Other Designated Substances and Hazardous Materials

Material	Description	Action
Benzene / Fuel Storage	Benzene is likely a component of the Diesel and Fuel Oil which was historically used on the subject property. An empty concrete tank nest was observed adjacent to the Fog Alarm Building, indicating that fuel storage tanks had previously been removed from the property *(Photograph 11)*. In addition, empty kerosene tanks were observed within the Storage Shed, and a gasoline jug was observed in the Fog Alarm Building workshop area *(Photograph 12)*.	Storage containers were observed to be in good condition with no visible signs of damage or leakage. It is recommended that these containers be routinely maintained and monitored to prevent any possible release. Work that may result in exposure to Benzene should follow all applicable provincial and federal regulations and guidelines pertaining to Benzene including the requirements of *O. Reg. 490/09*.

Material	Description	Action
PCBs	Fluorescent light fixtures were not observed within the subject buildings at the time of the survey. PCBs may be present within the pole mounted transformer in the centre of the subject property *(Photograph 13)*. Other electrical transformers presumed to contain PCBs may be present on the subject property.	All transformers or electrical equipment should be inspected for PCB-content during renovation activities. Handle, store and dispose of PCB-containing materials in accordance with *Federal PCB Regulation SOR/92-507* and *R.R.O. 1990 – Reg. 347 – General – Waste Management* regulations.
ODS	In buildings, Ozone-Depleting Substances (ODS) are commonly found in refrigeration systems, halon fire extinguishers and air conditioning units. Four (4) refrigerator units observed at the subject property have the potential to contain ODS-containing refrigerants *(Photograph 14)*. Units were not individually inspected for ODS.	Decommissioning, removal and disposal of any equipment suspected, or confirmed, to contain ODS must comply with provincial and federal regulations pertaining to ODS including: Federal (*FHR 2003*), Provincial (*O. Reg. 189/94*) and General Waste Management Regulations (*R.R.O. 1990, Regulation 347*).
Silica	Building materials and components known to contain silica such as glass, concrete, masonry, stone and mortar etc., were observed throughout the subject building.	Work that may disturb silica-containing materials should follow all applicable provincial and federal regulations and guidelines pertaining to Silica including the requirements of *O. Reg. 490/09*.
Mould	Water damaged and/or mould-contaminated building materials were observed within the subject building at the time of the survey, particularly within the Assistant Lighthouse Keeper's Building *(Photograph 15)*.	If the structures are intended for continuous occupancy, mould remediation will be necessary. Sources of active water leaks should be identified and repaired quickly as these conditions may be conducive to further mould growth.
Acrylonitrile	Acrylonitrile was not observed in the subject building at the time of the survey.	No action required.
Arsenic	Arsenic was not was not observed in the subject building at the time of the survey.	No action required.
Coke Oven Emissions	Coke oven emissions were not observed in the subject building at the time of the survey.	No action required.
Ethylene Oxide	Ethylene oxide was not observed in the area of work during the time of the survey.	No action required.
Isocyanates	Isocyanates were not observed in the subject building at the time of the survey.	No action required.
Vinyl Chloride	Vinyl chloride was not observed in the subject building at the time of the survey.	No action required.

4 LIMITATIONS

This report describes the asbestos-containing materials, Designated Substances and hazardous materials observed by the surveyors at the subject property. The survey assessed only those structures, finishes, permanent fixtures and components identified in this report. The assessment does not consider or define contaminants that may be present in the soil or in the air.

The field observations and laboratory analyses presented herein are considered sufficient in detail and scope to form a general inventory of Designated Substances at the subject building(s) or property. The findings and conclusions contained herein have been prepared in accordance with generally accepted industry methods and procedures. It is possible that Designated Substances or hazardous materials may exist which could not be reasonably identified within the scope of the assessment or which were not apparent during the site visit. WSP Canada Inc. cannot warrant or guarantee that the information provided herein is absolutely complete or accurate beyond the observations and findings stated.

Appendix A

PROJECT PHOTOGRAPHS

Photograph 1: View of Mississagi Strait Lighthouse Station Emergency Generator Room (left), Storage Shed (right) and Lighthouse Tower attached to Lighthouse Keepers Dwelling (center).

Photograph 2: View of Mississagi Strait Lighthouse Tower with Lighthouse Keepers Dwelling attached.

Photograph 3: View of Mississagi Strait Lighthouse Station Fog Alarm Building.

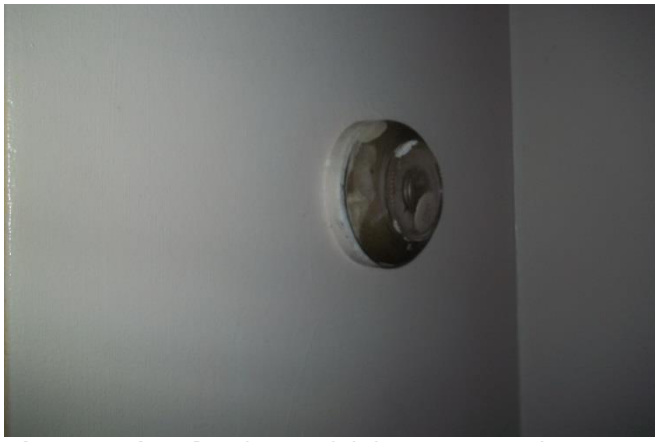
Photograph 4: [Lighthouse Keeper's Dwelling] Asbestos-containing 9"x9" pink vinyl floor tiles (Sample set LHD-VFT-4).

Photograph 5: [Fog Alarm Building] Asbestos-containing Air Cell pipe insulation debris observed in the attic (Sample set FAB-AIR-12).

Photograph 6: [Fog Alarm Building] Asbestos-containing Air Cell pipe insulation debris observed in the attic.

Photograph 7: [Assistant Lighthouse Keeper's Dwelling] Asbestos-containing transite siding panels observed on outside of building (Sample set ALKD-TRANS-17).

Photograph 8: [Assistant Lighthouse Keeper's Dwelling] Asbestos-containing transite siding panels observed on outside of building (Sample set ALKD-TRANS-17).



Photograph 9: [Assistant Lighthouse Keeper's Dwelling] Mercury-containing thermostat observed on the main floor.

Photograph 10: [Lighthouse Tower] Mercury wipe sample location on the 2nd floor stairs of the Lighthouse Tower (Sample ID M-1).

Photograph 11: [Exterior] Former tank nest area indicates that fuel storage tanks have previously been removed from the subject property.

Photograph 12: [Fog Alarm Building] Gasoline powered equipment and container observed in the building workshop area.

Photograph 13: [Exterior] Pole-mounted transformer with suspected PCB-containing transformer oil, located in the centre of the subject property.

Photograph 14: [Fog Alarm Building] Refrigerator unit observed on the main floor. Refrigerants may contain Ozone-Depleting Substances (ODS).

Photograph 15: [Assistant Lighthouse Keeper's Dwelling] Mould growth observed on the kitchen ceiling.

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Appendix B

LABORATORY CERTIFICATES OF ANALYSIS

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Collected:
Received: 11/27/2015
Analyzed: 12/08/2015

Proj: PWGSC MISSISSAUGA #151-12211-00

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: GS-CLK-01A ***Lab Sample ID:*** **551512461-0001**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White/Black	0%	100%	**<1% Chrysotile**	
400 PLM PtCt Grav. Red.	12/08/2015	White/Black	0.0%	100%	**<0.25% Chrysotile**	

Client Sample ID: GS-CLK-01B ***Lab Sample ID:*** **551512461-0002**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White/Black	0%	100%	**<1% Chrysotile**	
400 PLM PtCt Grav. Red.	12/08/2015	White/Black	0.0%	99.7%	**0.3% Chrysotile**	

Client Sample ID: GS-CLK-01C ***Lab Sample ID:*** **551512461-0003**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/07/2015	Tan	0%	100%	**<1% Chrysotile**	
400 PLM PtCt Grav. Red.	12/08/2015	Tan	0.0%	100%	**<0.25% Chrysotile**	

Client Sample ID: LHD-TP-02A ***Lab Sample ID:*** **551512461-0004**
Sample Description: TAR PAPER UNDER SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	50%	50%	None Detected	

Client Sample ID: LHD-TP-02B ***Lab Sample ID:*** **551512461-0005**
Sample Description: TAR PAPER UNDER SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	50%	50%	None Detected	

Client Sample ID: LHD-TP-02C ***Lab Sample ID:*** **551512461-0006**
Sample Description: TAR PAPER UNDER SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

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Client Sample ID: LHD-VFT-03A-Floor Tile ***Lab Sample ID:*** **551512461-0007**
Sample Description: 12" WHITE KITCHEN VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: LHD-VFT-03A-Mastic ***Lab Sample ID:*** **551512461-0007A**
Sample Description: 12" WHITE KITCHEN VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: LHD-VFT-03B-Floor Tile ***Lab Sample ID:*** **551512461-0008**
Sample Description: 12" WHITE KITCHEN VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: LHD-VFT-03B-Mastic ***Lab Sample ID:*** **551512461-0008A**
Sample Description: 12" WHITE KITCHEN VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: LHD-VFT-03C-Floor Tile ***Lab Sample ID:*** **551512461-0009**
Sample Description: 12" WHITE KITCHEN VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-VFT-03C-Mastic ***Lab Sample ID:*** **551512461-0009A**
Sample Description: 12" WHITE KITCHEN VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: LHD-VFT-04A-Floor Tile ***Lab Sample ID:*** **551512461-0010**
Sample Description: 9" PINK VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Brown	0%	98%	**2% Chrysotile**	

Client Sample ID: LHD-VFT-04A-Mastic ***Lab Sample ID:*** **551512461-0010A**
Sample Description: 9" PINK VINYL FLOOR TILE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

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Client Sample ID: LHD-VFT-04B-Floor Tile ***Lab Sample ID:*** **551512461-0011**
Sample Description: 9" PINK VINYL FLOOR TILE

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015				Stop Positive (Not Analyzed)	

Client Sample ID: LHD-VFT-04B-Mastic ***Lab Sample ID:*** **551512461-0011A**
Sample Description: 9" PINK VINYL FLOOR TILE

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

Client Sample ID: LHD-VFT-04C-Floor Tile ***Lab Sample ID:*** **551512461-0012**
Sample Description: 9" PINK VINYL FLOOR TILE

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015				Stop Positive (Not Analyzed)	

Client Sample ID: LHD-VFT-04C-Mastic ***Lab Sample ID:*** **551512461-0012A**
Sample Description: 9" PINK VINYL FLOOR TILE

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

Client Sample ID: LHD-DWJ-05A ***Lab Sample ID:*** **551512461-0013**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

Client Sample ID: LHD-DWJ-05B ***Lab Sample ID:*** **551512461-0014**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

Client Sample ID: LHD-DWJ-05C ***Lab Sample ID:*** **551512461-0015**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

Client Sample ID: LHD-DWJ-05D ***Lab Sample ID:*** **551512461-0016**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

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Client Sample ID: LHD-DWJ-05E ***Lab Sample ID:*** **551512461-0017**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

Client Sample ID: LHD-DWJ-05F ***Lab Sample ID:*** **551512461-0018**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

Client Sample ID: LHD-DWJ-05G ***Lab Sample ID:*** **551512461-0019**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	0%	100%	None Detected	

Client Sample ID: LHD-CLK-06A ***Lab Sample ID:*** **551512461-0020**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White/Red	0%	100%	None Detected	

Client Sample ID: LHD-CLK-06C ***Lab Sample ID:*** **551512461-0022**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-PLAS-07A ***Lab Sample ID:*** **551512461-0023**
Sample Description: PLASTER IN BATH AND BEDROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-PLAS-07B ***Lab Sample ID:*** **551512461-0024**
Sample Description: PLASTER IN BATH AND BEDROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-PLAS-07C ***Lab Sample ID:*** **551512461-0025**
Sample Description: PLASTER IN BATH AND BEDROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

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Client Sample ID: LHD-MAS-08A ***Lab Sample ID:*** **551512461-0026**
Sample Description: MASTIC UNDER VFT 04

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Brown	0%	100%	None Detected	

Client Sample ID: LHD-MAS-08B ***Lab Sample ID:*** **551512461-0027**
Sample Description: MASTIC UNDER VFT 04

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Brown	0%	100%	None Detected	

Client Sample ID: LHD-MAS-08C ***Lab Sample ID:*** **551512461-0028**
Sample Description: MASTIC UNDER VFT 04

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Brown	0%	100%	None Detected	

Client Sample ID: LHD-DWJC-09A ***Lab Sample ID:*** **551512461-0029**
Sample Description: DRYWALL COMPOUND PATCH IN BATHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: LHD-DWJC-09B ***Lab Sample ID:*** **551512461-0030**
Sample Description: DRYWALL COMPOUND PATCH IN BATHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: LHD-DWJC-09C ***Lab Sample ID:*** **551512461-0031**
Sample Description: DRYWALL COMPOUND PATCH IN BATHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: LHD-DWJC-09D ***Lab Sample ID:*** **551512461-0032**
Sample Description: DRYWALL COMPOUND PATCH IN BATHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: LHD-DWJC-09E ***Lab Sample ID:*** **551512461-0033**
Sample Description: DRYWALL COMPOUND PATCH IN BATHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

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Client Sample ID: LHD-MTR-10A ***Lab Sample ID:*** **551512461-0034**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: LHD-MTR-10B ***Lab Sample ID:*** **551512461-0035**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: LHD-MTR-10C ***Lab Sample ID:*** **551512461-0036**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: LHD-MTR-10D ***Lab Sample ID:*** **551512461-0037**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: LHD-MTR-10E ***Lab Sample ID:*** **551512461-0038**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-MTR-10F ***Lab Sample ID:*** **551512461-0039**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-MTR-10G ***Lab Sample ID:*** **551512461-0040**
Sample Description: MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-SHINGLE-11A ***Lab Sample ID:*** **551512461-0041**
Sample Description: ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

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Client Sample ID: LHD-SHINGLE-11B ***Lab Sample ID:*** **551512461-0042**
Sample Description: ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

Client Sample ID: LHD-SHINGLE-11C ***Lab Sample ID:*** **551512461-0043**
Sample Description: ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	35%	65%	None Detected	

Client Sample ID: FAB-AIR-12A ***Lab Sample ID:*** **551512461-0044**
Sample Description: AIR CELL DEBRIS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	80%	**20% Chrysotile**	

Client Sample ID: FAB-AIR-12B ***Lab Sample ID:*** **551512461-0045**
Sample Description: AIR CELL DEBRIS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015				Stop Positive (Not Analyzed)	

Client Sample ID: FAB-AIR-12C ***Lab Sample ID:*** **551512461-0046**
Sample Description: AIR CELL DEBRIS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015				Stop Positive (Not Analyzed)	

Client Sample ID: FAB-TAR-13A ***Lab Sample ID:*** **551512461-0047**
Sample Description: TAR PAPER ON WALLS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	50%	50%	None Detected	

Client Sample ID: FAB-TAR-13B ***Lab Sample ID:*** **551512461-0048**
Sample Description: TAR PAPER ON WALLS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	50%	50%	None Detected	

Client Sample ID: FAB-TAR-13C ***Lab Sample ID:*** **551512461-0049**
Sample Description: TAR PAPER ON WALLS

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	45%	55%	None Detected	

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Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: FAB-DWJC-14A ***Lab Sample ID:*** **551512461-0050**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-DWJC-14B ***Lab Sample ID:*** **551512461-0051**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-DWJC-14C ***Lab Sample ID:*** **551512461-0052**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-DWJC-14D ***Lab Sample ID:*** **551512461-0053**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-DWJC-14E ***Lab Sample ID:*** **551512461-0054**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-DWJC-14F ***Lab Sample ID:*** **551512461-0055**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-DWJC-14G ***Lab Sample ID:*** **551512461-0056**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: FAB-VFS-15A-Floor Tile ***Lab Sample ID:*** **551512461-0057**
Sample Description: BRICK PATTERN VINYL SHEET FLOORING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Brown/Black	0%	100%	None Detected	

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EMSL Canada Order 551512461
Customer ID: 55MACV62
Customer PO: 151-12211-00
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: FAB-VFS-15A-Mastic ***Lab Sample ID:*** **551512461-0057A**
Sample Description: BRICK PATTERN VINYL SHEET FLOORING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Clear	0%	100%	None Detected	

Client Sample ID: FAB-VFS-15B-Floor Tile ***Lab Sample ID:*** **551512461-0058**
Sample Description: BRICK PATTERN VINYL SHEET FLOORING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Brown/Black	0%	100%	None Detected	

Client Sample ID: FAB-VFS-15B-Mastic ***Lab Sample ID:*** **551512461-0058A**
Sample Description: BRICK PATTERN VINYL SHEET FLOORING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Clear	0%	100%	None Detected	

Client Sample ID: FAB-VFS-15C-Vinyl Sheet Flooring ***Lab Sample ID:*** **551512461-0059**
Sample Description: BRICK PATTERN VINYL SHEET FLOORING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

Client Sample ID: FAB-VFS-15C-Mastic ***Lab Sample ID:*** **551512461-0059A**
Sample Description: BRICK PATTERN VINYL SHEET FLOORING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Clear	0%	100%	None Detected	

Client Sample ID: FAB-CLK-16A ***Lab Sample ID:*** **551512461-0060**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White/Red	0%	100%	None Detected	

Client Sample ID: FAB-CLK-16B ***Lab Sample ID:*** **551512461-0061**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/Red	0%	100%	None Detected	

Client Sample ID: FAB-CLK-16C ***Lab Sample ID:*** **551512461-0062**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

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EMSL Canada Order 551512461
Customer ID: 55MACV62
Customer PO: 151-12211-00
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: FAB-VFS2-17A-Floor Tile ***Lab Sample ID:*** **551512461-0063**
Sample Description: WHITE VINYL SHEET FLOORING UNDER SAMPLE 15

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	15%	85%	None Detected	

Client Sample ID: FAB-VFS2-17A-Mastic ***Lab Sample ID:*** **551512461-0063A**
Sample Description: WHITE VINYL SHEET FLOORING UNDER SAMPLE 15

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: FAB-VFS2-17B-Floor Tile ***Lab Sample ID:*** **551512461-0064**
Sample Description: WHITE VINYL SHEET FLOORING UNDER SAMPLE 15

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan	15%	85%	None Detected	

Client Sample ID: FAB-VFS2-17B-Mastic ***Lab Sample ID:*** **551512461-0064A**
Sample Description: WHITE VINYL SHEET FLOORING UNDER SAMPLE 15

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: FAB-VFS2-17C-Vinyl Sheet Flooring ***Lab Sample ID:*** **551512461-0065**
Sample Description: WHITE VINYL SHEET FLOORING UNDER SAMPLE 15

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	7%	93%	None Detected	

Client Sample ID: FAB-VFS2-17C-Mastic ***Lab Sample ID:*** **551512461-0065A**
Sample Description: WHITE VINYL SHEET FLOORING UNDER SAMPLE 15

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: ALKD-TRANS-17A ***Lab Sample ID:*** **551512461-0066**
Sample Description: TRANSITE SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	90%	**10% Chrysotile**	

Client Sample ID: ALKD-TRANS-17B ***Lab Sample ID:*** **551512461-0067**
Sample Description: TRANSITE SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015				Stop Positive (Not Analyzed)	

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Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: ALKD-TRANS-17C ***Lab Sample ID:*** **551512461-0068**
Sample Description: TRANSITE SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015				Stop Positive (Not Analyzed)	

Client Sample ID: ALKD-TAR-18A ***Lab Sample ID:*** **551512461-0069**
Sample Description: TAR PAPER UNDER SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

Client Sample ID: ALKD-TAR-18B ***Lab Sample ID:*** **551512461-0070**
Sample Description: TAR PAPER UNDER SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

Client Sample ID: ALKD-TAR-18C ***Lab Sample ID:*** **551512461-0071**
Sample Description: TAR PAPER UNDER SIDING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

Client Sample ID: ALKD-DWJC-19A ***Lab Sample ID:*** **551512461-0072**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: ALKD-DWJC-19B ***Lab Sample ID:*** **551512461-0073**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: ALKD-DWJC-19C ***Lab Sample ID:*** **551512461-0074**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	0%	100%	None Detected	

Client Sample ID: ALKD-DWJC-19D ***Lab Sample ID:*** **551512461-0075**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

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Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: ALKD-DWJC-19E ***Lab Sample ID:*** **551512461-0076**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: ALKD-DWJC-19F ***Lab Sample ID:*** **551512461-0077**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: ALKD-DWJC-19G ***Lab Sample ID:*** **551512461-0078**
Sample Description: DRYWALL JOINT COMPOUND

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	None Detected	

Client Sample ID: ALKD-CLK-20A ***Lab Sample ID:*** **551512461-0079**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan/White	0%	100%	**<1% Chrysotile**	
400 PLM PtCt Grav. Red.	12/07/2015	Tan/White	0.0%	99.7%	**0.3% Chrysotile**	

Client Sample ID: ALKD-CLK-20B ***Lab Sample ID:*** **551512461-0080**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Tan/Black	0%	100%	**<1% Chrysotile**	
400 PLM PtCt Grav. Red.	12/07/2015	Tan/Black	0.0%	99.7%	**0.3% Chrysotile**	

Client Sample ID: ALKD-CLK-20C ***Lab Sample ID:*** **551512461-0081**
Sample Description: WINDOW CAULKING

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray	0%	100%	**<1% Chrysotile**	
400 PLM PtCt Grav. Red.	12/07/2015	Gray	0.0%	100%	**<0.25% Chrysotile**	

Client Sample ID: ALKD-VFS-21A-Floor Tile ***Lab Sample ID:*** **551512461-0082**
Sample Description: VINYL SHEET FLOORING IN WASHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	15%	85%	None Detected	

Client Sample ID: ALKD-VFS-21A-Mastic ***Lab Sample ID:*** **551512461-0082A**
Sample Description: VINYL SHEET FLOORING IN WASHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

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Customer ID: 55MACV62
Customer PO: 151-12211-00
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: ALKD-VFS-21B-Floor Tile ***Lab Sample ID:*** **551512461-0083**
Sample Description: VINYL SHEET FLOORING IN WASHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	15%	85%	None Detected	

Client Sample ID: ALKD-VFS-21B-Mastic ***Lab Sample ID:*** **551512461-0083A**
Sample Description: VINYL SHEET FLOORING IN WASHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: ALKD-VFS-21C-Vinyl Sheet Flooring ***Lab Sample ID:*** **551512461-0084**
Sample Description: VINYL SHEET FLOORING IN WASHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	White	10%	90%	None Detected	

Client Sample ID: ALKD-VFS-21C-Mastic ***Lab Sample ID:*** **551512461-0084A**
Sample Description: VINYL SHEET FLOORING IN WASHROOM

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Yellow	0%	100%	None Detected	

Client Sample ID: KS-TP-22A ***Lab Sample ID:*** **551512461-0085**
Sample Description: TAR PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	40%	60%	None Detected	

Client Sample ID: KS-TP-22B ***Lab Sample ID:*** **551512461-0086**
Sample Description: TAR PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

Client Sample ID: KS-TP-22C ***Lab Sample ID:*** **551512461-0087**
Sample Description: TAR PAPER

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	25%	75%	None Detected	

Client Sample ID: KS-SHINGLE-23A ***Lab Sample ID:*** **551512461-0088**
Sample Description: ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

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Customer ID: 55MACV62
Customer PO: 151-12211-00
Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Client Sample ID: KS-SHINGLE-23B ***Lab Sample ID:*** **551512461-0089**
Sample Description: ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

Client Sample ID: KS-SHINGLE-23C ***Lab Sample ID:*** **551512461-0090**
Sample Description: ROOF SHINGLE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Black	0%	100%	None Detected	

Client Sample ID: LHD-PLAS-07D ***Lab Sample ID:*** **551512461-0091**
Sample Description: NOT ON COC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-PLAS-07E ***Lab Sample ID:*** **551512461-0092**
Sample Description: NOT ON COC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

Client Sample ID: LHD-PLAS-07F ***Lab Sample ID:*** **551512461-0093**
Sample Description: NOT ON COC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	10%	90%	None Detected	

Client Sample ID: LHD-PLAS-07G ***Lab Sample ID:*** **551512461-0094**
Sample Description: NOT ON COC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	12/04/2015	Gray/White	0%	100%	None Detected	

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EMSL Canada Order 551512461
Customer ID: 55MACV62
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Project ID:

Test Report: Asbestos Analysis of Bulk Materials for Ontario Regulation 278/05 via EPA600/R-93/116 Method

Analyst(s):

Nicole Dimou	PLM (55) 400 PLM PtCt Grav. Red (3)
Romeo Samson	PLM (47) 400 PLM PtCt Grav. Red (3)

Reviewed and approved by:

Matthew Davis
or Other Approved Signatory

None Detected = <0.5%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Mississauga, ON NVLAP Lab Code 200877-0

Report amended: 12/08/201514:58:50 Replaces amended report from: 12/08/201514:58:50 Reason Code: Client-Additional Analysis

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EMSL Canada Or	551512457
CustomerID:	55MACV62
CustomerPO:	151-12211-00
ProjectID:	

Attn: **Marc St. Germain**
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600 Cochrane Drive
Suite 500
Markham, ON L3R 5K3

Phone:	(514) 386-1481
Fax:	(905) 475-5994
Received:	11/27/15 9:01 AM
Collected:	

Project: **PWGSC MISSISSAUGA #151-12211-00**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
GS-PB-01	*551512457-0001*		12/2/2015	15000 ppm
	Site: WHITE EXTERIOR PAINT			
GS-PB-02	*551512457-0002*		12/2/2015	56000 ppm
	Site: BROWN TRIM PAINT			
GS-PB-03	*551512457-0003*		12/2/2015	170000 ppm
	Site: RED EXTERIOR PAINT			
GS-PB-04	*551512457-0004*		12/2/2015	38000 ppm
	Site: GREY DOOR PAINT			
GS-PB-05	*551512457-0005*		12/2/2015	140 ppm
	Site: BLUE CEILING BAINT			
LHD-PB-06	*551512457-0006*		12/2/2015	57000 ppm
	Site: INTERIOR WHITE PAINT			
LHD-PB-07	*551512457-0007*		12/2/2015	49000 ppm
	Site: INTERIOR TEAL PAINT			
LHD-PB-08	*551512457-0008*		12/2/2015	25000 ppm
	Site: INTERIOR GREY PAINT			
LHD-PB-09	*551512457-0009*		12/2/2015	68000 ppm
	Site: INTERIOR DARK GREEN UNDERCOAT			
LHD-PB-10	*551512457-0010*		12/2/2015	120000 ppm
	Site: RED PAINT IN TURRET			
LHD-PB-11	*551512457-0011*		12/2/2015	99000 ppm
	Site: WHITE PAINT IN TURRET			
LHD-PB-12	*551512457-0012*		12/2/2015	3800 ppm
	Site: PINK BATH AND BED ROOM PAINT			
LHD-PB-13	*551512457-0013*		12/2/2015	100000 ppm
	Site: PINK IN WEST ROOM			
FAB-PB-13	*551512457-0014*		12/2/2015	210000 ppm
	Site: GREY PAINT ON METAL CLADDING STAIRS AND WALL			
FAB-PB-14	*551512457-0015*		12/2/2015	9100 ppm
	Site: SILVER PAINT ON METAL CLADDING			

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 12/04/2015 08:10:58

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CustomerID:	55MACV62
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ProjectID:	

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Phone: (514) 386-1481
Fax: (905) 475-5994
Received: 11/27/15 9:01 AM
Collected:

Project: **PWGSC MISSISSAUGA #151-12211-00**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
FAB-PB-15	*551512457-0016*		12/2/2015	8100 ppm
	Site: GREY WALL PAINT			
FAB-PB-16	*551512457-0017*		12/2/2015	1100 ppm
	Site: RED INTERIOR PAINT			
FAB-PB-17	*551512457-0018*		12/2/2015	120000 ppm
	Site: BLACK PAINT ON STAIRS AND WINDOW FRAMES			
FAB-PB-18	*551512457-0019*		12/2/2015	140000 ppm
	Site: WHITE WALL AND CEILING PAINT			
FAB-PB-19	*551512457-0020*		12/2/2015	810 ppm
	Site: GREY FLOOR PAINT IN KITCHEN			
FAB-PB-20	*551512457-0021*		12/2/2015	28000 ppm
	Site: SILVER PAINT ON FOG HORN TANK			
FAB-PB-21	*551512457-0022*		12/2/2015	230000 ppm
	Site: LIGHT GREY ON 2ND FLOOR WALL			
FAB-PB-22	*551512457-0023*		12/2/2015	7800 ppm
	Site: GREY PAINT ON 2ND FLOOR			
FAB-PB-23	*551512457-0024*		12/2/2015	1900 ppm
	Site: GREY FLOOR PAINT IN FOG HORN ROOM			
FAB-PB-24	*551512457-0025*		12/2/2015	18000 ppm
	Site: BEIGE PAINT			
FAB-PB-25	*551512457-0026*		12/2/2015	44000 ppm
	Site: GREEN DOOR PAINT			
ALKD-PB-26	*551512457-0027*		12/2/2015	<90 ppm
	Site: WHITE INTERIOR UNDERCOAT			
OH-PB-27	*551512457-0028*		12/2/2015	200000 ppm
	Site: SILVER OUTHOUSE DOOR PAINT			

Lisa Podzyhun
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements established by the AIHA-LAP, unless specifically indicated otherwise.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

Initial report from 12/04/2015 08:10:58

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone: (856) 303-2500 Fax: (856) 858-4571 Email: EnvChemistry2@emsl.com

Attn: **Stephen Heikkila**
WSP Canada, Inc.
600 Cochrane Drive
Suite 500
Markham, ON L3R 5K3

Phone: (905) 475-7270
Fax: (905) 475-5994

12/2/2015

The following analytical report covers the analysis performed on samples submitted to EMSL Analytical, Inc. on 12/1/2015. The results are tabulated on the attached data pages for the following client designated project:

PWGSC Mississagi #151-12211-00

The reference number for these samples is EMSL Order #011507218. Please use this reference when calling about these samples. If you have any questions, please do not hesitate to contact me at (856) 303-2500.

Reviewed and Approved By:

Julie Smith - Laboratory Director

The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.
NELAP Certifications: NJ 03036, NY 10872, PA 68-00367

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 858-4571
http://www.EMSL.com EnvChemistry2@emsl.com

EMSL Order:	011507218
CustomerID:	MACV62
CustomerPO:	551512470
ProjectID:	

Attn: **Stephen Heikkila**
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600 Cochrane Drive
Suite 500
Markham, ON L3R 5K3

Phone: (905) 475-7270
Fax: (905) 475-5994
Received: 12/01/15 10:10 AM

Project: **PWGSC Mississagi #151-12211-00**

Analytical Results

Client Sample Description M-1 3rd Floor ***Collected:*** 11/25/2015 ***Lab ID:*** *0001*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date*	*Analyst*	*Analysis Date*	*Analyst*
7471B	Mercury	0.059	0.020	µg/100 cm²	12/2/2015	JS	12/2/2015	JS

Client Sample Description M-2 Turret ***Collected:*** 11/25/2015 ***Lab ID:*** *0002*

Method	*Parameter*	*Result*	*RL*	*Units*	*Prep Date*	*Analyst*	*Analysis Date*	*Analyst*
7471B	Mercury	0.17	0.020	µg/100 cm²	12/2/2015	JS	12/2/2015	JS

Definitions:

ND - indicates that the analyte was not detected at the reporting limit
RL - Reporting Limit

Appendix C

ASBESTOS-CONTAINING MATERIAL EVALUATION CRITERIA

Asbestos-Containing Material Evaluation Criteria

A description of the criteria used in evaluating the condition, accessibility and exposure risk of asbestos-containing materials (ACM) is provided below.

Assessment of Condition

Spray-Applied Fireproofing, Insulation and Textured Finishes

In evaluating the condition of ACM spray applied as fireproofing, thermal insulation or texture, decorative or acoustic finishes, the following criteria apply:

Good
Surface of material shows no significant signs of damage, deterioration or delamination. Up to one percent visible damage to surface is allowed within range of GOOD. Evaluation of sprayed fireproofing requires the Assessor to be familiar with the irregular surface texture typical of sprayed asbestos products. GOOD condition includes unencapsulated or unpainted fireproofing or texture finishes, where no delamination or damage is observed, and encapsulated fireproofing or texture finishes where the encapsulation has been applied after the damage or fallout occurred.

Poor
Sprayed materials show signs of damage, delamination or deterioration. More than one percent damage to surface of ACM spray.

In observation areas, where damage exists in isolated locations, both GOOD and POOR condition may be reported. The extent or percentage of each condition will be recorded on the Assessor reassessment form.

FAIR condition is not utilized or considered as a valid criterion in the evaluation of sprayed fireproofing, sprayed insulation, or texture coat finishes.

The evaluation of ACM spray applied as fireproofing, non-mechanical thermal insulation, or texture, decorative or acoustic finishes which are present above ceilings, may be limited by the number of observations made, and by building components such as ducts or full height walls that obstruct the above ceiling observations. Persons entering the ceiling area are advised to be watchful for ACM DEBRIS prior to accessing or working above ceilings in areas of building with ACM, regardless of the reported condition.

Other ACM

In evaluating the condition of mechanical insulation (on boilers, breaching, ductwork, piping, tanks, equipment etc.) the following criteria are used:

Good
Insulation is completely covered in jacketing and exhibits no evidence of damage or deterioration. No insulation is exposed. Includes conditions where the jacketing has minor surface damage (i.e., scuffs or stains), but the jacketing is not penetrated.

Fair
Minor penetration damage to jacketed insulation (cuts, tears, nicks, deterioration or delamination) or undamaged insulation that has never been jacketed. Insulation is exposed but not showing surface disintegration. The extent of missing insulation ranges should be minor to none.

Poor
Original insulation jacket is missing, damaged, deteriorated or delaminated. Insulation is exposed and significant areas have been dislodged. Damage cannot be readily repaired. The evaluation of

mechanical insulation may be limited by the number of observations made and building components such as ducts or full height walls that obstruct observations. In these circumstances, it is not possible to observe each foot of mechanical insulation from all angles.

Non-Friable and Potentially Friable Materials

Non-friable materials generally have little potential to release airborne fibres, even when damaged by mechanical breakage. However, some non-friable materials, i.e., exterior asbestos cement products, may have deteriorated so that the binder no longer effectively contains the asbestos fibres. In such cases of significantly deteriorated non-friable material, the material will be treated as a friable product.

Evaluation of Accessibility

The accessibility of building materials known or suspected of being ACM is rated according to the following criteria:

Access (A)
Areas of the building within reach of all building users. Includes areas such as gymnasiums, workshops, and storage areas where activities of the building users may result in disturbance of ACM not normally within reach from floor level.

Access (B)
Frequently entered maintenance areas within reach of maintenance staff, without the need for a ladder. Includes: frequently entered pipe chases, tunnels and service areas or areas within reach from a fixed ladder or catwalk, i.e., tops of equipment, mezzanines.

Access (C) Exposed
Areas of the building above 8'0" where use of a ladder is required to reach the ACM. Only refers to ACM materials that are exposed to view, from the floor or ladder, without removing or opening other building components such as ceiling tiles, or service access doors or hatches. Does not include infrequently accessed service areas of the building.

Access (C) Concealed
Areas of the building which require the removal of a building component, including lay-in ceilings and access panels into solid ceiling systems. Includes rarely entered crawl spaces, attic spaces, etc. Observations are limited to the extent visible from the access points.

Access (D)
Areas of the building behind inaccessible solid ceiling systems, walls, or mechanical equipment, etc. where demolition of the ceiling, wall or equipment, etc., is required to reach the ACM. Evaluation of the condition and extent of ACM is limited or impossible, depending on the Assessor's ability to visually examine the materials in Access D.

Definition of Action Levels

Based on the results of the inspection and bulk sample analysis of samples collected and submitted for testing, recommendations were provided for compliance with regulation. These include assigned "Action Levels" to assist in the prioritization of corrective measures. The measures that are to be taken for each "Action Level" are described in full in the following table:

Action Level	Required Action
"Action 1"	**Immediate Clean-Up of Debris that is Likely to Be Disturbed** Restrict access that is likely to cause a disturbance of the ACM DEBRIS and clean up ACM DEBRIS immediately. Utilize correct asbestos procedures. This action is required for compliance with regulatory requirements. The surveyor will immediately notify the owner of this condition.
"Action 2"	**Type 2 Precautions for Entry into Areas with ACM DEBRIS** At locations where ACM DEBRIS can be isolated in lieu of removal or cleaned up, use appropriate means to limit entry to the area. Restrict access to the area to persons utilizing Type 2 asbestos precautions. The precautions will be required until the ACM DEBRIS has been cleaned up, and the source of the DEBRIS has been stabilized or removed.
"Action 3"	**ACM Removal Required for Compliance** Remove ACM for compliance with regulatory requirements. Utilize asbestos procedures appropriate to the scope of the removal work.
"Action 4"	**Type 2 Precautions for Access into Areas Where ACM is Present and Likely to be Disturbed by Access** Use Type 2 asbestos precautions when entry or access into an area is likely to disturb the ACM. ACTION 4 must be used until the ACM is removed (Use ACTION 1 or 2 if DEBRIS is present).
"Action 5"	**Proactive ACM Removal** Remove ACM in lieu of repair, or at locations where the presence of asbestos in GOOD condition is not desirable.
"Action 6"	**ACM Repair** Repair ACM found in FAIR condition, and not likely to be damaged again or disturbed by normal use of the area or room. Upon completion of the repair work, treat ACM as material in GOOD condition and implement ACTION 7. If ACM is likely to be damaged or disturbed, during normal use of the area or room, implement ACTION 5.
"Action 7"	**Asbestos Management Program with Routine Surveillance** Implement an Asbestos Management Program, including routine surveillance of ACM. Trained workers or contractors must use appropriate asbestos precautions (Type 1, Type 2 or Type 3) during disturbance of the remaining ACM.
"Action 8"	**Suspect Materials** Implement the Asbestos Management Program for building materials that historically contained asbestos but cannot, or have not, been sufficiently tested for asbestos content. These materials are identified as SUSPECT MATERIALS.

Appendix D

BACKGROUND AND PAST USES OF DESIGNATED SUBSTANCES

Background and Past Uses of Designated Substances

Prior to the establishment and mainstream acknowledgement of the negative health consequences associated with human exposure to designated substances defined in the Act, these substances found use in an assortment of applications. The adverse health effects and common applications of substances regulated under the Act are summarized in this section.

Asbestos

Unlike other designated substances regulated under the act that are unimolecular (one chemical), asbestos is a term used to describe a group of minerals, all with long, thin fibrous crystals. In the late 19th century, asbestos maintained large popularity among the manufacturing and construction industries due to its resistance to heat, chemical and electrical damage, its sound absorption properties, tensile strength and affordability. These desirable characteristics resulted in the appearance of asbestos-containing materials (ACM) in construction products such as flat and corrugated sheets, pipes and shingles, vinyl flooring, linoleum, roofing felts, reinforced cement products, coatings and mastics and asbestos paper products. Asbestos' thermal insulating properties resulted in its appearance in sprayed insulation and fireproofing for steel structures, often in high relative ratios. Its capacity to absorb both heat and acoustic energy prompted its use as thermal/acoustic insulation for pipes and boilers. The three most prevalent and widely used types of asbestos were: 1) chrysotile; 2) amosite, and; 3) crocidolite.

In the early 1970s, the use of asbestos products declined sharply due to increasing concerns raised over the material's health effects. By mid 1979, the specific prohibition and the availability of safer alternatives largely put an end to the use of many asbestos products.

Due to the extensive use of ACM in the construction industry over a period of approximately 50 years, the concern over the possibility of individuals being exposed to ACM is a legitimate one. It has been shown that inhalation of asbestos fibres at high concentrations or over extended periods of time can cause asbestosis, lung cancer or mesothelioma. However, it has been well established that, unless damaged or disturbed, satisfactorily encapsulated ACM does not pose a hazard to worker or employee health and safety.

Lead

Lead is a heavy metal that has been used by humans in industrial applications for several millennia. Lead may be used in its pure metallic form or combined chemically with other elements to form lead compounds. Inorganic lead compounds (lead salts) result when lead forms an ionic bond with atomic or polyatomic anions, examples of which include lead oxide, lead chromate, lead carbonate and lead nitrate. Inorganic lead compounds may exist in either the solid or liquid state and have found use in applications such as insecticides, pigments, paints, glasses, plastics and rubber compounds. Lead was used as a primary ingredient in many interior and exterior oil-based paints from the early 1900s to the late 1970s. Interior or exterior paints produced after 1970 may however; still contain small amounts of lead. Lead can enter the human body through all known mechanisms of toxicological exposure; inhalation, ingestion and dermal absorption. The toxicological dynamics and kinetics of lead are such that no amount of lead exposure is safe. Worker exposure to lead in the form of a high dose sustained over a short time period or after chronic exposure to low doses can both result in severe adverse health effects.

Lead dust is a particular hazard in buildings. Lead conjugated particulate has been documented to be aerosolized in facilities that house applications such as rifle/gun ranges or industrial processes such as sanding, cutting or grinding of lead-containing materials.

Silica

Silica has found use in a variety of applications, including: sandblasting; abrasive grinding and scouring, resin, moulds casting and glass manufacturing and in processes related to the production of electronic components and fibreglass.

The prolonged inhalation of dust containing free crystalline silica results in a disease known as silicosis. Silicosis is a pneumoconiosis (a lung disease caused by the inhalation of dust) and is characterized by progressive fibrosis of the lungs and marked by shortness of breath, impaired lung function and subsequent complications that sometimes result in death. In the construction sector, silica (as common sand) is a major ingredient of concrete and cement products such as masonry and mortar. Concern over silica's adverse health effects are raised when silica becomes respirable for two reasons; 1) smaller silica particles can more deeply permeate into the lungs, resulting in a higher capacity for the material to cause adverse damage on a per mass basis and; 2) these smaller sized particles are more easily aerosolized than their larger, non-respirable counterparts. Processes such as cutting, abrading, and drilling of concrete and other sand-containing materials creates respirable silica-containing dust that has the potential to be inhaled by workers who do not use appropriate protective measures and personal protective equipment.

Mercury

Mercury is a silver-coloured metal that exists in the liquid state at room temperature. Mercury has been and is currently used in commercial applications as both a pure metal and in metallic, chelated compounds. The greatest use of elemental mercury in Ontario is in electrical equipment such as silent switches. Small amounts of mercury compounds are present in fluorescent tubes and mercury vapour lamps, older thermostats and paints.

Other Designated Substances

Ethylene oxide is used in the pharmaceutical industry and by hospitals as a disinfectant of plastic items that cannot be autoclaved.

Isocyanates are a class of chemicals used in the manufacture of certain types of plastics, foams, coatings and other products.

Acrylonitrile is a clear, (colourless or yellow) liquid that is explosive, flammable and toxic. It is used as a polymer or resin in the production of rubbers, coatings and adhesives.

Coke oven emissions are the benzene-soluble fraction of total particulate matter produced by the destructive distillation or carbonization of coal for the production of coke.

Benzene is a clear, colourless and highly volatile organic solvent. It is used in a tremendous number of processes in chemical laboratories and within the chemical industry and is demonstrated to be highly carcinogenic.

Arsenic is a metalloid used to harden copper, lead and other alloys, in the manufacture of electronics and glass and in numerous other applications. Its mechanism of toxicity is via the arrest of cellular respiration and can be absorbed via ingestion, inhalation or dermal absorption.

Vinyl chloride is a colourless gas with a sweet odour that is used in the manufacture of various products in the building and construction sectors, including the automotive industry, electrical wire insulation, cables, piping, industrial and household equipment, and medical supplies. The carcinogenicity of this substance has been widely established.

Other Hazardous Materials

Polychlorinated Biphenyls (PCBs) have been synthetically manufactured on a commercial basis since 1929. They have never been manufactured in Canada, with the entire supply coming form the USA. By the late 1960s, the toxic effects of PCBs started to gain recognition, as did its bioaccumulative properties, as significant levels of PCBs were being detected within species throughout the world's most remote

environments. Throughout the 1970s, the manufacture of PCBs was phased out; however considerable amounts remain in use.

PCBs were commonly used in electrical equipment because of their excellent electrical and fireresistant properties. For a considerable period of time, askarels (a mixture of chlorobenzenes and PCBs) were the coolants of choice for indoor transformers. Many outdoor transformers with mineral oil coolant became contaminated with PCBs during manufacture or servicing. PCBs were also used in a variety of other products including heat transfer fluids, lubricants, plasticizers, inks, dyes, pesticides and adhesives.

Ozone-Depleting Substances such as halocarbons are synthetic, organic compounds that containing halogen species, namely fluorine, chlorine, and bromine. These substances have either been classified into groups based on chemical structure (such as the fluorocarbons, the halons, the chlorofluorocarbons (CFCs), and the hydrochlorofluorocarbons (HCFCs)) or are molecules that cannot be grouped into such classifications on the basis of their physical/chemical properties (such as carbon tetrachloride, methyl chloroform, and methyl bromide). Canadian environmental legislation aimed at prohibiting the release of these substances is in effect, as they are known contributors to ozone depletion.

ODS-based solvents (particularly CFCs and HCFCs) have found general use in numerous domestic, commercial and industrial applications. Halocarbons are used primarily as a refrigerant and as a blowing agent in foam product manufacturing. In buildings, ODSs are commonly found in refrigeration systems, halon fire extinguishers and air conditioning systems.

Urea Formaldehyde Foam Insulation (UFFI) is a solid product that was used in buildings (particularly residential dwellings) as injectable insulation, often in cases where it was otherwise impractical to provide conventional insulation. UFFI was used extensively throughout the 1970s, with particular usage between 1975 and 1978, the time period during which the Canadian Home Insulation Program, a financial incentive program to encourage home insulation upgrades administered by the federal government, was in effect. The insulation was approved for use in Canada in exterior wood-frame walls only and was banned for use in 1980.

UFFI contains formaldehyde, which in a non-vapour state, is not believed to cause adverse health effects in humans. Concerns regarding the safety of UFFI were raised when it became known that the material has the capacity to release formaldehyde gas, a well-known probable human carcinogen. As a solid product, UFFI is considered to be safe for human contact. However, upon initial application of the foam, small amounts of formaldehyde may be released to the air. Given that there is a finite amount of formaldehyde available for off-gassing, the rate of formaldehyde release from the foam declines steadily as time progresses. Studies have shown that within two years of application, half of the available formaldehyde has been released.

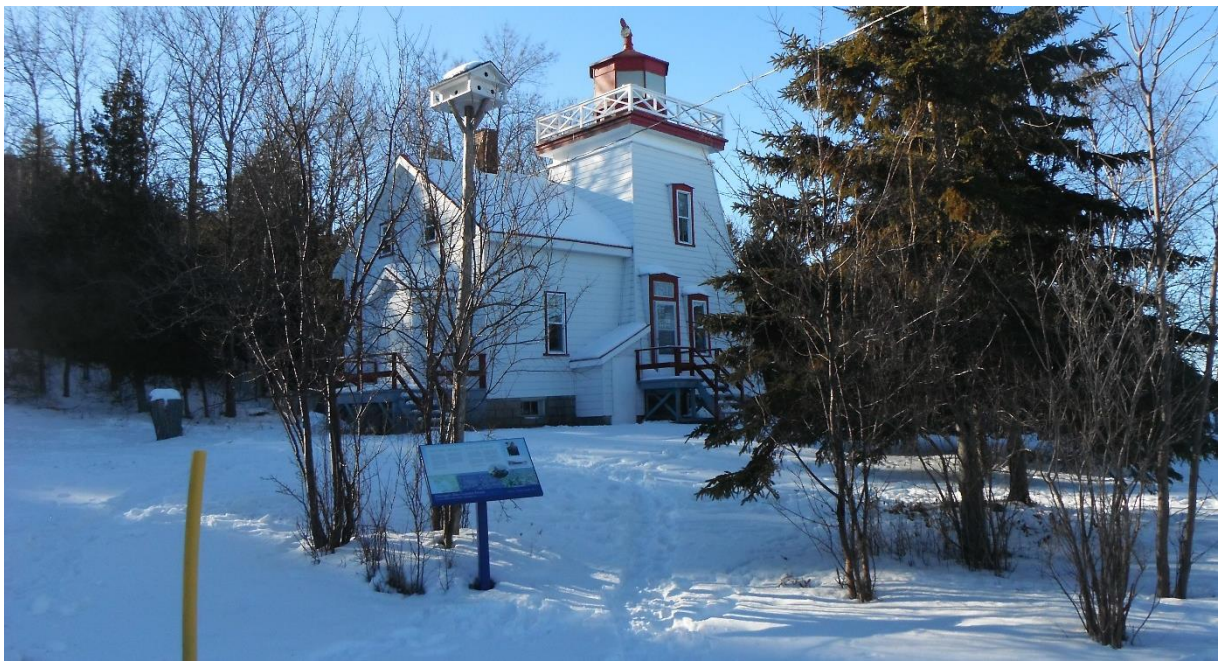
Other Chemicals and Wastes include potentially toxic substances that may exist at the subject building. These may include water treatment chemicals associated with heating and cooling systems, heating fuels, building maintenance supplies such as paint and paint stripper, building cleaning supplies containing chemicals such as sodium hypochlorite and ammonium hydroxide and pesticides. In line with the objectives of this assessment, efforts were made to identify whether substances were in use, are present for intended future use or have become obsolete. It is recommended that; 1) the health and safety information of those substances identified as having use at the subject facility be reviewed in order to ensure that they appropriately stored and handled and; 2) wastes be gathered at a central location, classified and disposed of in accordance with the applicable regulatory requirements.

END

Environmental Property Assessment

Janet Head Lighthouse

Gore Bay, Ontario



Submitted to:
Public Works Government Services Canada
4900 Yonge Street, 11th Floor
Toronto, Ontario
M2N 6A6
PWGSC Project No.: **R.059895.005**

Prepared by:
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Cambridge, Ontario, N3H 4R7
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Amec Foster Wheeler Project No.: **TC150101**
31 March 2015

EXECUTIVE SUMMARY

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), is pleased to provide Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans Canadian Coast Guard (CCG) with the following environmental condition assessment of the Janet Head Light Station in Gore Bay, Ontario. The environmental condition assessment includes an intrusive soil investigation, a designated substances survey, and a limited structural assessment, all as indicated by the PWGSC Statement of Work (SOW), dated November 25, 2014.

The objectives of the assessment were to update the environmental condition of the Site through an intrusive soil investigation, a designated substances survey, and a limited structural assessment. More specifically, the objectives were as follows:

1. Update the environmental condition of the Janet Head Lighthouse property with respect to the delineation of metal impacts in soil in the vicinity of the structure through an intrusive subsurface investigation;
2. Inspection and assessment of the Janet Head Lighthouse for the presence of designated substances including asbestos containing material, lead and/or PCB containing paint, and other designated or hazardous substances; and,
3. Evaluation of the structural integrity of the building on Site as it relates to the feasibility of any remedial work or abatement, if required.

Intrusive Subsurface Investigation

Based on the results of the intrusive investigation, Amec Foster Wheeler offers the following conclusions with respect to the environmental condition of the subsurface material in the vicinity of the Janet Head Lighthouse:

1. In general, the subsurface conditions at the Site consisted of native, organic topsoil at surface, overlying sand with some gravel fill stratum underlain by a native silty clay stratum;
2. The soil across the Site is considered to be coarse textured for the purpose of this assessment;
3. No observable odours or staining were observed in the overburden soil samples;
4. Results of the soil chemical analyses indicated that metals were detected and exceeded the applicable CEQG and Table 6 SCS relatively broadly across the Site, The most ubiquitous impacts observed include lead, but zinc and thallium are also fairly widely distributed:

5. Amec Foster Wheeler verified that the vertical extent of impacts is limited to the upper 15 cm in portions of the Site and no greater than the upper 40 cm in other known contaminated areas on Site:
6. The highest concentrations of metals, and the largest variety of impacts was observed in the immediate vicinity of the former dump area, and the extent lateral extent of the impacts in the former dump area is more extensive than previously reported, suggesting that the actual footprint of the former dump may have been larger than previously thought;
7. While small areas of the Site remain not fully delineated, Amec Foster Wheeler estimates that the overall quantity of contaminated material on-Site is 230 to 280 m^3; and,
8. Results of the soil chemical analyses indicated that a TCLP characterization identifies the surficial soils as solid, non-hazardous, non-registerable waste.

In summary, the analytical results, combined with the observed field conditions and previous investigations at the Site suggests that metals detected in soil at the Site has resulted from the past and present uses of the Site as a lighthouse. Impacts appear to have been derived largely from the use of lead based paint, and from the disposal of metal containing waste in a small on-Site dump area. For clarity, based on the small size of the on-Site dump area, Amec Foster Wheeler assumes that it was used exclusively for disposal of demolition and construction waste by the occupants of the Janet Head Lighthouse. While minor uncertainty remains with respect to the delineation of impacts in the southwest portion of the impacted area on-Site, based on the observed concentration of metals (mainly lead) in this area, and the heterogeneity inherent with metal impacts in soil, there would be little benefit, if any, to further delineating the impacts at this location.

DSHMS

Based on the results of the designated substances and hazardous materials survey Amec Foster Wheeler drew the following conclusions:

Asbestos-Containing Materials (ACM)

- Non-friable ACM includes vinyl floor tile (samples 2A-C and 3A-C), mastic associated with one variety of vinyl floor tile (samples 2A-C), and the vinyl portion of one variety of vinyl sheet flooring (samples 4A-C);
- The vinyl component of vinyl sheet flooring is non-friable ACM; however, the paper/fibrous backing of vinyl sheet flooring may become friable during disturbance or removal operations; and,
- ACM may also be present in forms that were not observed or sampled during the Site survey. Presumed ACM is listed in Section 4.6.1.8 of this report.

Lead

- Lead was detected in all six paint samples at concentrations between 0.024 and 18 percent by weight, which exceeded the PWGSC criteria of 0.009% by weight. Red paint on the exterior light house structure (sample P5 contained 4% lead) was observed to be in poor (flaking) condition; and,
- Other potential lead-containing materials include conduits, cable coverings, electrical equipment, and lead-acid emergency light batteries.

Silica

- Presumed to be present in masonry and concrete products.

Mercury

- Mercury vapour is present in fluorescent light fixtures; and,
- Mercury may be a component of some paints.

Polychlorinated Biphenyls (PCBs)

- Light fixtures are suspected to contain PCB ballasts based on the age of the Site building; and,
- PCBs was detected at a concentration of 1.64 ppm in one sample of white paint (sample P6) on the exterior of the structure, which is below the Federal Regulation of 50 ppm for solids.

Ozone-Depleting Substances (ODS)

- One refrigeration unit presumed to contain ODS was found within the site building.

Suspect Visible Mould Growth (SVG)

- SVG was not observed on the surface of accessible building materials at the time of the survey.

Urea Formaldehyde Foam Insulation (UFFI)

- UFFI was not observed in accessible areas of the building structure.

Radioactive Materials

- One smoke detector presumed to contain a small amount of radioactive material was present in the Site building.

Chemical Storage, Fuel, Oil Storage

- Chemicals, fuel or storage tanks were not observed in accessible areas of the building structure.

Other designated substances and hazardous materials may also be present in concealed locations not accessible as part of this scope of work.

Limited Structural Assessment

Based on the limited structural assessment completed Amec Foster Wheeler draws the following conclusions with respect to the structural integrity of the building.

The structure, reportedly constructed in 1879, is presently 136 years of age. The normal useful life of a wood structure is approximately 100 years depending on quality of materials used, construction methods, maintenance, and exposure to the elements.

The overall condition of the tower and adjoining structure is considered to be poor, and has outlived its' normal useful life.

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1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), is pleased to provide Public Works and Government Services Canada (PWGSC) on behalf of the Department of Fisheries and Oceans Canadian Coast Guard (CCG) with the following environmental condition assessment of the Janet Head Light Station in Gore Bay, Ontario. The environmental condition assessment includes an intrusive soil investigation, a designated substances survey, and a limited structural assessment, all as indicated by the PWGSC Statement of Work (SOW), dated November 25, 2014.

1.1 Site Description and History

The Gore Bay (Janet Head) Light Station (L.L 1023) is located on the western shore of Manitoulin Island, near Gore Bay Ontario (hereafter referred to as the "Site"). The CCG property covers a total area of approximately 1.3 hectares on the south shore of the North Channel at the entrance to Gore Bay. The original lighthouse was constructed in 1879 as a navigation aid for vessels along the northern shore of Lake Huron.

Previous investigation at the site (DCS, 1998) identified Designated Substances and Hazardous Materials including lead and/or polychlorinated biphenyls (PCBs) in paint (interior floors of the lighthouse), asbestos containing materials (ACMs; vinyl floor tile and sheet flooring in the lighthouse first floor), possible ozone depleting substances (in refrigerator and freezer) and possible PCBs in a pole mounted transformer and ballast associated with the navigational light. A soil sample collected in the vicinity of an obsolete above ground storage tank (since removed) near the lighthouse revealed lead concentrations exceeding the then-current guidelines; however, no impacts were noted for petroleum hydrocarbon compounds.

Subsequent Investigations completed by DCS (2002) identified soil impacts by various metals (antimony, arsenic, barium, cadmium, copper lead, mercury and zinc) in the vicinity of a former on Site dump. DCS estimated that approximately 200 m^3 of soil at the site was contaminated.

A risk assessment completed by Dillon (2006) considered that all age groups might visit the light station including frequent visits by local residents, as well as potential exposure for an on-Site maintenance worker. Risk levels were generally deemed to be acceptable for the human receptors considered. Overall it was concluded that the soil contamination (particularly by lead) posed no immediate risk but that it should be addressed due to frequent potential exposure by residents. The RA also indicated that potential concerns with soil borne organisms, soil micro-biota, and invertebrates may also exist; however, based on the lack of visual evidence of stressed vegetation they were not anticipated to be adversely affected by the soil contamination. The predicted risks to birds and mammals were found to be acceptable with a significant factor being the limited spatial extent of the contamination. No evaluation of invertebrate health was

conducted. It was concluded that the elevated concentrations of metals in soil were not expected to have a deleterious effect on local wildlife.

With no significant risks anticipated to either human health or the environment no further action was considered warranted at that time for the Janet Head Light Station. A map indicating the location of the Site and surrounding area is provided on Figure 1, while a plan of the Site and surrounding area is provided in Figure 2.

1.2 Current and Proposed Future Uses

The Site is predominantly grassed with the exception of a gravel covered parking area and the footprint of the lighthouse itself. The property is of some historical significance and is a tourist attraction, although evidence, including the type and age of the contents of the dwelling, suggest that the dwelling is also used as a seasonal cottage and, based upon this, Amec Foster Wheeler assumed that residential land use was appropriate for regulatory purposes (as described below).

2.0 OBJECTIVES

The objectives of the assessment were to update the environmental condition of the Site through an intrusive soil investigation, a designated substances survey, and a limited structural assessment. More specifically, the objectives were as follows:

1. Update the environmental condition of the Janet Head Lighthouse property with respect to the delineation of metal impacts in soil in the vicinity of the structure through an intrusive subsurface investigation;
2. Inspection and assessment of the Janet Head Lighthouse for the presence of designated substances including asbestos containing material, lead and/or PCB containing paint, and other designated or hazardous substances; and,
3. Evaluation of the structural integrity of the building on Site as it relates to the feasibility of any remedial work or abatement, if required.

3.0 INTRUSIVE SUBSURFACE INVESTIGATION

3.1 Scope of Work

The following tasks were completed as part of the Scope of Work for the intrusive subsurface investigation:

- Reviewed existing historical information and completed a data gap analysis to assess whether modifications to the proposed scope of work were warranted;
- Arranged for the location of underground and overhead utilities including natural gas pipelines, water services and telephone and electrical conduits marked by the local utility companies and/or their representative agents to clear the planned borehole locations in advance of drilling operations;

- Collected soil samples which included drilling of sixteen boreholes, logging soil characteristics and field screening for evidence of negative impact using visual and olfactory screening methods;
- All of the boreholes were finished by backfilling with bentonite;
- Submitted vertically stratified soil samples from each borehole (i.e., shallow, 0-15 cm; intermediate, 25-40 cm; and deep, 60-75 cm) for analysis of metals; however, samples from the deep strata were submitted on hold pending the results of the intermediate samples. If intermediate sample analysis indicated that metal impacts were present the corresponding deep sample was then analyzed for metals as well;
- Compared the analytical results reported for the soil samples to the appropriate CEQG)) for the current or intended land use;
- Submitted representative composite soil sample for Toxicity Characteristic Leachate Procedure (TCLP) metals analysis; and,
- Prepared this report documenting the findings of the assessment, including an outline of the methodologies used, stratigraphic and instrumentation logs, analytical results for all samples, an interpretation of the findings.

3.2 Regulatory Framework

Federal contaminated Sites are evaluated using the *Canadian Environmental Quality Guidelines* (CEQG) developed by the Canadian Council of Ministers of the Environment (CCME). The CEQGs are risk based, numerical guidelines for various media excluding groundwater. The appropriate SCS for the Site are the Soil Quality Guidelines for the Protection of Environmental and Human Health for residential/parkland property Use "Residential / Parkland CEQG". While the Site itself is a tourist attraction it is evident that a portion of the on-Site building is occupied as a seasonal dwelling during the summer months, as such the more conservative residential / parkland property use is assumed for the property

Considering the possibility of divestiture of this property Amec Foster Wheeler also compared all results to the applicable Ontario Ministry of the Environment and Climate Change (MOECC) Site Condition Standards (SCS) outlined in "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*", Ministry of the Environment (MOE), 15 April 2011. The application of the appropriate generic effects-based SCS is dependent upon several site-specific conditions including: 1) the existing/proposed property use; 2) the existing/potential ground water use; 3) depth of clean-up; 4) soil texture; 5) depth to bedrock; and 6) proximity to a water body or Areas of Natural Significance.

The SCS applicable to the Site have been evaluated on the basis of the following rationale:

- The current and intended future use of the property is assumed to be residential. While the Site itself is a tourist attraction it is evident that a portion of the on-Site building is

occupied as a seasonal dwelling during the summer months, and as such the more conservative residential/parkland property use is assumed for the property;

- There are no known areas of natural significance or conditions in the vicinity of the Site, which would cause the Site to be classified as potentially sensitive according to the Ministry of Natural Resources' Natural Heritage Information Centre web site;
- Based on previous investigations of the Site, it was determined that less than 2 metres of soil exists over bedrock for more than two-thirds of the property, and therefore, the Site would be classified as sensitive, under *O.Reg. 153/04*, as amended;
- Ground water could be used as a source of potable water on the Site, as the street is not municipally serviced;
- The Site does not include land that is within 30 m of a "water body"; and,
- Based on the soil conditions observed in the field and upon examination of the soil samples by Amec Foster Wheeler, the predominant subsurface soil conditions across the Site are considered coarse textured for the purposes of assessment.

Based on the above Site characteristics, the Site would be classified as being Environmentally Sensitive per O. Reg. 153/04 (as amended), and the appropriate property use classification would be commercial. Therefore, the appropriate SCS for the Site are the Table 6, shallow soil, potable ground water standards for residential / parkland / Institutional property use and coarse-textured soils ("EPA Table 6 SCS").

The composite soil sample was analyzed for metals parameters under Schedule 4, O. Reg. 558 and the laboratory results were compared to the Schedule 4 Leachate Quality Criteria of O.Reg. 558/00 under the *Environmental Protection Act*.

3.3 Field Preparation

3.3.1 Subsurface Utility Locates

The locations of all buried and overhead services were obtained prior to the initiation of any of the subsurface investigations. All on-site underground utilities were marked by the public utility locating services, in order to clear the individual borehole locations prior to their advancement.

3.3.2 Quality Assurance/Quality Control Program

A strict Quality Assurance/Quality Control (QA/QC) program was implemented and maintained throughout the project to ensure the Site data to be representative of the actual Site conditions. The QA/QC program provides a method of documented checks to assess the precision and accuracy of collected data. The QA/QC program includes a set of standard procedures or protocols to be followed throughout the investigations. To this end, Amec Foster Wheeler field and QA/QC protocols have been developed to meet or exceed those defined in the MOE documents entitled *Guide for Completing Phase Two Environmental Site Assessments under Ontario Regulation 153/04* (June 2011) and *Protocol for Analytical Methods Used in the*

Assessment of Properties under Part XV.1 of the Environmental Protection Act (9 March 2004, amended as of 1 July 2011). The field QA/QC program included the following components:

1) The use of personal protective equipment (PPE) including hard hats, safety glasses, safety work boots, and chemically resistant latex/nitrile gloves for sample handling;
2) Thorough documentation of all field activities and sample handling practices including field notes, chain of custody forms, memos to file, etc.;
3) Thorough decontamination of all sampling equipment employed in all investigation phases;
4) The incorporation of blind duplicate samples into the sampling and analytical programs to assess the validity of the data received from the analytical laboratory; and,
5) The use of laboratory analytical protocols and method detection limits that have been established in accordance with regulatory requirements for the province of Ontario.

3.4 Subsurface Investigations and Soil Sampling

The subsurface conditions and representative samples of soil media were obtained through the completion of a multi-faceted investigation and sampling program that included the drilling of boreholes. The subsurface geological conditions were established from visual observations and soil samples collected during the borehole drilling program. Soil quality data was obtained from visual and olfactory observations, field screening methods and laboratory analytical data.

3.4.1 Borehole Drilling

A total of sixteen boreholes (BH1 through BH16) were advanced in the targeted areas of concern on the Site on 27 January 2015. The borehole locations are indicated on Figure 2. The borehole locations were selected to intersect potential subsurface soil contamination and to establish the site-specific shallow geological characteristics beneath the Site.

The drilling was completed by Strata Soil Sampling of Markham, Ontario. The boreholes were advanced through the shallow overburden to a depth of 0.75 m below surface grade using a portable Pionjar 120 drilling equipment, equipped with split spoon sampling equipment. Seventy five centimetre (75 cm) long soil samples were collected in the overburden (where useable) using a modified split spoon sampling technique in the shallow overburden. All drilling activities were completed under the supervision of Amec Foster Wheeler field staff.

3.4.2 Soil Sampling

The soil samples collected during the borehole investigations were examined, classified, and logged according to soil type, moisture content, colour, consistency, and presence of visual and/or olfactory indicators of negative impact. Borehole soil samples were split into vertically stratified depth intervals (0-15cm (A) 25-40 cm (B), and 50-75cm (C)) fractions upon recovery at the surface. All of the sample fractions were placed in 120 ml sample jars with Teflon-lined lids and subsequently stored in coolers at 4°C for future potential laboratory analysis.

A single "representative" soil sample of the impacted materials that require off-site disposal was submitted to ALS Laboratories, as a composite for TCLP metals screening analysis, in order that the impacted soils may be accepted at an appropriately licensed facility.

All soil samples were collected in accordance with strict environmental sampling protocols to minimize variability and to ensure reliable and representative results. Disposable nitrile gloves were used and replaced between the handling of successive samples. All soil sampling equipment (stainless steel trowels, spatulas, etc.) was thoroughly subjected to physical removal of any frozen or adhered debris between soil sample locations to prevent potential cross-contamination.

3.4.3 Sample Screening

All soil samples were screened in the field for gross evidence of negative environmental impact including staining and odours. The duplicate borehole soil sample fractions were selected based on visual and olfactory observations.

3.4.4 Soil Sample Analyses

Soil samples deemed to be representative of the Site conditions were collected and placed in laboratory-supplied glass jars. The samples were selected on the basis of visual/olfactory evidence of contamination, stratified sampling rationale, on the basis of at least three different depth intervals (0-15cm (A) 25-40 cm (B), and 50-75cm (C). Additionally one composite soil sample representative of the potentially impacted soils was collected and placed in a laboratory-supplied glass jar. All laboratory samples were stored in a cooler and kept cool during transport to the laboratory. Continuous Chain of Custody documentation was maintained.

In total, thirty seven (37) discrete, soil samples collected from the boreholes during the borehole drilling and soil sampling were submitted to the laboratory for analysis of metals. In addition, duplicate samples DUP1, DUP2, DUP3, DUP4, and DUPC1 were obtained from the following samples BH11B, BH9B, BH5B, BH15A, and BH10C and also submitted for laboratory analysis for metals. One composite sample was collected from the potentially impacted materials for analysis of TCLP metals screening.

3.5 Laboratory Analyses

Representative soil samples collected during the investigation were submitted for laboratory analysis of the suspect parameters of concern. The soil laboratory chemical analysis was conducted by ALS Laboratories of Waterloo, Ontario. ALS is a Standards Council of Canada certified laboratory in accordance with ISO/IEC 17025:1999 – "*General Requirements for the Competence of Testing and Calibration Laboratories*" for the tested parameters set out in the Soil, Ground Water and Sediment Standards.

3.6 Results of the Intrusive Investigation

3.6.1 Site Geology

The subsurface conditions encountered at the Site are described in the stratigraphic and instrumentation logs provided in Appendix A. In general, the subsurface conditions at the Site consisted of native, organic topsoil at surface, overlying sand with some gravel fill stratum underlain by a native silty clay stratum. The soil across the Site is considered to be coarse-textured for the purpose of this assessment. Bedrock was not reached during drilling activities and is therefore greater than 0.75 m bgs throughout the site.

3.6.2 Field Measurements and Observations

No observable odours or staining were observed in the overburden soil samples.

3.6.3 Laboratory Analysis

The results of the soil sample analyses carried out as part of the assessment are summarized in Table 1. A discussion of the results of the laboratory analyses in the context of the applicable standards are provided in the following sections. Copies of the laboratory Certificates of Analysis are provided in Appendix B.

3.6.4 Soil Sample Analyses

A total of forty-two (42, including duplicates) soil samples collected during the borehole sampling program were submitted for metals analysis. Of the metal impacts detected, lead was by far the most ubiquitous with concentrations exceeding the CEQG (140 µg/g) in eleven (11) of sixteen (16) sampling locations in shallow soil samples, and exceeding the CEQG in five of 16 sampling locations in the intermediate samples. Further to the above, lead impacts were in excess of the Table 6 SCS (120 µg/g) in an additional three (3) and one (1) sampling location for shallow and intermediate soil samples, respectively. Details regarding the lead concentrations are provided in Table 1. In addition to lead impacts thallium, and/or zinc were also detected in shallow soil samples collected from six (6) sampling locations and in intermediate samples collected from three (3) locations. Barium was detected above the CEQG (500 µg/g) in shallow samples collected from BH10A and BH12A. Arsenic, copper and tin were also detected above their respective CEQG of 12 µg/g, 63 µg/g and 50 µg/g, in the shallow sample collected from BH10. In general, concentrations of the same parameters exceeded their respective Table 6 SCS; however, subtle variations exist due to slight differences between the Table 6 SCS and the CEQG, for some parameters. None of the samples submitted from the deep soil strata exceeded either the CEQG or the Table 6 SCS for any of the metals parameters analysed. Details of all analysis are provided in Table 1. All metal exceedances in soil are shown on Figure 3, along with the inferred extent of impacts in the shallow (0-15 cm) and intermediate (0-40 cm) depth intervals.

Notably, the most heavily impacted material on Site is clearly in the vicinity of the former “dump area”. Interestingly, even in these areas where metal impacts are considerably higher than anywhere else on Site within the intermediate strata, the concentration of metals in deeper soil remains well below the applicable CEQG and Table 6 SCS. Soil exceedances are shown on Figure 3.

It should be noted that the vertical extent of impacts appears to be fully delineated across the site; however, the lateral extent of impacts remains unclear along the south west corner of the contaminated area. Step out samples collected by Amec Foster Wheeler during this investigation clarified previously undefined impact boundaries (when compared to CEQGs); however, we failed to fully delineate the lateral extent of impacts at this location. Based on previous investigations it was assumed that one additional step-out sample at this location would be sufficient to delineate, unfortunately it was also impacted. Furthermore, there is no reliable and cost effective method to screen samples in the field for metals at concentrations typically encountered on-Site. Nevertheless, based on the areas that are fully delineated, and assuming any additional impacts outside the delineated area to the southwest would be relatively minor, Amec Foster Wheeler estimates a total of 230 to 280 m^3 of metal contaminated soil exists on-Site.

TCLP metals analysis presented on Table 2 indicate that there are no exceedances of the O. Reg. 347/90, Schedule 4 Leachate Criteria. Therefore, impacted soil identified for off-Site disposal to a Ministry of Environment licensed landfill facility can be classified as solid, non-hazardous, non-registerable waste.

3.7 Quality Assurance Program

3.7.1 Accreditation

The analytical laboratory employed to perform the laboratory analyses is accredited by the Standards Council of Canada in accordance with ISO/IEC 17025:1999 – "*General Requirements for the Competence of Testing and Calibration Laboratories*" for the tested parameters.

3.7.2 Criteria

The "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the *Environmental Protection Act*" (the "Analytical Protocol"), March 2004, establishes performance criteria for use when assessing the reliability of data reported by analytical laboratories. These include maximum hold times for the storage of samples/sample extracts between collection and analysis, specified/approved analytical methods, required field or laboratory quality assurance samples such as blanks and field and laboratory duplicates, specified recovery ranges for spiked samples and surrogates (compounds added to samples in known concentrations for calibration purposes), Reporting Detection Limits (RDLs) and specified precision required when analyzing laboratory duplicate and spike/controlled reference material samples.

3.7.3 Data Validation

All samples/sample extracts were analyzed within their applicable hold times using approved analytical methods. The RDLs were met for all tested parameters. Agreement between the corresponding datasets for the reference material samples where applicable and recoveries reported for spiked samples/blanks, where applicable, is acceptable. Agreement between the corresponding datasets for the laboratory duplicate samples is considered acceptable. In summary, the analytical results reported for samples collected during this investigation are considered to have met the performance criteria of the Analytical Protocol.

3.7.4 Field QA/QC Samples

The results of the field duplicate sample analyses indicate that the sampling results are generally reproducible with relative percent differences (RPD) for the primary and duplicate samples reporting within acceptable ranges with the following exception. Sample DUP3 exceeds the target RPD target of 50% for barium, lead, and titanium concentrations; this is due to the soil stratum of the corresponding sample BH9B being obtained in an inferred fill material stratum illustrating the variability of the soil chemistry within the fill material. Sample DUPC1 exceeds the target RPD target of 50% for concentrations of lead only; the variance is due to a non-homogeneous clay deposit within the corresponding BH10C sample which exhibits varved layering with increased silt content providing restricted contaminant transport within the soil stratum making it impracticable to submit completely homogeneous soil samples for laboratory analysis.

3.8 Conclusions

Based on the results of the intrusive investigation, Amec Foster Wheeler offers the following conclusions with respect to the environmental condition of the subsurface material in the vicinity of the Janet Head Lighthouse:

9. In general, the subsurface conditions at the Site consisted of native, organic topsoil at surface, overlying sand with some gravel fill stratum underlain by a native silty clay stratum;
10. The soil across the Site is considered to be coarse textured for the purpose of this assessment;
11. No observable odours or staining were observed in the overburden soil samples;
12. Results of the soil chemical analyses indicated that metals were detected and exceeded the applicable CEQG and Table 6 SCS relatively broadly across the Site, The most ubiquitous impacts observed include lead, but zinc and thallium are also fairly widely distributed:
13. Amec Foster Wheeler verified that the vertical extent of impacts is limited to the upper 15 cm in portions of the Site and no greater than the upper 40 cm in other known contaminated areas on Site:
14. The highest concentrations of metals, and the largest variety of impacts was observed in the immediate vicinity of the former dump area, and the extent lateral extent of the impacts in the former dump area is more extensive than previously reported, suggesting that the actual footprint of the former dump may have been larger than previously thought;
15. While small areas of the Site remain not fully delineated, Amec Foster Wheeler estimates that the overall quantity of contaminated material on-Site is 230 to 280 m^3; and,
16. Results of the soil chemical analyses indicated that a TCLP characterization identifies the surficial soils as solid, non-hazardous, non-registerable waste.

In summary, the analytical results, combined with the observed field conditions and previous investigations at the Site suggests that metals detected in soil at the Site has resulted from the past and present uses of the Site as a lighthouse. Impacts appear to have been derived largely from the use of lead based paint, and from the disposal of metal containing waste in a small on-Site dump area. For clarity, based on the small size of the on-Site dump area, Amec Foster Wheeler assumes that it was used exclusively for disposal of demolition and construction waste by the occupants of the Janet Head Lighthouse. While minor uncertainty remains with respect to the delineation of impacts in the southwest portion of the impacted area on-Site, based on the observed concentration of metals (mainly lead) in this area, and the heterogeneity inherent with metal impacts in soil, there would be little benefit, if any, to further delineating the impacts at this location.

4.0 DESIGNATED SUBSTANCES & HAZARDOUS MATERIALS SURVEY

4.1 Introduction

The DSHMS was planned to identify the extent of designated substances in readily accessible areas of the structure, as defined and regulated by Section 30 of the Ontario Occupational Health Safety and Safety Act (OHSA) Revised Statues of Ontario 1990 (as amended), and enforced by the Ontario Ministry of Labour (MOL). “Environmentally Regulated Materials” (hazardous materials) included in the survey are not regulated by Section 30 of the OHSA; however, these materials may be associated with disposal requirements and impact the work and workers on the project.

Amec Foster Wheeler understands that the purpose of the DSHMS was to support renovation and remediation to address any environmental concerns, if present.

4.2 Scope of Work

The DSHMS was completed in general accordance with Amec Foster Wheeler’s proposal (Number TRP1314081) dated December 5, 2014. The scope of work included the following activities:

- Review of previous DSHMS reports, environmental reports, abatement records, and building construction and renovation information, as made available by the Client.
- Conduct a survey of readily accessible areas within the structure to identify building materials suspected to contain designated substances, including asbestos, lead, and mercury. The survey of hazardous materials included materials containing polychlorinated biphenyls (PCBs), ozone-depleting substances, urea formaldehyde foam insulation (UFFI), mould growth, radioactive materials, chemical storage and fuel oil and/or waste oil storage. The survey included a description of the materials suspected to contain designated substances and hazardous building materials as well as their known locations,

physical condition, and where possible a visual estimation of quantity. Digital photographs were taken of the identified building materials that contained designated substances or hazardous materials.

- Collect bulk samples of all readily accessible suspected asbestos-containing building materials (ACM) and paint samples potentially containing lead.
- Collect bulk samples of building materials or surface tape lift samples of suspect visible mould growth (SVG).
- Collect select bulk samples of paint suspected to contain PCBs.
- Submit analytical samples in accordance with appropriate quality assurance/quality control (QA/QC) protocols to accredited laboratories for analysis.
- Prepare this report that includes a description of sampling and analytical methods, interpretation of the analytical results, a discussion of findings, and conclusions and recommendations for the management of the identified materials, as appropriate.

4.3 Regulatory Requirements and Guidelines

4.3.1 Designated Substances

This designated substances report is made to fulfill the Owner's requirements under Section 30 of the OHSA. The building owner must provide this report to all contractors working on the Site. Subsequently, all contractors must furnish this report to their subcontractors. The designated substances defined under the OHSA and their corresponding regulations at the time of the survey are summarized below.

"Designated Substance" as defined by the OHSA means "*a biological, chemical or physical agent or combination thereof prescribed as a designated substance to which the exposure of a worker is prohibited, regulated, restricted, limited or controlled*." The OHSA has issued specific regulations under Section 30 of the Act for these substances. The Designated Substances Regulations identified under the Industrial Regulation of the OHSA, provide guidance on exposure and medical monitoring, permissible occupational exposure limits, etc.

The MOL issued a regulation and/or guideline associated with construction related activities for only three of the eleven designated substances and includes asbestos, lead, and silica.

There are eleven designated substances defined by the OHSA, which are regulated by Ontario Regulation *Designated Substances* (O.Reg. 490/09) in a workplace, as defined by these regulations (manufacturing/process). During manufacturing processes and work within a workplace, hygiene air monitoring could be performed to assess worker exposure levels.

4.3.1.1 Asbestos

The handling, identification, documentation, and removal of asbestos are regulated by Ontario Regulation 278/05 *Designated Substance – Asbestos on Construction Projects and In Buildings*

and Repair Operations (O.Reg. 278/05). ACM is defined by O. Reg. 278/05 as being a material that contains 0.5 percent or more asbestos fibers by dry weight. As described in Section 8 of O. Reg. 278/05, a record of ACM must be developed as part of on-going asbestos management in buildings. The record of ACM includes, but is not limited to, the location and condition of ACM and whether it is considered friable or non-friable.

Asbestos is the name used for a group of fibrous minerals that occur naturally in soil and rock. There are over 3,000 products that may have contained asbestos, such as roofing shingles, ceiling tiles, floor tiles, asbestos cement products, gaskets, insulation, paper products, and other building and insulating products. ACMs are divided into the following two broad categories:

- **Friable ACM:** materials that, (a) when dry, can be crumbled, pulverized or powdered by hand pressure, or (b) is crumbled, pulverized or powdered (O. Reg. 278/05 definition). Typical friable materials include acoustical or decorative spray applications, fireproofing, and mechanical insulation.

  ACM that is friable has a much greater potential than non-friable ACM to release airborne asbestos fibres when disturbed. The most common friable ACM used in the past are surfacing materials (usually sprayed fireproofing, texture, decorative or acoustic sprayed finishes) and thermal insulations on mechanical systems.

- **Non-friable ACM:** hard or manufactured products wherein the asbestos fibres are bound. Typical non-friable ACM includes; tar and floor tiles, pre-formed manufactured cement wallboards, pipes, and siding. Though many non-friable ACM products are considered non-friable when intact, they can become friable during demolition or renovation activities.

Special considerations: Some ACMs, such as plaster, compressed fibre ceiling tiles and drywall compound are considered non-friable materials when in-place and in good condition as the associated binding agent prevents the release of airborne fibres. These materials are non-friable in place, but can generate dust upon disturbance/removal. These materials are referred to as potentially friable materials (or miscellaneous friable materials). However, the binding agent can be relatively weak, and if disturbed or damage in any way, the material may act as a friable material with an increased risk of asbestos fibre release. These materials must be handled as friable materials in the event of any disturbance or damage.

Vermiculite insulation is an unconsolidated material and asbestos fibres may not be uniformly distributed in the material. As such, the standard Phase Light Microscopy (PLM) analytical method is not recommended for quantification and is used solely to determine the presence or absence of asbestos fibres. Any observation of asbestos fibres in the sample is reported as positive for asbestos, or negative (non-detect) if not observed.

There has never been a complete ban on the use of asbestos products in Canada, although asbestos products are subject to various prohibitions and restrictions under Provincial and Federal legislation. While ACMs are still manufactured globally and are available for limited use in Canada, the building products available since the late 1980s to early 1990s tend to be low risk, non-friable materials. Buildings between 1986 and 1990 are unlikely to contain high risk ACM such as mechanical or spray applied insulation and newer buildings (post 1992) are less likely to contain non-friable ACM.

4.3.1.2 Lead

In building construction, lead was frequently used for roofs, cornices, tank linings, electrical conduits, as a main component of soft solder ally used to seal pipe joints and in caulking, ceramic glazing and other such materials. Lead was also used extensively for pigmentation, sealing, and as a drying agent in oil based paints up until the early 1950s.

The MOL issued the "*Lead on Construction Projects*" guideline in September 2004. The guideline includes legal requirements, health effects, control of the health hazard, classification of construction operations, and measures and procedures for working with the designated substance during operations that create lead dust or fumes. The OHSA does not set a regulatory limit on the concentration of lead in paint and based on discussions with the MOL, any concentration of lead in paint applications should be considered to be lead-containing.

The United States Department of Housing and Urban Development (US HUD) guideline of 1 milligram per square centimetre (mg/cm^2), 0.5 percent lead by weight, or 5,000 parts per million (ppm) lead is used in the United States as a guideline for determining whether the use of safety precautions would be required during operations that create lead dust or fumes.

In 1976, the Canadian Federal Government introduced the Liquid Coating Materials Regulations under the Federal Hazardous Products Act (HPA), restricting the maximum total lead content of paints and other liquid coating materials used in or around premises attended by children or pregnant women to 0.5% by weight (5,000 mg/kg). In January 1991, Health Canada negotiated a voluntary reduction of lead content in all Canadian produced consumer paint to a maximum of 0.06%. Recently the Canadian Federal Government revoked Part 1 of the HPA and enacted the Surface Coating Materials Regulations (SOR/2005-109) under the Canada Consumers Product Safety Act (S.C. 2010) which reduce the maximum total lead content of any new surface coatings for consumer products to 0.009% (90 mg/kg). This reduction does not generally apply to surface coating applied to buildings or other structures used for agricultural or industrial purposes or as an anti-weathering or anti-corrosive coating.

For this report, the PWGSC requested that the concentration of lead in paint be evaluated against the HPA criteria, which defines a lead-containing paint to be greater than 0.009% (90 mg/kg).

4.3.1.3 Mercury

Mercury can be used in fluorescent, compact fluorescent and high intensity discharge (HID) lamps, electrical switches, thermostats, thermometers, and certain batteries. All fluorescent and compact fluorescent lights contain mercury regardless of the date of manufacture.

Mercury was also commonly added to leaded paints as a fungal retardant, however it is not commonly tested for as the proper handling and disposal of lead-containing paints would typically minimize any safety or disposal issues for mercury.

In January 1991, under the voluntary industry program negotiated by Health Canada, the intentional addition of mercury to Canadian produced consumer paints for interior use ceased. Under the Federal Surface Coating Materials Regulations (SOR/2005-109), the maximum total mercury concentration of paints and other surface coatings is restricted to 10 mg/kg (0.001%) when a dried sample is tested in accordance with a method that conforms to good laboratory practices. The 10 mg/kg mercury restriction is unique to Canada and is based on a toxicological assessment by Health Canada in 1995, which was reconfirmed in 2004.

4.3.1.4 Silica

Silica is used in the manufacture of glass, ceramics, abrasives, water treatment products and filtration systems. Crystalline silica materials also are used in the production of concrete or mortar-based building materials, cement, acoustic ceiling tiles, and ceramic tiles which are used for construction purposes. Common construction sand contains free crystalline silica and is present in ceiling tiles, concrete products, mortar, and brick.

The MOL issued the "*Silica on Construction Projects*" guideline in September 2004. The guidelines include legal requirements, health effects, control of the health hazard, classification of construction operations, and measures and procedures for working with the designated substance during operations that create silica dust.

Silica may be present in many building materials and is therefore expected to be present in the Site building. As such, Amec Foster Wheeler did not specifically survey or sample for the presence of silica, however it has been noted in this report.

4.3.2 Hazardous Building Materials

4.3.2.1 Polychlorinated Biphenyls (PCBs)

PCB-containing products were manufactured for use in applications where stable, fire-resistant, and heat-transfer properties were demanded between 1926-29 and 1977. Most PCBs were sold for use as dielectric fluids (insulating liquids) in electric transformers and capacitors. Other uses included heat transfer fluid, hydraulic fluid, dye carriers in carbonless copy paper, plasticizers in paints, adhesives, and caulking compounds. In Canada, PCBs were prohibited from being used in products, equipment, machinery, electrical transformers and capacitors that were

manufactured or imported into the country after July 1980. However, older equipment in use after this date may still contain PCBs if the equipment's fluid has not been changed, or if there was sufficient inventory of such equipment.

PCBs are also regulated under the Federal Canadian Environmental Protection Act, 1999, PCB Regulation SOR/2008-273 which came into force September 2008 and subsequent amendment regulation SOR 2010-57. The Federal PCB regulations generally establish deadlines for ending the use and long term storage of PCBs and products containing PCBs. PCB-containing equipment or any PCB-containing substance with a PCB concentration at or in excess of 2 ppm for liquids and 50 ppm for solids (including applied surface coatings such as paint) are subject to the above Federal regulations.

This survey is intended for pre-renovation purposes only, and may not provide sufficient detail for long term management of PCBs or to determine end-of-use inventories as required in SOR/2008-273-PCB Regulation.

4.3.2.2 Ozone Depleting Substances (ODSs)

Ozone depleting substances (ODSs) include any substances containing chlorofluorocarbon (CFC), hydrochlorofluorocarbon (HCFC), halon or any other material capable of destroying ozone in the atmosphere. ODSs have been used in rigid polyurethane foam and insulation, laminates, aerosols, air conditioners, fire extinguishers, cleaning solvents and the sterilization of medical equipment. Federal regulations introduced in 1995 required the elimination of production and import of CFCs by 1 January 1996 (subject to certain essential uses) and a freeze on the production and import of HCFC-22 by 1 January 1996. These regulations also require the complete elimination of HCFC-22 by the year 2020.

In Canada, the Federal and Provincial governments have legislation in place for ODSs. Federally, ODS is regulated under the Federal Halocarbon Regulations (SOR/2003-289 and amendment regulation SOR/2009-221; which are under the authority of the Federal Environmental Protection Act (1999). The purpose of the Federal Halocarbon Regulation is to regulate the use, identification, leak testing and disposal of ODSs on a Federal Lands. ODSs and other halocarbons are regulated by Ontario Regulation 463/10 made under the Environmental Protection Act (EPA).

No sampling of suspect ODS-containing equipment was completed as part of this survey.

4.3.2.3 Suspect Visible Mould Growth (SVG)

Mould spores are ubiquitous in both indoor and outdoor environments and in the presence of adequate moisture, may pose a concern in a building environment.

There are currently no regulations specifically covering exposure to mould and/or mould remediation practices in Canada and there are no occupational exposure limits that define acceptable levels of mould exposure without adverse health effects. However, Section 25 and 27

of the OHSA states that an employer and supervisor must take every reasonable precaution to ensure the health and safety of their workers. This includes exposure to mould and other biological matter.

Direction on the assessment and remediation of mould in Ontario is based on the following documents:

- *"Mould Guidelines for the Canadian Construction Industry"* Canadian Construction Association (document CCA82). February 2004.
- *"Mould Abatement Guidelines, Second Edition."* Environmental Abatement Council of Ontario (EACO). 2010.
- *"Fungal Contamination in Public Buildings Health Effects and Investigation Methods"* Health Canada. 2004;

4.3.2.4 Urea Formaldehyde Foam Insulation

UFFI is a thermosetting resin or plastic insulating material made from urea and formaldehyde that was developed in Europe in the 1950s. During the 1970s, when concerns about energy efficiency led to efforts to improve home insulation in Canada, UFFI became an important insulation product for existing houses. The spray application of UFFI was reportedly used between 1977 and its ban in Canada in 1980. UFFI was banned due to developing concerns of the release of toxic formaldehyde vapour emitted in the curing process and from the breakdown of old insulation due to water or moisture damage. Health Canada has reportedly determined that 0.1 parts per million (ppm) is a safe level of formaldehyde in a residential building. Sensitivity to this concentration may vary based on individual age and health. The survey was limited to a visual inspection of readily accessible areas of the structure. No sampling of suspect UFFI was completed as part of this survey.

4.3.2.5 Radioactive Materials

The most common type of smoke detector is an ionization detector, which contains a small amount of Americium 241, a synthetic isotope which emits both alpha and gamma rays. Each smoke detector contains about 1 microcurie (about 1/ 5000 of a gram) of Americium shielded inside the detector. The gamma radiation is a low intensity ray, and much of it is blocked by the casing of the detector. According to the Nuclear Regulatory Commission, the amount of radiation that escapes the detector (at 1 meter from the alarm) is roughly 3,000 times less than normal background radiation exposure rates. The only possible health risk is if the Americium 241 is inhaled.

As well, the Nuclear Substances and Radiation Devices Regulations permits a person, without a licence, to dispose of smoke alarms containing a nuclear substance if it does not contain more than 185 kBq of americium 241. Residential ionization smoke alarms typically contain up to 33 kBq of americium 241, which is comparable to the background radiation already present in many

materials. The Canadian Nuclear Safety Commission (CNSC) has confirmed that individual smoke alarms containing americium 241 may be disposed of in the regular garbage. However, if the smoke alarm contains radium or if there are large numbers of smoke alarms to be disposed of, more than 10 units, they should be shipped to the Low Level Radioactive Waste Management Office for disposal.

4.3.2.6 Storage Tanks

Storage tanks in Ontario, if present would be subject to regulation depending on the type of tank and project stored. The potential for storage tanks at the Site, whether aboveground ASTs or USTs would likely be associated with the storage of fuel oil for heating of the residential dwellings. Heating oil is regulated by the Fuel Oil Regulation and adopted documents including the Fuel Oil Code the Ontario Installation Code for Oil-Burning Equipment based on the CSA B139 and amendments. These regulations fall under the Technical Standards and Safety Act, 2000 (the Act) which is administered by the Technical Standards and Safety Authority (TSSA).

The requirements for storage tanks under the Fuel Oil Code and CSA B139 for storage tanks that are most likely to be present at the Site are as follows:

- Any AST or UST that has not been in use for a period of two (2) years must be decommissioned including removal of all product, removal of the tank and remediation of any contamination.
- Any AST or UST that has not been in use for a period of 180 days must be temporarily decommissioned including removal of all remaining product, labeled as “Empty” and subsequently monitored monthly thereafter.

Storage tanks with petroleum products on Federal Lands are regulated under the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, SOR-2008-197. Fuel oil is regulated if stored in a tank with capacity over 2,500 Litres.

4.4 Existing Information

Previous DSHM survey reports, remediation documents or as-built drawings were not provided by the Client.

4.5 Methodology

Mr. Justin Tse of Amec Foster Wheeler performed the DSHM survey and sampling program on 27 January 2015. The extent of the survey was limited to the single light station (refer to Figures 5 to 7) proposed to be renovated as outlined by the PWGSC. The survey excluded an inspection of the roof of the cottage portion of the light station.

A room-by-room survey of all readily accessible areas in the building was performed. Suspected designated substances and hazardous materials included in this scope of work were visually identified by appearance, age, and knowledge of current and historical uses of the Site and building materials.

For the purposes of this report, building materials were assessed for the following Designated Substances: Asbestos, lead, mercury and silica. The following Designated Substances are not typically found in building materials in a composition/state that are in a hazardous form for worker exposure during general renovation and/or demolition activities. Therefore, these materials were not addressed in this survey: Arsenic, acrylonitrile, benzene, coke oven emissions, ethylene oxide, isocyanates and vinyl chloride (vinyl chloride monomer, not PVC).

Where access was possible within the surveyed area extents and inspected for the presence of DSHM included in this report. A room-by-room and area-by-area survey of readily accessible areas within the Site building was performed. Suspected DSHM included in this report were visually identified by appearance, age, and knowledge of current and historical uses of the Site and building materials. The survey includes a detailed description of any suspected DSHM identified within the building. Information was recorded where ACM and suspect lead paint were observed, including; approximate quantities where reasonable within the confines of the project scope of work, locations, condition, sample information and sample locations. Quantities reported are an approximate visual estimate.

This survey was limited to non-destructive testing at the request of the PWGSC. Concealed locations, such as spaces above solid ceilings, and within shafts and pipe chases were accessed through existing access panels only. Walls, solid ceilings, flooring, interior finishes, structural items, or exterior building finishes were not removed during the assessment to determine the presence of concealed materials. The exterior top of the lighthouse was not accessible for inspection. Therefore, additional investigation may be required to support future demolition/renovation projects.

4.5.1 Asbestos-Containing Materials – Strategy and Sampling Frequency

The survey included a detailed description of any suspected ACM identified within the rooms. Details of location, type of building material, where possible an estimation of quantity, condition, and accessibility were recorded.

There is no construction cut-off date in Provincial legislation for the provision of ACM surveys. Amec Foster Wheeler's sampling strategy is to focus on those materials most likely to contain regulated concentrations of asbestos (ACM defined as having an asbestos concentration 0.5% or greater) based on knowledge of the use and manufacture of building materials.

Asbestos bulk samples were collected in groups in compliance with the requirements of O. Reg. 278/05 (the Regulation). The Regulation identifies the minimum number of samples to be collected and analyzed (1, 3, 5, or 7 depending on quantity, application and friability) from each homogeneous material, in order for the material to be considered non-asbestos. This frequency is indicated in Table 1 of the Regulation. A homogeneous material is defined in O. Reg. 278/05, as one that is uniform in colour and texture. The surveyor used information obtained on Site by visual examination and available information on the phases of the construction, and reported renovations, to determine the extent of each homogeneous area and the number of samples required. In addition, visual differences in applications were noted where possible.

Most buildings undergo renovations on a frequent basis, including the removal and replacement of plaster finishes, drywall partitions and installation of new partitions. Attempts to distinguish and delineate asbestos-containing drywall compound from new non-asbestos drywall compound is often difficult and may be fully unachievable. This may also be applicable to other finishes such as plasters. Therefore, such materials were sampled at various locations in the building including exterior walls, columns, interior walls, stairwells and corridors and mechanical spaces to get an understanding of the Site conditions. Where various construction periods or visually similar products were present, AMEC made a reasonable attempt to follow the Regulation with respect to sampling by collecting a minimum of three or up to seven samples for each visible different material, as outlined in Table 1 of O. Reg. 278/05.

In areas where finished surfaces required partial removal to inspect hidden materials (e.g., cloth or PVC jacketing over pipe or tank insulation), a small opening was cut to allow for inspection and sampling of the underlying materials. All openings were re-sealed with industrial adhesive tape.

Bulk samples of suspected ACM were submitted under chain of custody protocol to Scientific Analytical Institute Inc. (SAI) of Greensboro, North Carolina, United States, as detailed below. SAI is accredited for bulk asbestos fiber analysis by the National Voluntary Laboratory Accreditation Program (NVLAP). Samples were analyzed using polarized light microscopy (PLM) methodology (EPA/600/R-93/116). This method is specified by O. Reg. 278/05 for establishing whether the material is asbestos-containing and defining the content and type of asbestos. Results of <0.5% asbestos are considered to be non-asbestos. Note that small asbestos fibres may be missed by PLM due to resolution limitations of the optical microscope that can result in a false negative analytical result. Negative results (non-detect for asbestos fibres) for vinyl floor tile samples were re-analyzed using Transmission Electron microscopy (TEM).

The laboratory followed a “positive-stop” analysis methodology and stop analyzing a sample set if any one of the series of samples proves to be positive for the presence of asbestos. Therefore, duplicate samples taken in order to satisfy the requirements of O. Reg. 278/05 were not analyzed if the initial sample was identified as asbestos-containing. The laboratory stopped analyzing samples from a homogeneous material once greater than 0.5% asbestos was detected in any of

the samples of that material. All samples of a homogeneous material were analyzed if no asbestos was detected. Where building materials are described in this report as non-asbestos, or described as containing no asbestos, this is subject to the limitations of the analytical method used, and should be understood to mean no asbestos was detected by the laboratory but may remain bound in compounds or in a smaller size than detectable by the specified method.

4.5.1.1 Basis of Evaluation and Recommendation

The condition and the potential for disturbance of any ACM observed were visually evaluated. The evaluation criteria were based on the existing Ontario regulation and Amec Foster Wheeler's experience involving buildings that contain ACM.

An ACM was considered damaged, if it is sprayed material that is delaminating, mechanical insulation with damaged/missing insulation or jacketing, or non-friable materials that have been pulverized or damaged so that they may have become friable.

The priority for remedial action is not only based on the evaluation of condition, but also on several other factors which include:

- Accessibility or potential for direct contact and disturbance.
- Practicality of repair (e.g., will damage to the ACM continue after it is repaired).
- Visibility/accessibility of the material.
- Efficiency of the work (e.g., if damaged ACM is being removed in an area, it may be most practical to remove all ACM in the area even if it is in good condition).

4.5.1.2 ACM Evaluation – Matrix Assessment of Condition

In evaluating the condition of ACM, the following criteria are used for mechanical insulation:

GOOD Insulation is completely covered in jacketing and/or exhibits no evidence of damage or deterioration. No insulation or friable ACM is exposed. Includes conditions where the jacketing has minor surface damage (e.g., scuffs or stains), but the jacketing is not penetrated.

FAIR Minor penetration damage to jacketed or covered surface (e.g., cuts, tears, nicks, deterioration, or delamination). Friable ACM is exposed but not showing surface disintegration. The extent of missing insulation should be minor to none and the damage should be readily repairable.

POOR Original insulation jacket or surface cover is missing, damaged, deteriorated, or delaminated. Friable ACM is exposed and significant areas have been damaged. Damage cannot be readily repaired.

In evaluating the condition of ACM, the following criteria are used for spray applied materials (fireproofing, texture finish):

GOOD Material is completely adhered to substrate and/or exhibits no evidence of damage or deterioration. Exposed sprayed fireproofing (thermal insulation) is considered to be in good condition, where no fallout or debris is present below. Painted texture finishes are in good condition (unpainted texture is considered to be in fair condition).

FAIR Minor penetration damage to paint covered surface (cracks, dents, nicks, deterioration, water damage or delamination). Friable ACM is exposed but not showing surface disintegration. The extent of missing material should be minor to none and the damage should be readily repairable. Fireproofing is either Good or Poor condition.

POOR Materials is delaminating, falling or hanging from applied surface

Non-friable ACM was considered to be in poor condition if they have been pulverized or damaged so that they have become friable. Broken, cracked or loose materials are considered to be in fair condition.

4.5.1.3 Asbestos Sampling Exclusions

A number of materials which may contain asbestos were not sampled during this survey includes, but is not limited to the following:

- Sampling the materials may cause consequential damage to the property (e.g. active equipment, asbestos-cement products, sampling roofing may cause leaks, windows);
- Sampling the material may have been hazardous to the surveyor (e.g. electrical hazard);
- The material is inaccessible without major demolition (e.g. behind existing architectural finishes, etc.);
- Sampling materials at elevated heights (beyond the reach of approximately 12 feet above ground level); or,
- The material is present in such an inconsistent fashion that without complete removal of finishes, the extent of ACM cannot be determined (e.g. floor levelling compound).

Where present these materials must be presumed to be asbestos-containing and sampling immediately prior to commencing renovation is typically the best practice.

4.5.2 Lead and Lead-Containing Paint

The survey included a description of building materials suspected to contain lead. Details of location, description, and condition were recorded.

Paint chip samples of primary paint colors potentially containing lead were collected and submitted to ALS Canada Ltd (ALS) for lead analysis. ALS is accredited for lead analysis by the National Lead Laboratory Accreditation Program (NLLAP). The samples were subsequently analyzed using flame atomic absorption spectroscopy (FAAS) methodology (ASTM D3335-85A). Paint chip samples were generally collected of typical primary paint colours from common building materials which would be subject to maintenance or recycling during demolition such as walls, trim, doors, etc. It was not the intent to sample minute colours (e.g., one random trim colour). Building materials with prefinished coating (e.g., metal siding), where a sample could not be obtained without extensive damage, where substrate interference may pose and issue or if the paint coating was inaccessible (e.g., elevated height) were not collected. Where multiple layers were identified, samples were typically collected typically as one sample as most layers could not be segregated. Given the limited paint sampling conducted, Table 6 and the room by room summary of identified materials (refer to Appendix C of this report) indicates only those locations where actual sampling was completed.

4.5.2.1 Basis for Evaluation, Condition and Recommendations

The condition and the potential for disturbance of any lead-containing material observed were visually evaluated. Condition evaluation considered similar characteristics as summarized below for condition of lead

<u>Condition</u>

- Good: no visible damage or exposed material
- Fair: repairable damage with minor amounts of exposed or damaged material (peeling, flaking), minor removal required.
- Poor: extensive damage with missing or exposed paint or substantially damaged materials

4.5.3 Mercury

The survey included the visual identification of known mercury sources, which may include thermostats, switches, and fluorescent and compact fluorescent lamps (CFL).

No sampling for mercury in paint was completed as part of this survey.

4.5.4 Polychlorinated Biphenyls (PCBs)

As part of the survey, Amec Foster Wheeler assessed the Site building for the presence of potential PCB-containing materials. Potential PCB-containing equipment or materials were identified by appearance, age and knowledge of current and historical uses of the Site and subject materials. Where possible, information labels on electrical equipment such as transformers and capacitors for motors were examined where available to determine PCB content. The information

was compared against information available in the "*Handbook on PCB's in Electrical Equipment*" issued by Environment Canada, in order to determine PCB content of materials.

Select paint samples were submitted for PCB analysis. Paint samples analyzed were determined based on general industry literature which indicated industrial paint coatings exhibiting elastomeric properties or durable paints may contain PCBs. Such coatings may be applied to or used as floor markings, floor and wall coatings, exterior doors, railings and concrete surfaces. Paint samples were randomly selected to get a general representation of all building materials surveyed

Bulk PCB samples of paints were analyzed by ALS Canada Ltd (ALS) in Waterloo, Ontario, Canada using the US EPA 3550C/8082A method. ALS Laboratory is accredited by CALA.

4.5.5 Mould

Suspected mould growth on building materials was identified by visual growth (referred to as suspect visible mould growth or SVG) or evidence of water intrusion / damage. Based on the walk-through and observations, a walk-through visual inspection was performed for evidence of substantial moisture issues and mould reservoirs and/or amplifiers. The presence and extent of any SVG and water damage was determined in readily accessible areas of the structure using reasonable means noting that Amec Foster Wheeler may not have been able to identify all possible fungal reservoirs, as certain materials may be hidden by walls, finishes and equipment.

Bulk samples or surface tape lift samples were collected of SVG only if observed in accessible areas of the structure, as per results section below, and submitted to an experienced laboratory for mould analysis using direct microscopic examination (DME).

4.5.6 ODS, UFFI, Radioactive Materials & Chemical Storage

This survey was limited to the visual identification of suspected ODS-containing equipment, UFFI, radioactive materials and chemical/fuel storage in accessible areas of the structure. No sampling of these materials were completed as a part of this survey.

4.6 Results

The following section provides an overview of the Designated Substance and hazardous materials and the presence of such substances in readily accessible areas of the structure identified during the time of the survey. The survey excluded an inspection of the roof of the cottage portion of the light station.

A room-by-room summary of identified Designated Substances and hazardous materials is provided in Appendix C. A summary of bulk samples collected and analyzed as asbestos-containing, non-asbestos, concentration of lead in paint and concentration of PCBs in paint are

provided in Tables 3, 4, 5, and 6, respectively. Photographs of select sampled materials are provided in Appendix D.

4.6.1 Asbestos-Containing Materials

A total of 37 bulk samples of suspected ACM were collected from homogeneous building materials in various locations of the building to identify the presence, estimated quantity where possible and type of asbestos. A summary of bulk samples found to contain asbestos is provided in Table 3, while bulk samples found to be non-asbestos are summarized in Table 4. A photographic log of select sampled building materials is provided in Appendix D. The sample locations, sample IDs and room locations are shown on the floor plans provided on Figures 4 through 7. A copy of the laboratory analytical results report is presented in Appendix B.

ACM is present in the building based on the visual survey, sampling and laboratory analysis program, and by visual comparison of sampled and analyzed materials to similar building materials observed (suspected ACM). A room-by-room summary of all ACM identified in the building is provided in Appendix C, which includes the location of the material, type of building material, estimated quantity, accessibility, state of asbestos, description of condition, asbestos content and type. The summary of all ACM includes both the sampled materials and the suspected materials based on comparison to sample results of similar building materials.

The following sections are presented based on the type of building materials identified in accessible areas of the structure as suspect ACM in the Site building during the time of the survey.

4.6.1.1 Plaster and Skim Coat

Smooth skim coat over plaster on walls and ceilings (samples 5A-G) were observed throughout Site building. Skim coat and plaster samples were analyzed and found to be non-asbestos.

Refer to photograph #47 in Appendix D.

4.6.1.2 Drywall Joint Compound

Drywall joint compound on walls was determined to be non-asbestos (samples 9A-C).

Refer to photograph #51 in Appendix D.

4.6.1.3 Acoustic Ceiling Tiles

One (1) visually distinct type of ceiling tile was identified as 2’x4’ square pattern with pinholes was analyzed and determined to be non-asbestos (samples 1A-C).

Refer to photograph #43 in Appendix D.

4.6.1.4 Vinyl Sheet Flooring

Two (2) visually distinct types of vinyl sheet flooring were observed in the building as follows:

- Green with green pattern (samples 4A-C); and,

- Brown square pattern (samples 6A-C).

Green with green pattern vinyl sheet flooring (samples 4A-C) in Location 5 – foyer was found to contain 25% chrysotile asbestos. The vinyl component of vinyl sheet flooring is non-friable ACM; however, the paper/fibrous backing of vinyl sheet flooring may become friable during disturbance or removal operations. This material is non-friable ACM (vinyl/top layer) when managed in-place and in good condition.

Brown Square pattern vinyl sheet flooring (samples 6A-C) in Location 4 – washroom was found to be non-asbestos by both PLM and TEM analysis.

Refer to photographs #46 and #48 in Appendix D.

4.6.1.5 Vinyl Floor Tile and Mastic

Two (2) visually distinct types of vinyl floor tile and mastic were present in the building as follows:

- 9”x9” brown with brown streaks and mastic (samples 2A-C); and,
- 12”x12” brown with brown and white streaks and mastic (samples 3A-C).

9”x9” brown with brown streaks vinyl floor tile and mastic (samples 2A-C) was found to contain 5% and 3% chrysotile asbestos, respectively.

12”x12” brown with brown and white streaks vinyl floor tile (samples 3A-C) was found to contain 3% chrysotile asbestos. Asbestos was not detected in the mastic.

Both materials are considered to be non-friable ACM and were in good condition at the time of the survey.

Refer to photographs #44 and #45 in Appendix D.

4.6.1.6 Caulking

Two (2) visual distinct types of window caulking were identified on the exterior of the Site building. White window caulking (samples 8A-C) and grey window caulking (samples 11A-C) were found to be non-asbestos.

Refer to photographs #50 and #53 in Appendix D.

4.6.1.7 Cement Products

Parging applied to the basement stone foundation walls (samples 7A-C) and mortar samples collected from the basement stone foundation walls (samples 10A-C) were found to be non-asbestos.

Refer to photographs #49 and #52 in Appendix D,

4.6.1.8 Presumed Asbestos-Containing Materials

ACMs may be present in forms that were not observed or sampled (non-friable unless noted otherwise) during the Site inspection including, but not limited to:

- roofing, felt and tar (roof not accessible for the cottage portion of the light station); and,
- adhesives and sealants;
- concrete floor leveling compound (if present);
- exterior cladding (materials that may be present under roof cladding, such as felts, tars, etc.); and,
- electrical equipment (insulation on or in high voltage wiring and components).

For the purpose of renovation, demolition, or any other alteration or disturbance, all suspect ACM, unless confirmed through sampling and analysis, should be considered to contain asbestos and handled in accordance with a written work plan as required by O. Reg. 278/05. If present these materials must be presumed to be ACM and are best sampled immediately prior to commencing renovations or demolition of the affected materials.

4.6.2 Lead-Containing Materials

4.6.2.1 Lead-Containing Paint

Paint potentially containing lead was identified in the Site building. Painted surfaces inside the building in more than a limited quantity included walls, floors, ceilings, stairs and the exterior metal lighthouse structure.

Visually distinctive paint finishes that were identified on the surface of building materials in more than a limited quantity (e.g., approximately 100 square feet or more) were sampled to identify the presence and quantity of lead-containing paint (LCP). The concentration of lead detected in the six (6) visually distinct colours (samples P1 to P6) were analyzed to contain from 0.024 to 18 percent lead by weight. The concentration of lead detected in all 6 paint samples exceeded the PWGSC criteria of 0.009%. Paint samples were identified to be in good condition with exception of the red paint on the exterior light house structure (sample P5 contains 4% lead), which appeared to be in poor (flaking) condition at the time of the survey.

A summary of the paint chip samples collected, sample locations, general description of the paint and the reported analytical results are provided in Table 5. A copy of the laboratory analytical report is provided in Appendix B. Photographs of the lead-containing paint sample locations are provided in the photographic log in Appendix D.

4.6.2.2 Other Lead Products

Based on the visual survey of the building, the Site inspection identified the following products that may contain lead: light station roof top sheeting, flashing, conduits, cable coverings, electrical equipment, and possible presence of lead-acid batteries in emergency lights.

These materials were not sampled at the time of the survey. Based on the apparent age of the building, it should be assumed that all solder material associated with copper and cast-iron plumbing throughout the building contain lead.

4.6.3 Mercury

Mercury vapour is present in fluorescent light fixtures located throughout the first floor of the Site building.

Low concentrations of mercury can be sometimes present in paint. These materials were not sampled at the time of the survey.

4.6.4 Silica

Based on the visual inspection of the Site building, crystalline silica is presumed to be present in stone parging and mortar.

4.6.5 Other Designated Substances

No evidence suggesting the significant presence of acrylonitrile, arsenic, benzene, ethylene oxide, isocyanates, vinyl chloride, and coke oven emissions was observed in the structure during the survey. These designated substances are not typically found in building materials in a composition/state that is hazardous during general construction activities.

4.6.6 Polychlorinated Biphenyls (PCBs)

Based visual assessment, the building has not been relamped; therefore, the light fixtures are suspected to contain PCB light ballasts.

Select paints were sampled for analysis of PCBs. PCBs was detected above the method detection limit in one (1) of the six (6) paint samples at a concentration of 1.64 mg/kg (sample P6, exterior white paint). This paint was identified to be in good condition.

A summary of the paint samples collected, sample location, general description of the paint and the reported analytical result is provided in Table 6. The photographs of the paint sample locations (photographs #1 to #6) are provided in Appendix D. A copy of the laboratory analytical report is provided in Appendix B.

4.6.7 Ozone-Depleting Substances (ODS)

One (1) refrigerator unit was observed in the kitchen (Location 1) of the Site building. Refrigerant from the unit should be inspected and treated as ODS. This material was not sampled at the time of the survey.

4.6.8 Suspect Visible Mould Growth

Suspect visible mould growth (SVG) was not observed on the surfaces of accessible building materials in the areas that were inspected during the time of this inspection. Water damage and SVG may be present in accessible areas of the structure that was not inspected as part of this scope of work.

4.6.9 Urea Formaldehyde Foam Insulation (UFFI)

UFFI was not observed in accessible areas of the building structure.

4.6.10 Radioactive Materials

One (1) smoke detector alarm was observed in the kitchen (Location 1) of the Site building. Smoke detectors can contain small amounts of radioactive material in the encapsulated metal chamber.

4.6.11 Chemical, Fuel, Oil Storage

Chemicals, fuel or storage tanks were not observed in accessible areas of the building structure.

4.7 Conclusions

The Designated Substances and hazardous materials survey was completed in general accordance with Amec Foster Wheeler's proposal and the PWGSC Statement of Work. The extent of the survey was limited to the light station (refer to Figures 3 to 6) proposed to be renovated as outlined by the PWGSC. The survey excluded an inspection of the roof of the cottage portion of the light station. A summary of all designated and hazardous substances is provided in Appendix C.

Based on findings of the survey, visual identification and laboratory results, identified materials include the following:

Asbestos-Containing Materials (ACM)

- Non-friable ACM includes vinyl floor tile (samples 2A-C and 3A-C), mastic associated with one variety of vinyl floor tile (samples 2A-C), and the vinyl portion of one variety of vinyl sheet flooring (samples 4A-C);
- The vinyl component of vinyl sheet flooring is non-friable ACM; however, the paper/fibrous backing of vinyl sheet flooring may become friable during disturbance or removal operations; and,
- ACM may also be present in forms that were not observed or sampled during the Site survey. Presumed ACM is listed in Section 4.6.1.8 of this report.

Lead

- Lead was detected in all six paint samples at concentrations between 0.024 and 18 percent by weight, which exceeded the PWGSC criteria of 0.009% by weight. Red paint on the exterior light house structure (sample P5 contained 4% lead) was observed to be in poor (flaking) condition; and,
- Other potential lead-containing materials include conduits, cable coverings, electrical equipment, and lead-acid emergency light batteries.

Silica

- Presumed to be present in masonry and concrete products.

Mercury

- Mercury vapour is present in fluorescent light fixtures; and,
- Mercury may be a component of some paints.

Polychlorinated Biphenyls (PCBs)

- Light fixtures are suspected to contain PCB ballasts based on the age of the Site building; and,
- PCBs was detected at a concentration of 1.64 ppm in one sample of white paint (sample P6) on the exterior of the structure, which is below the Federal Regulation of 50 ppm for solids.

Ozone-Depleting Substances (ODS)

- One refrigeration unit presumed to contain ODS was found within the site building.

Suspect Visible Mould Growth (SVG)

- SVG was not observed on the surface of accessible building materials at the time of the survey.

Urea Formaldehyde Foam Insulation (UFFI)

- UFFI was not observed in accessible areas of the building structure.

Radioactive Materials

- One smoke detector presumed to contain a small amount of radioactive material was present in the Site building.

Chemical Storage, Fuel, Oil Storage

- Chemicals, fuel or storage tanks were not observed in accessible areas of the building structure.

Other Designated Substances and hazardous materials may also be present in concealed locations not accessible as part of this scope of work.

4.8 DSHMS Limitations

Within the limitations of the agreed-upon scope of work, the field observations, measurements and analysis are considered sufficient to form a general inventory of hazardous materials in the Site building. It should be noted that the data presented herein were collected at specific sampling locations, and depending on the homogeneity of the samples, the data may vary between these locations. Some inherent limitations exist as to the thoroughness of this assessment due to the nature of building construction. For example it may not practical to test all pipe insulation for asbestos content or all paint for lead content at the Site due to the amount and locations and being located under existing materials. Some reasonable extrapolation (e.g., sampling of similar materials) was required from the findings of the assessment. For example, samples of suspect ACM were not collected in each homogeneous area of the building when homogeneous materials of a similar nature, composition, and color were sampled in other homogeneous areas.

Within the limitations of the agreed-upon scope of work, the survey included building materials found within or forming part of the building envelope and building mechanical systems and equipment. The inspection did not include the identification of suspected designated substances located in the interior of electrical, mechanical (e.g., interior surfaces of ventilation ducting, boilers, etc.), or process manufacturing equipment, inside wall cavities (e.g., pipe chases), inaccessible ceiling plenums, sub floors, underlying materials (e.g., underlying flooring and paint layers), and where sampling could have affected the integrity of the system (e.g., water-proof roof membrane and caulking). Amec Foster Wheeler is not responsible for the repairs of building materials that were sampled during the survey.

Within the limitations of the agreed-upon scope of work, this assessment has been undertaken and performed in a professional manner in accordance with generally accepted practices, using the degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. Due to physical limitations inherent to this assessment, Amec Foster Wheeler expressly does not warrant that the Site is free of designated substances or that all designated substances have been identified. No other warranties, expressed or implied, are made.

5.0 LIMITED STRUCTURAL ASSESSMENT

The Gore Bay (Janet Head) Light Station (L.L 1023) is located on the western shore of Manitoulin Island, near Gore Bay Ontario. The CCG property covers a total area of approximately 1.3 hectares on the south shore of the North Channel at the entrance to

Gore Bay. The original light station was constructed in 1879 as a navigation aid for vessels along the northern shore of Lake Huron.

5.1 Scope of Work and Methodology

The scope of work for the limited structural assessment included a visual assessment of the accessible portions of the structure by a qualified Structural Engineer, licensed and in good standing with Professional Engineers Ontario.

A project summary report herein includes observations made on site, assessment of findings, and recommendations for implementation of remedial work and/or further investigation, if applicable.

5.2 Implementation

5.2.1 Review of Background Information (Historical Reports)

No previous structural assessment reports were available at the time of this report.

5.2.2 Site Investigation

A site investigation was performed on January 27th 2015 by Amec Foster Wheeler's Senior Associate Engineer Consultant, Tim Jones, P.Eng., who is a qualified structural engineer in good standing with Professional Engineers Ontario. Mr. Jones was accompanied by Amec Foster Wheeler's Technologist, Mr. Justin Tse, B.Sc., present for implementing environmental site work.

The weather condition was clear and sunny with temperature of approximately minus 20 degrees Celsius. The property surrounding the light station structure and the roofs were snow covered at the time of the site assessment.

5.3 Observations

5.3.1 Description of Structure

The light station is situated on the land side of the road that parallels the shoreline of the North Channel of Lake Huron. The light station structure, situated on a gentle slope, is a wood-framed, pyramid-shaped, two-storey tower plus a 3rd level beacon house with an exterior walkaround platform. Adjoining the tower on its east and south elevations is a wood-framed, one-and-a-half storey structure. The tower and adjoining structure have a finished interior, occupied during the summer season. An unfinished basement was observed below the entire footprint area. At the time of the site visit the entire facility was unheated.

The basement foundation supporting the square base of the pyramid tower is of stone and mortar construction. The basement foundation supporting the adjoining structure is of poured-in-place concrete with either a parged exterior finish (east elevation) or a formed "architectural-block" type exterior finish above grade (south and part of north elevations). The foundations rise approximately 18 to 30 inches above the exterior, varying grade elevation.

The exterior walls of the structure are clad in white vinyl siding. Windows are present on all wall elevations, including the basement level on the north, south and west elevations. Although mostly snow covered at the time of the site visit, the flat roof of the tower walkaround and the pitched roofs of the adjoining structure appeared to be clad in prefinished metal. The beacon house is of all metal construction.

Access to the interior of the structure is from steps to entrances on the north and east elevations. The interior of the first and second levels have finished floors, walls, and ceilings with no exposed structural elements. The only exception is the exposed painted underside of the wood floor deck and structural framing of the beacon house platform and walkaround, as visible in the exposed second level ceiling in the tower. The second level areas are accessed by one stairway off the main level. The beacon house is accessed through a floor hatch from a stairway off the tower's second floor level. The beacon house exterior walkaround is accessed through a crawl hatch on one of the side walls of the beacon house. The basement is accessed by a stairway from the main level. The basement is unfinished with exposed stone or cast-in-place concrete foundation walls, concrete floor, structural wood framing, and underside of the main floor wood planking.

5.3.2 Observations

The stone foundation walls of the tower base as observed above grade had severely cracked mortar and parging. In some locations stones were dislodged and shifted. The foundation walls were partially snow covered and ice formations were prevalent. Moss growth was observed on the stone foundation wall below the main entrance stair structure.

The vinyl siding appeared to be intact and generally in good condition as observed from ground level. However, a damaged bottom section on the west elevation of the tower provided access underneath which revealed a wood substrate, soft and wet to the touch.

Windows and frames on the main and second levels appeared to be in fair condition. However, window frames within the foundation walls were aged, severely worn and scoured, and deteriorating.

Outside stair structures appeared to be solid; however, the floor of the east covered entranceway was badly sloped.

Upon entering from the east entrance doorway, the main level kitchen floor area was badly sloped southwards towards the mid-section of the structure, as was the floor of the adjoining room sloped northwards towards the mid-section of the structure, directly below the line of the chimney on the roof. When observed from the basement, the floor joists below this area was framed out for the chimney support. This framing did not appear to be adequately reinforced for the opening. Deflection of the adjacent floor joists was evident.

The poured concrete basement floor was severely heaved and cracked throughout the basement areas, with differential heaving observed.

The stone foundation walls of the tower base as observed below grade had severely cracked mortar and parging. In some locations stones were dislodged and shifted. The poured-in place concrete foundation walls of the adjoining structure appeared to be in fair condition with no significant anomalies.

The wood structural framing observed in the basement consists of heavy timber beams bearing upon the foundation walls, sized lumber wood floor joists, tower corner wood posts, and tower wall wood stringers. The wood framing, where visible, appeared to be generally in fair condition. However, the base of a tower wall wood stringer sitting atop a timber beam, accessible to view adjacent to the north basement window was observed to be deteriorated and contained dry rot.

Occasional vertical cracks in the finished walls of the second floor level of the tower were observed.

With the exception of the sagging floors of the kitchen and adjacent room, floors were noted to be firm.

No handrails were observed on any of the interior stairs.

The exterior walkaround deck was mostly snow and ice covered. However, the deck appeared to be sound.

The handrail on the beacon house walkaround was solid, but worn and scoured. It was noted to be approximately 30 inches in height.

Exterior and interior finishes on the beacon house were worn and scoured.

The roofs of the adjoining structure, as observed from the beacon house walkaround, were mostly snow covered.

As observed from the walkaround, the brick masonry chimney atop the adjoining roofs was noted to have spalled and missing bricks and was in very poor condition.

5.4 Conclusions

The light station structure, reportedly constructed in 1879, is presently 136 years of age. The normal useful life of a wood structure is approximately 100 years depending on quality of materials used, construction methods, maintenance, and exposure to the elements.

The overall condition of the tower and adjoining structure is considered to be poor, and has outlived its' normal useful life.

To extend its' useful life, major repairs are required.

6.0 CLOSURE

This report was prepared for the exclusive use of Public Works Government Services Canada, and is intended to provide an environmental condition assessment to the approved scope of work on the Site, being Gore Bay (Janet Head) Light Station (L.L 1023) located on the western shore of Manitoulin Island, near Gore Bay Ontario, at the time of the Site visits. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, is the responsibility of the third party. Should additional parties require reliance on this report, written authorization from Amec Foster Wheeler will be required. With respect to third parties, Amec Foster Wheeler has no liability or responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

The report is based on data and information collected during the environmental condition assessment of the property conducted by Amec Foster Wheeler. It is based solely on the conditions of the Site encountered at the time of the Site visits, supplemented by a review of historical information and data obtained by Amec Foster Wheeler as described in this report, and discussion with a representative of the owner/occupant, as reported herein. Except as otherwise maybe specified, Amec Foster Wheeler disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to Amec Foster Wheeler after the time during which Amec Foster Wheeler conducted the environmental condition assessment.

Amec Foster Wheeler makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

This report is also subject to the further Standard Limitations contained in Appendix F.

We trust that the information presented in this report meets your current requirements. Should you have any questions, or concerns, please do not hesitate to contact the undersigned.

Respectfully submitted,

Amec Foster Wheeler Environment & Infrastructure,
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TABLES

Public Works Government Services Canada
Environmental Property Assessment
Janet Head Lighthouse
Gore Bay, Ontario
March 31, 2015

Table 1 - Summary of Metals Soil Analysis

Parameters	RDL	Analytical Results (µg/g)												Residential / Parkland CEQG	Table 6 SCS
Laboratory ID		L1572369-1	L1572369-2	L1572360-1	L1572369-3	L1572369-4	L1572369-5	L1572369-6	L1572369-7	L1572369-8	L1572360-4	L1572369-9	L1572369-10		
Sample Number		BH1A	BH1B	BH1C	BH2A	BH2B	BH3A	BH3B	BH4A	BH4B	BH4C	BH5A	BH5B		
Depth		0 - 15 cm	25 - 40 cm	50 - 75 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	50 - 75 cm	0 - 15 cm	25 - 40 cm		
Sample Date		27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15		
Aluminum (Al)	50	19300	18000	16300	18700	26000	5030	26800	19400	16300	24300	12900	12000		
Antimony (Sb)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	20	7.5
Arsenic (As)	0.2	8.56	6.88	7.56	5.35	6.27	1.84	6.01	6.01	4.77	5.53	3.45	3.89	12	18
Barium (Ba)	1	349	124	41.9	75.2	60.7	22.2	50.5	174	55	44.3	46.3	62.5	500	390
Beryllium (Be)	0.5	1	0.9	0.81	0.94	1.31	<0.50	1.5	1.08	0.9	1.25	0.59	0.66	4	4
Bismuth (Bi)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Boron (B)	5	57.3	46.7	33.8	50.8	64.4	13.1	79	57.5	41.4	62.3	31.1	37.7		120
Cadmium (Cd)	0.5	**1.37**	0.75	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10	1.2
Calcium (Ca)	100	55400	73800	61800	26700	19600	37900	6610	28100	64700	6250	19800	159000		
Chromium (Cr)	1	31	26.8	23.4	36	36.8	10.4	37.4	32.2	25.3	34	24.4	16.5	64	160
Cobalt (Co)	1	13	11.9	11.9	12	15.8	3.5	16.3	12.5	10.8	16.4	8	7.2	50	22
Copper (Cu)	1	51.6	38.4	32.2	45.6	32	13.6	31.3	48.6	33.9	30.6	26.7	17.2	63	140
Iron (Fe)	50	34300	30800	30900	28600	36900	10700	40900	31900	27100	37700	20700	19700		
Lead (Pb)	1	**2520**	**1100**	39.3	**132**	14.8	15.1	11.5	**1080**	**301**	11.4	**217**	64.8	140	120
Lithium (Li)	1	31.7	30.6	28.3	31.8	41.4	7	46.5	34.6	29.7	44.1	19.6	19.7		
Magnesium (Mg)	20	18200	29900	19800	11700	14200	8050	11800	12400	15800	11800	8600	49100		
Manganese (Mn)	1	1760	890	494	423	449	151	434	610	401	485	290	482		
Molybdenum (Mo)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	10	6.9
Nickel (Ni)	1	31.6	28.1	28.3	30.8	36	9.5	39.6	34.4	26.9	39.2	20.9	16.5	50	100
Phosphorus (P)	50	2420	2220	1790	1980	1450	490	1510	2290	1520	1180	1220	1240		
Potassium (K)	100	5230	4650	4110	5600	7640	1190	8630	5280	4270	7360	2940	3730		
Selenium (Se)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	2.4
Silver (Ag)	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	20	20
Sodium (Na)	100	180	150	120	130	140	110	140	150	120	110	130	150		
Strontium (Sr)	1	91.3	75.6	74	56.2	37.3	124	27.3	63.6	91.2	22.9	44.2	159		
Thallium (Tl)	0.5	**3.4**	**1.6**	<0.50	<0.50	<0.50	<0.50	<0.50	**1.6**	0.52	<0.50	<0.50	<0.50	1	1
Tin (Sn)	5	14.3	7.7	<5.0	<5.0	<5.0	<5.0	<5.0	9.1	<5.0	<5.0	<5.0	<5.0	50	
Titanium (Ti)	5	90.6	57.3	56	33.5	71.2	273	75.8	50.2	35	89.7	160	47.4		
Uranium (U)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	23	23
Vanadium (V)	1	38.3	31.5	28.5	31.7	43.8	20.3	45.9	33.3	27.2	40.7	32.7	21.5	130	86
Zinc (Zn)	5	**1960**	**1060**	175	133	76.1	22.3	68.4	**527**	153	66	106	47.6	200	340

Notes: All units in micrograms per gram (µg/g)
RDL = reported detection limit.
< = less than laboratory analytical detection limit.
Commercial CEQG = Canadian Environmental Quality Guidelines developed by the Canadian Council of Ministers of the Environment for a commercial land use.
Table 6 SCS = Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act for coarse grained, shallow soils, potable ground water condition, commercial land use.
Red Bold result indicates exceedance of the Table 6 SCS.
Bold and Highlighted result indicates exceedance of the CEQG
Red Bold and highlighted result indicates exceedance of the CEQG and the Table 6 SCS.

Table 1 - Summary of Metals Soil Analysis … continued

Parameters	RDL	Analytical Results (µg/g)											Residential / Parkland CEQG	EPA Table 6 SCS
Laboratory ID		L1572369-11	L1572369-12	L1572369-13	L1572369-14	L1572369-15	L1572369-16	L1572369-17	L1572369-18	L1572369-19	L1572369-20	L1572360-10		
Sample Number		BH6A	BH6B	BH7A	BH7B	BH8A	BH8B	BH9A	BH9B	BH10A	BH10B	BH10C		
Depth		0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	50 - 75 cm		
Sample Date		27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15		
Aluminum (Al)	50	15900	25000	16500	25600	18200	26600	7270	10600	8500	10700	26100		
Antimony (Sb)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4	<1.0	<1.0	20	7.5
Arsenic (As)	0.2	4.58	6.19	4.75	5.12	4.79	6.07	5.81	5.6	**16.7**	5.79	5.84	12	18
Barium (Ba)	1	55.1	66.3	74.6	50.3	78.3	60	114	111	**1170**	208	38.3	500	390
Beryllium (Be)	0.5	0.79	1.28	0.87	1.44	0.98	1.35	<0.50	0.56	<0.50	0.57	1.33	4	4
Bismuth (Bi)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0		
Boron (B)	5	39.5	64.1	36.1	64.1	54.7	65.7	21.8	25.1	29.1	23.9	72		120
Cadmium (Cd)	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.89	<0.50	**2.01**	<0.50	<0.50	10	1.2
Calcium (Ca)	100	22300	23500	25500	6520	30500	18800	130000	103000	74900	96300	11800		
Chromium (Cr)	1	24.5	33.6	24.7	35.3	29.2	35	15.9	17.1	23.4	16.6	35.6	64	160
Cobalt (Co)	1	9.8	15.4	10.4	16.2	11.7	15.6	6.1	8.1	9.2	8.4	16.4	50	22
Copper (Cu)	1	28.4	31.2	36.9	32.9	43.7	32.3	33.1	37.6	**240**	43.1	27.7	63	140
Iron (Fe)	50	24500	37900	27100	39100	29000	38900	19500	25700	22700	24900	38700		
Lead (Pb)	1	**203**	103	**184**	21.7	**310**	31.9	**168**	33.6	**7010**	**422**	13.8	140	120
Lithium (Li)	1	24.6	39.3	32	48.2	31.2	43.1	13.1	17.4	10.2	18.5	43.4		
Magnesium (Mg)	20	10800	15300	11700	11600	13100	12600	24300	28100	16800	24300	11700		
Manganese (Mn)	1	300	526	321	379	389	492	630	753	750	719	483		
Molybdenum (Mo)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	1.5	<1.0	<1.0	10	6.9
Nickel (Ni)	1	24.3	36	27.7	41.3	31.5	37.6	15.9	17.9	41.1	18.5	42.4	50	100
Phosphorus (P)	50	1330	1530	1740	1410	2350	1470	1720	1640	4820	2460	1600		
Potassium (K)	100	4120	7310	3820	7560	5300	7930	1930	2800	1650	2460	8150		
Selenium (Se)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	2.4
Silver (Ag)	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.47	<0.20	<0.20	20	20
Sodium (Na)	100	110	120	100	120	140	130	110	120	330	120	130		
Strontium (Sr)	1	44.4	46	54.2	28.7	72.3	43.4	134	94.8	143	111	32		
Thallium (Tl)	0.5	<0.50	<0.50	<0.50	<0.50	0.57	<0.50	<0.50	<0.50	**10.2**	0.67	<0.50	1	1
Tin (Sn)	5	<5.0	<5.0	<5.0	<5.0	5	<5.0	<5.0	<5.0	**71.6**	13.1	<5.0	50	
Titanium (Ti)	5	107	60.2	23.5	72.8	36.2	51.5	60.2	55	87.4	48.1	77		
Uranium (U)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	23	23
Vanadium (V)	1	32.9	42	27	40.4	30.8	42.4	15.2	21.2	12	20.2	41.9	130	86
Zinc (Zn)	5	112	89.5	158	71.4	211	76.7	150	72.4	**1560**	**219**	73.4	200	340

Notes: All units in micrograms per gram (µg/g)
RDL = reported detection limit.
< = less than laboratory analytical detection limit.
Commercial CEQG = Canadian Environmental Quality Guidelines developed by the Canadian Council of Ministers of the Environment for a commercial land use.
Table 6 SCS = Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act for coarse grained, shallow soils, potable ground water condition, commercial land use.
Red Bold result indicates exceedance of the Table 6 SCS.
Bold and Highlighted result indicates exceedance of the CEQG
Red Bold and highlighted result indicates exceedance of the CEQG and the Table 6 SCS.

Table 1 - Summary of Metals Soil Analysis … continued

Parameters	RDL	Analytical Results (µg/g)														Residential / Parkland CEQG	EPA Table 6 SCS
Laboratory ID		L1572369-21	L1572369-22	L1572360-11	L1572369-23	L1572369-24	L1572360-12	L1572369-25	L1572369-26	L1572369-27	L1572369-28	L1572369-29	L1572369-30	L1572369-31	L1572369-32		
Sample Number		BH11A	BH11B	BH11C	BH12A	BH12B	BH12C	BH13A	BH13B	BH14A	BH14B	BH15A	BH15B	BH16A	BH16B		
Depth		0 - 15 cm	25 - 40 cm	50 - 75 cm	0 - 15 cm	25 - 40 cm	50 - 75 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm	0 - 15 cm	25 - 40 cm		
Sample Date		27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15	27-JAN-15		
Aluminum (Al)	50	16700	11100	21200	12300	9450	16500	19800	7860	7760	9340	7570	5150	9900	19500		
Antimony (Sb)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	20	7.5
Arsenic (As)	0.2	6.3	5.27	5.85	5.78	5.01	6.88	5.9	3.16	3.82	4.75	3.92	3.94	4.17	5.12	12	18
Barium (Ba)	1	165	95	47	**513**	404	43.6	149	35.9	52.1	65.6	194	36.8	47.3	44	500	390
Beryllium (Be)	0.5	0.86	0.62	1.14	0.69	<0.50	0.84	1.06	<0.50	<0.50	0.51	<0.50	<0.50	<0.50	1.03	4	4
Bismuth (Bi)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Boron (B)	5	39	28	56.9	33.9	19.8	40.5	35.7	19.2	23.9	22.6	20.4	19.3	24.2	46.2		120
Cadmium (Cd)	0.5	<0.50	<0.50	<0.50	0.74	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10	1.2
Calcium (Ca)	100	53800	160000	20200	89200	80600	41500	13700	228000	127000	146000	160000	248000	34400	13900		
Chromium (Cr)	1	23.4	16.4	30.6	20.8	15.4	25.3	27.7	13.6	12.9	13.6	12	7.9	22.8	29.7	64	160
Cobalt (Co)	1	11.8	8.1	15.2	8.9	7.7	13.4	15.2	6.3	6.2	6.8	5.8	4.1	7.1	12.9	50	22
Copper (Cu)	1	33.5	17.7	26.9	27	28.1	28.7	32.3	12.8	23.4	28.8	20.3	11.3	25.8	28.1	63	140
Iron (Fe)	50	29200	25800	37500	25000	23100	33900	32800	14500	16900	20300	17900	13700	18700	32800		
Lead (Pb)	1	**639**	**142**	14.7	**2090**	**1420**	40.4	**622**	**137**	**131**	71.7	61.3	7.6	**136**	16	140	120
Lithium (Li)	1	25.7	18.2	35.9	21.9	17.8	28.9	33.1	14.1	15.2	16.7	13.7	10.7	16.4	31.6		
Magnesium (Mg)	20	13700	44100	15400	29500	23200	19000	9790	13400	37700	35800	38200	33700	11400	10800		
Manganese (Mn)	1	605	692	715	585	676	595	574	437	510	634	582	570	315	347		
Molybdenum (Mo)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	10	6.9
Nickel (Ni)	1	29.5	19.2	36.4	21.9	18.2	29.9	35.1	14.3	14.7	15.4	12.8	8.7	18.8	32	50	100
Phosphorus (P)	50	1990	1750	1620	1570	1350	1360	1740	1070	1940	1940	1600	1700	1070	1470		
Potassium (K)	100	4730	3170	6370	3580	2100	4300	5230	2260	2230	2550	2020	1690	2470	5370		
Selenium (Se)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1	2.4
Silver (Ag)	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	20	20
Sodium (Na)	100	<100	130	120	120	<100	<100	<100	120	130	130	130	140	170	120		
Strontium (Sr)	1	59.9	199	29.8	89.5	85.9	48.8	24.6	346	113	139	159	284	54	33.8		
Thallium (Tl)	0.5	**1.01**	<0.50	<0.50	**3.14**	**2.14**	<0.50	**1.05**	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	1	1
Tin (Sn)	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	50	
Titanium (Ti)	5	30.9	47.6	72.1	53.5	44.2	60.5	31.7	22.7	65.1	32.2	35.9	45	87.2	80.3		
Uranium (U)	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	23	23
Vanadium (V)	1	27.9	20.5	37.1	24	19.2	31.4	31.1	14.5	16.2	17.7	15	10.9	22	34.8	130	86
Zinc (Zn)	5	154	53.2	78.3	**627**	**324**	68.5	200	52.3	124	79.2	79.7	30.5	75.2	53.8	200	340

Notes: All units in micrograms per gram (µg/g)
RDL = reported detection limit.
< = less than laboratory analytical detection limit.
Commercial CEQG = Canadian Environmental Quality Guidelines developed by the Canadian Council of Ministers of the Environment for a commercial land use.
Table 6 SCS = Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act for coarse grained, shallow soils, potable ground water condition, commercial land use.
Red Bold result indicates exceedance of the Table 6 SCS.
Bold and Highlighted result indicates exceedance of the CEQG
Red Bold and highlighted result indicates exceedance of the CEQG and the Table 6 SCS.

Table 2 - Summary of TCLP Soil Analysis

Parameters	RDL	Analytical Results - µg/L	TCLP
Laboratory ID		**L1572367-1**	
Sample Number		**TCLP JANET HEAD**	
Sample Date		**27-JAN-15**	
Arsenic (As)	0.05	<0.050	2.5
Barium (Ba)	0.5	<0.50	100
Boron (B)	2.5	<2.5	500
Cadmium (Cd)	0.005	<0.0050	0.5
Chromium (Cr)	0.05	<0.050	5
Lead (Pb)	0.05	<0.050	5
Mercury (Hg)	0.0001	<0.00010	0.1
Selenium (Se)	0.25	<0.25	1
Silver (Ag)	0.005	<0.0050	5
Uranium (U)	0.25	<0.25	10

Notes:
1) All units in micrograms per litre (µg/L) (parts per billion).
2) RDL = reported detection limit.
3) < = less than laboratory analytical detection limit.
4) TCLP = Schedule 4 Leachate Quality Criteria of O.Reg. 558/00 under the Environmental Protection Act.
5) **Bolded** result indicates exceedance of TCLP criteria.

Table 3. Summary of Bulk Sample Results Materials Determined to be Asbestos-Containing.

AMEC Sample No.	Photo No.	Sample Location Description	Sample Description	Laboratory Results
2A 2B 2C	2	Location 6 – Living Room	9”x9” Brown with brown streaks VFT	5% Chrysotile
			Mastic	3% Chrysotile
3A 3B 3C	3	Location 6 – Living Room	12”x12” Brown with brown/white streaks VFT	3% Chrysotile
			Mastic	Non-asbestos
4A 4B 4C	4	Location 5 - Foyer	Green with green pattern vinyl sheet floor	25% Chrysotile

Table 3 represents a summary of laboratory results and must be used in conjunction with the detailed findings provided in the HMDSS report.

Table 4. Summary of Bulk Sample Results Materials Determined to be Non-Asbestos Containing.

Sample No.	Photo No.	Sample Location Description	Sample Description	Laboratory Results
1A 1B 1C	1	Location 1 – Kitchen Floor	2'x4' Ceiling tile square pattern with pinhole	None Detected
5A 5B 5C 5D 5E 5G	5	Various Interior Walls	White skim coat and plaster	None Detected
6A 6B 6C	6	Location 4 – Washroom Floor	Brown square pattern vinyl sheet flooring	None Detected (by PLM & TEM analysis)
7A 7B 7C	7	Location 7- Basement Walls	Parging over stone	None Detected
8A 8B 8C	8	Location 12 – Light House Exterior Windows	White caulking	None detected
9A 9B 9C	9	Location 4 – Washroom	Drywall joint compound	None detected
10A 10B 10C	10	Location 7 – Basement Walls	Concrete block mortar	None detected
11A 11B 11C	11	Location 13 – Exterior Window	Grey caulking	None detected

**An asbestos-containing material (ACM) is defined as a material that contains to 0.5, or greater, percent asbestos by dry weight in accordance with O. Reg. 278/05.*

Table 4 represents a summary of laboratory results and must be used in conjunction with the detailed findings provided in the HMDSS report.

Table 5. Summary of Paint Sample Results – Lead

Sample No.	Photo No.	Sample Location Description	Sample Description	Laboratory Results (%)	Condition
P1	12	Location 2 – Living Room	Yellow	0.024	Good
P2	13	Location 5 - Foyer	Beige	0.037	Good
P3	14	Location 1 – Kitchen	White	18	Good
P4	15	Location 1 – Kitchen Floor	Grey	7.6	Good
P5	16	Location 12 – Light House Exterior	Red	14	Poor (Flaking)
P6	17	Location 12 – Light House Exterior	White	10	Good

**Lead-containing paint is not defined by the MOL. The PWGSC defines lead-containing paint as a paint containing 0.009% or greater, which would require lead handling procedures or special precautions.*

Table 5 represents a summary of laboratory results and must be used in conjunction with the detailed findings provided in the HMDSS report.

Table 6. Summary of Paint Sample Results – PCBs.

Sample No.	Photo No.	Sample Location Description	Sample Description	Laboratory Results (ppm)
P1	12	Location 2 – Living Room	Yellow	<0.694
P2	13	Location 5 - Foyer	Beige	<0.5
P3	14	Location 1 – Kitchen	White	<1.09
P4	15	Location 1 – Kitchen Floor	Grey	<1.04
P5	16	Location 12 – Light House Exterior	Red	<0.5
P6	17	Location 12 – Light House Exterior	White	1.64

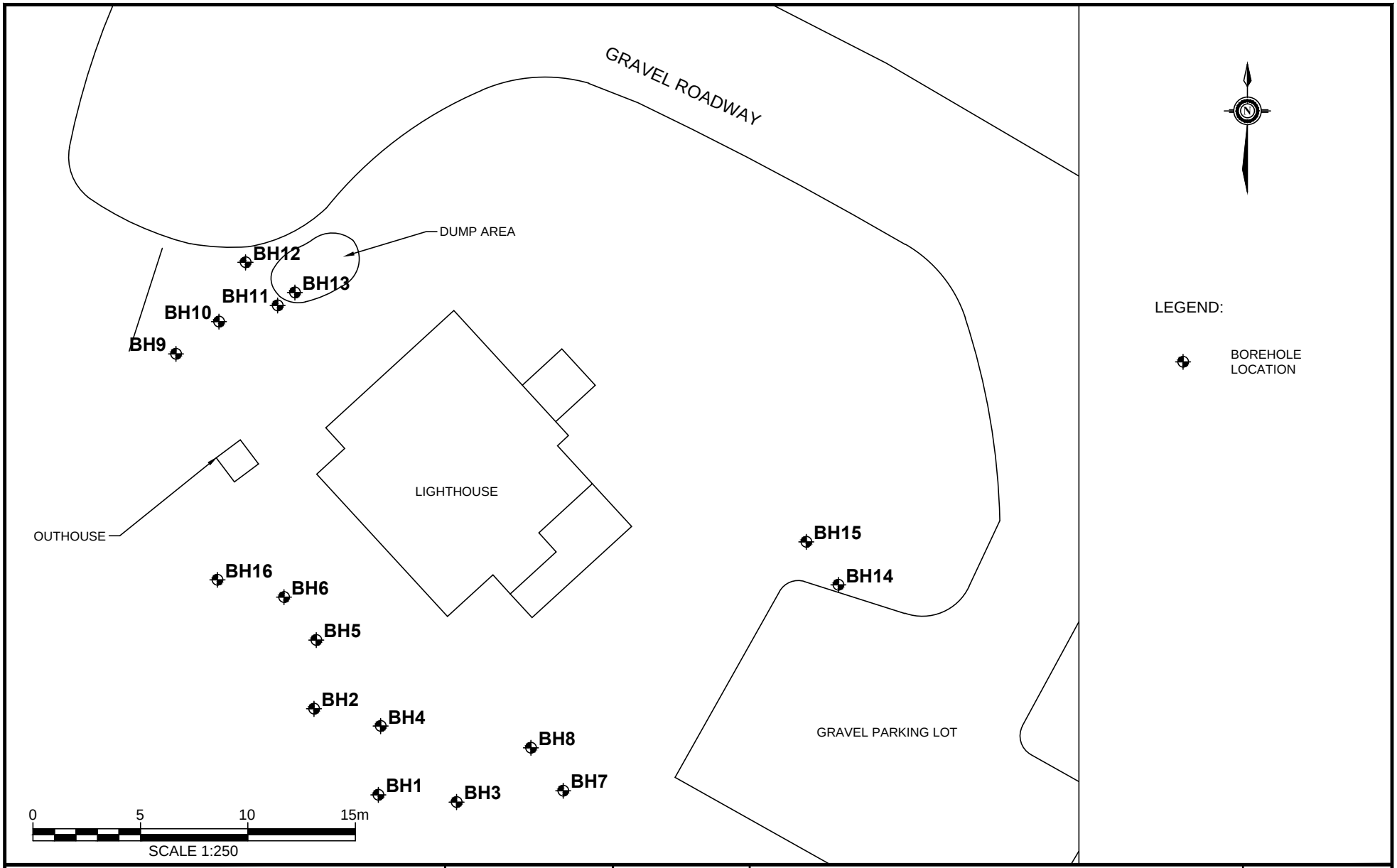
**A PCB-containing material (solid) is defined as a material that contains to 50 ppm or greater.*

Table 6 represents a summary of laboratory results and must be used in conjunction with the detailed findings provided in the HMDSS report.

FIGURES

CLIENT PUBLIC WORKS AND GOVERNMENT SERVICES CANADA	amec foster wheeler	DWN BY: ZF CHK'D BY: DAR DATUM: PROJECTION: SCALE: AS SHOWN	PROJECT ENVIRONMENTAL CONDITION ASSESSMENT JANET HEAD LIGHTHOUSE GORE BAY, ONTARIO	REV. NO.: A DATE: MARCH 2015 PROJECT NO: TC150101
Amec Foster Wheeler Environment & Infrastructure 160 Traders Boulevard, Unit #110 Mississauga, Ontario L4Z 3K7			TITLE SITE LOCATION PLAN	FIGURE No. 1

R:\2015\Projects_Other\TC150101-PWGSC-Janet Head\Drawings\TC150101.dwg – Figure 1 – Mar. 20, 2015 3:02pm – zhanna.furman



CLIENT PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		DWN BY: ZF CHK'D BY: DAR DATUM: PROJECTION: SCALE: AS SHOWN	PROJECT ENVIRONMENTAL CONDITION ASSESSMENT JANET HEAD LIGHTHOUSE GORE BAY, ONTARIO	REV. NO.: A DATE: MARCH 2015 PROJECT NO: TC150101
Amec Foster Wheeler Environment & Infrastructure 160 Traders Boulevard, Unit #110 Mississauga, Ontario L4Z 3K7	amec foster wheeler		TITLE BOREHOLE LOCATION PLAN	FIGURE No. 2

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STATION			BH10	
UNIT			µg/g	µg/g
DATE			27-Jan-15	27-Jan-15
DEPTH (m)			0-0.15	0.25-0.40
PARAMETERS	CEQG	TABLE 6 SCS		
ARSENIC	12	18	**16.7**	5.79
BARIUM	500	390	**1170**	208
CADMIUM	10	1.2	**2.01**	<0.50
COPPER	63	140	**240**	43.1
LEAD	140	120	**7010**	**422**
THALLIUM	1	1	**10.2**	0.67
TIN	50	NA	**71.6**	13.1
ZINC	200	340	**16.7**	**219**

STATION			BH12	
UNIT			µg/g	µg/g
DATE			27-Jan-15	27-Jan-15
DEPTH (m)			0-0.15	0.25-0.40
PARAMETERS	CEQG	TABLE 6 SCS		
BARIUM	500	390	**513**	**404**
LEAD	140	120	**2090**	**1420**
THALLIUM	1	1	**3.14**	**2.14**
ZINC	200	340	**627**	**324**

STATION			BH11	
UNIT			µg/g	µg/g
DATE			27-Jan-15	27-Jan-15
DEPTH (m)			0-0.15	0.25-0.40
PARAMETERS	CEQG	TABLE 6 SCS		
LEAD	140	120	**639**	**142**
THALLIUM	1	1	**1.01**	<0.50

STATION			BH13	
UNIT			µg/g	µg/g
DATE			27-Jan-15	27-Jan-15
DEPTH (m)			0-0.15	0.25-0.40
PARAMETERS	CEQG	TABLE 6 SCS		
LEAD	140	120	**622**	**137**
THALLIUM	1	1	**1.05**	<0.50

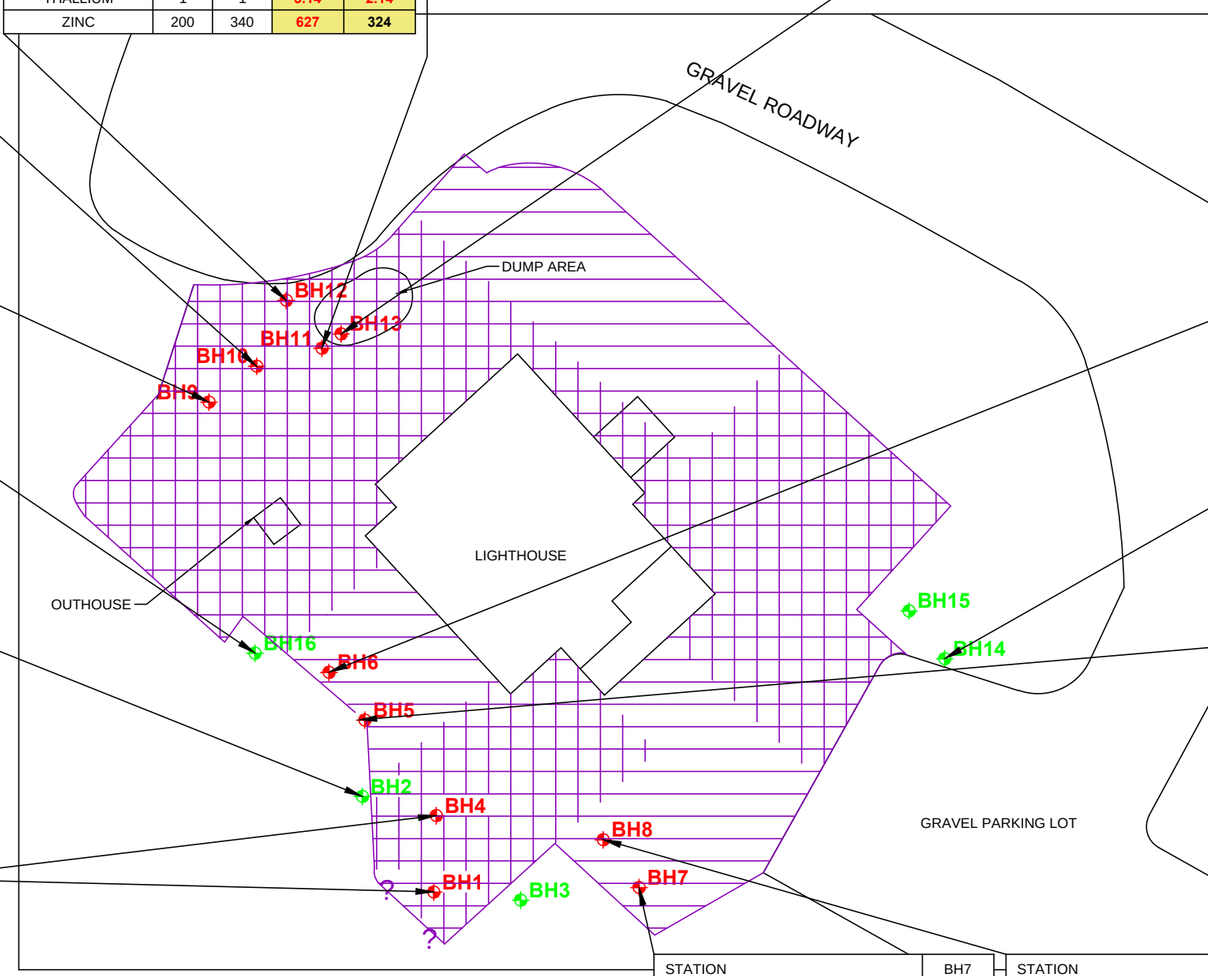
STATION			BH9
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**168**

STATION			BH16
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**136**

STATION			BH2
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**132**

STATION			BH4	
UNIT			µg/g	µg/g
DATE			27-Jan-15	27-Jan-15
DEPTH (m)			0-0.15	0.25-0.40
PARAMETERS	CEQG	TABLE 6 SCS		
LEAD	140	120	**1080**	**301**
THALLIUM	1	1	**1.6**	0.52
ZINC	200	340	**527**	153

STATION			BH1	
UNIT			µg/g	µg/g
DATE			27-Jan-15	27-Jan-15
DEPTH (m)			0-0.15	0.25-0.40
PARAMETERS	CEQG	TABLE 6 SCS		
CADMIUM	1	1.2	**1.37**	0.75
LEAD	140	120	**2520**	**1100**
THALLIUM	1	1	**3.4**	**1.6**
ZINC	200	340	**1960**	**1060**



STATION			BH6
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**203**

STATION			BH14
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**131**

STATION			BH5
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**217**

NOTES:

1. Commercial CEQG = Canadian Environmental Canadian Environmental Quality Guidelines developed by the Canadian Council of Ministers of the Environment for a residential land use.
2. EPA Table 6 SCS = Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act for coarse grained, shallow soils, potable ground water condition, residential land use.
3. Locations where all soil samples meet CEQGs for all parameters analyzed shown in green.
4. Locations where one or more soil samples exceed CEQGs for at least one of the parameters analyzed shown in red.

0 5 10 15m

SCALE 1:250

STATION			BH7
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**184**

STATION			BH8
UNIT			µg/g
DATE			27-Jan-15
DEPTH (m)			0-0.15
PARAMETERS	CEQG	TABLE 6 SCS	
LEAD	140	120	**310**

LEGEND:

- BOREHOLE LOCATION
- 3.4 — SOIL SAMPLE EXCEEDS TABLE 6 SCS
- 219 — SOIL SAMPLE EXCEEDS CEQG
- 1960 — SOIL SAMPLE EXCEEDS TABLE 6 SCS AND CEQG
- 0-0.15m SOIL INTERVAL EXCEEDS CCME RESIDENTIAL / PARKLAND CRITERIA
- 0-0.40m SOIL INTERVAL EXCEEDS CCME RESIDENTIAL / PARKLAND CRITERIA

CLIENT:
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Amec Foster Wheeler Environment & Infrastructure
160 Traders Boulevard East, Unit #110
Mississauga, Ontario L4Z 3K7

amec foster wheeler

DWN BY: ZF
CHK'D BY: DAR
DATUM:
PROJECTION:
SCALE: AS SHOWN

PROJECT
ENVIRONMENTAL CONDITION ASSESSMENT
JANET HEAD LIGHTHOUSE
GORE BAY, ONTARIO

TITLE
SOIL EXCEEDANCES

DATE: MARCH 2015
PROJECT NO: TC150101
REV. NO.: A
FIGURE No. 3

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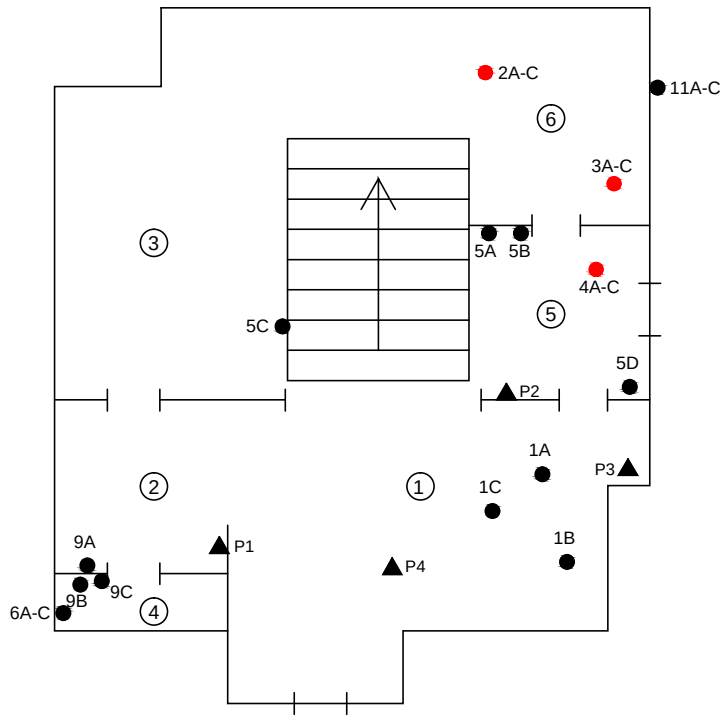

LEGEND

1A	ASBESTOS SAMPLE LOCATION
1A	NON-ASBESTOS SAMPLE LOCATION
P1	PAINT SAMPLE LOCATION
5	ROOM ID

0 1 3 6m

SCALE 1:125

CLIENT

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Amec Foster Wheeler Environment & Infrastructure

160 Traders Boulevard, Unit #110
Mississauga, Ontario L4Z 3K7

amec foster wheeler

DWN BY:	ZF
CHK'D BY:	DAR
DATUM:	
PROJECTION:	
SCALE:	AS SHOWN

PROJECT

DESIGNATED SUBSTANCES SURVEY
JANET HEAD LIGHTHOUSE
GORE BAY, ONTARIO

TITLE

FIRST FLOOR PLAN

REV. NO.:	A
DATE:	MARCH 2015
PROJECT NO:	TC150101
FIGURE No.	4

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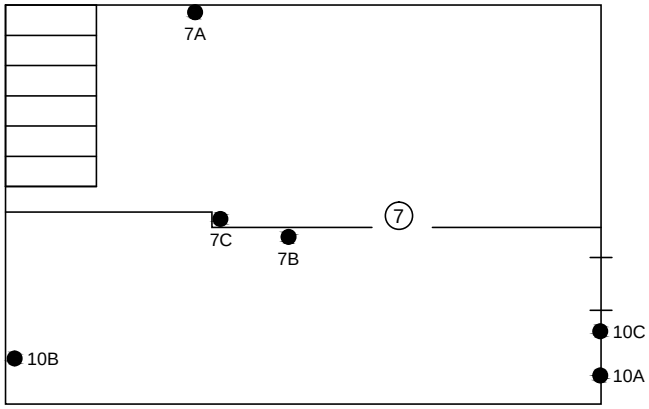

LEGEND

● 10A	NON-ASBESTOS SAMPLE LOCATION
(7)	ROOM ID

CLIENT PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		DWN BY: ZF	PROJECT DESIGNATED SUBSTANCES SURVEY JANET HEAD LIGHTHOUSE GORE BAY, ONTARIO	REV. NO.: A
Amec Foster Wheeler Environment & Infrastructure 160 Traders Boulevard, Unit #110 Mississauga, Ontario L4Z 3K7	amec foster wheeler	CHK'D BY: DAR		DATE: MARCH 2015
		DATUM:		PROJECT NO: TC150101
		PROJECTION:	TITLE BASEMENT PLAN	FIGURE No. 5
		SCALE: NTS		

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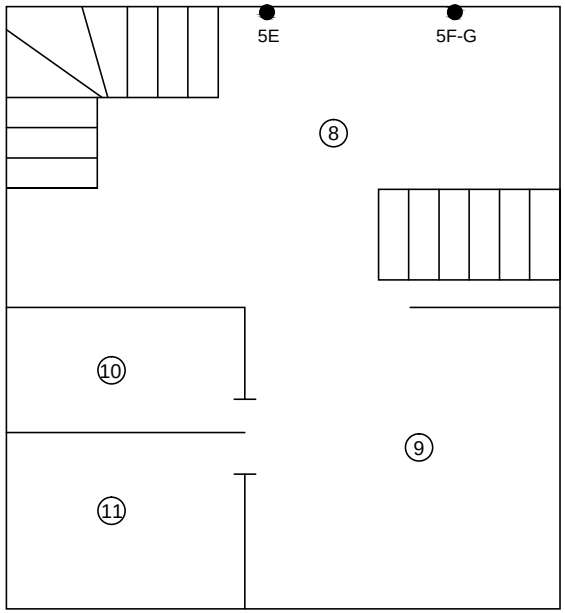

LEGEND

● 1A NON-ASBESTOS SAMPLE LOCATION

(8) ROOM ID

CLIENT PUBLIC WORKS AND GOVERNMENT SERVICES CANADA		DWN BY: ZF	PROJECT DESIGNATED SUBSTANCES SURVEY JANET HEAD LIGHTHOUSE GORE BAY, ONTARIO	REV. NO.: A
Amec Foster Wheeler Environment & Infrastructure 160 Traders Boulevard, Unit #110 Mississauga, Ontario L4Z 3K7	amec foster wheeler	CHK'D BY: DAR		DATE: MARCH 2015
		DATUM:		PROJECT NO: TC150101
		PROJECTION:	TITLE SECOND FLOOR PLAN	FIGURE No. 6
		SCALE: NTS		

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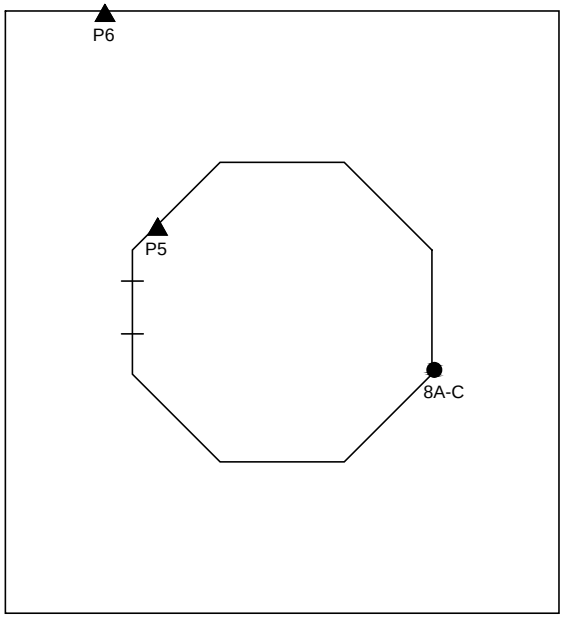

LEGEND

● 10A	NON-ASBESTOS SAMPLE LOCATION
▲ P6	PAINT SAMPLE LOCATION

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Amec Foster Wheeler Environment & Infrastructure
160 Traders Boulevard, Unit #110
Mississauga, Ontario L4Z 3K7

amec foster wheeler

DWN BY:	ZF
CHK'D BY:	DAR
DATUM:	
PROJECTION:	
SCALE:	NTS

PROJECT

DESIGNATED SUBSTANCES SURVEY
JANET HEAD LIGHTHOUSE
GORE BAY, ONTARIO

TITLE

ROOF PLAN

REV. NO.:	A
DATE:	MARCH 2015
PROJECT NO:	TC150101
FIGURE No.	7

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APPENDIX A

BOREHOLE LOGS

RECORD OF BOREHOLE No. BH1 Co-Ord. 17T 385271 E, 5089070 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											
	brown SAND some gravel trace silt frozen	0.1										BH1A submitted for metals analysis
	grey SILTY CLAY moist	0.3										BH1B submitted for metals analysis
							0.5					BH1C submitted for metals analysis
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH2 Co-Ord. 17T 385269 E, 5089075 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* △ Intact ▲ Remould Nilcon Vane* ◇ Intact ◆ Remould * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12 Soil Vapour Reading △ parts per million (ppm) 100 200 300 400 ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											
	brown SAND some gravel trace silt frozen	0.1										BH2A submitted for metals analysis BH2B submitted for metals analysis
	grey SILTY CLAY moist	0.3					0.5					
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH3 Co-Ord. 17T 385275 E, 5089069 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane*: △ Intact ▲ Remould; Nilcon Vane*: ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											
	brown SAND some gravel trace silt frozen	0.1										BH3A submitted for metals analysis
	grey SILTY CLAY moist	0.2					0.5					BH3B submitted for metals analysis
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH4 Co-Ord. 17T 385272 E, 5089074 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH4A submitted for metals analysis BH4B submitted for metals analysis
	grey SILTY CLAY moist 0.4					0.5					BH4C submitted for metals analysis
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH5 Co-Ord. 17T 385270 E, 5089078 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* △ Intact ▲ Remould Nilcon Vane* ◇ Intact ◆ Remould * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12 Soil Vapour Reading △ parts per million (ppm) 100 200 300 400 ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											
	brown SAND some gravel trace silt frozen	0.1										BH5A submitted for metals analysis BH5B submitted for metals analysis Sample BH5B = Dup3
	grey SILTY CLAY moist	0.4					0.5					
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH6 Co-Ord. 17T 385268 E, 5089080 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH6A submitted for metals analysis BH6B submitted for metals analysis
	grey SILTY CLAY moist 0.4					0.5					
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH7 Co-Ord. 17T 385280 E, 5089068 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting ○ SPT ● DCPT MTO Vane* △ Intact ▲ Remould Nilcon Vane* ◇ Intact ◆ Remould * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12 Soil Vapour Reading △ parts per million (ppm) 100 200 300 400 ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											
	brown SAND some gravel trace silt frozen	0.1										BH7A submitted for metals analysis
	grey SILTY CLAY moist	0.2					0.5					BH7B submitted for metals analysis
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH8 Co-Ord. 17T 385279 E, 5089071 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH8A submitted for metals analysis
	grey SILTY CLAY moist 0.3					0.5					BH8B submitted for metals analysis
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH9 Co-Ord. 17T 385266 E, 5089092 N

amec

Project Number:	TC150101	Drilling Location:	Northwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											BH9A submitted for metals analysis
	brown SAND some gravel trace silt frozen	0.2					0.5					BH9B submitted for metals analysis Sample BH9B = Dup2
	grey SILTY CLAY moist	0.6										
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH10 Co-Ord. 17T 385268 E, 5089093 N

amec

Project Number:	TC150101	Drilling Location:	Northwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										BH10A submitted for metals analysis
	brown SAND some gravel trace silt frozen 0.2										BH10B submitted for metals analysis
	grey SILTY CLAY moist 0.5					0.5					BH10C = DUPC1 both submitted for metals analysis
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH11 Co-Ord. 17T 385271 E, 5089093 N

amec

Project Number:	TC150101	Drilling Location:	Northwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH11A submitted for metals analysis BH11B submitted for metals analysis Sample BH11B = Dup1
						0.5					BH11C submitted for metals analysis
	grey SILTY CLAY moist 0.6										
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH12 Co-Ord. 17T 385270 E, 5089095 N

amec

Project Number:	TC150101	Drilling Location:	Northwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	PenetrationTesting: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH12A submitted for metals analysis BH12B submitted for metals analysis BH12C submitted for metals analysis
						0.5					
	END OF BOREHOLE 0.8 (no refusal)										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH13 Co-Ord. 17T 385272 E, 5089093 N

amec

Project Number:	TC150101	Drilling Location:	Northwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH13A submitted for metals analysis BH13B submitted for metals analysis
	grey SILTY CLAY moist 0.4					0.5					
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

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Scale: 1 : 10

RECORD OF BOREHOLE No. BH14 Co-Ord. 17T 385295 E, 5089075 N

amec

Project Number:	TC150101	Drilling Location:	Northeast	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE			SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:		Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS											
	brown SAND & GRAVEL frozen	0.1					0.5					BH14A submitted for metals analysis BH14B submitted for metals analysis
	grey SILTY CLAY moist	0.6										
	END OF BOREHOLE (no refusal)	0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH15 Co-Ord. 17T 385294 E, 5089077 N

amec

Project Number:	TC150101	Drilling Location:	Northeast	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND & GRAVEL frozen 0.1										BH15A submitted for metals analysis Sample BH15A = Dup4 BH15B submitted for metals analysis
	grey SILTY CLAY moist 0.5					0.5					
	END OF BOREHOLE (no refusal) 0.8										

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No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

RECORD OF BOREHOLE No. BH16 Co-Ord. 17T 385266 E, 5089082 N

amec

Project Number:	TC150101	Drilling Location:	Southwest	Logged by:	AMP
Project Client:	Public Works and Government Services Canada	Drilling Method:	50 mm Split Spoon Sampler	Compiled by:	AMP
Project Name:	Environmental Condition Assessment	Drilling Machine:	Pionjar 120 Portable Drill	Reviewed by:	DAR
Project Location:	Janet Head Lighthouse	Date Started:	27 Jan 15	Date Completed: 27 Jan 15	Revision No.: 0, 16/3/15

LITHOLOGY PROFILE		SOIL SAMPLING						FIELD TESTING	LAB TESTING		COMMENTS
Lithology Plot	DESCRIPTION Local Ground Surface Elevation:	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	DEPTH (m)	ELEVATION (m)	Penetration Testing: ○ SPT ● DCPT; MTO Vane* △ Intact ▲ Remould; Nilcon Vane* ◇ Intact ◆ Remould; * Undrained Shear Strength (kPa) 15 30 45 60	★ Rinse pH Values 2 4 6 8 10 12; Soil Vapour Reading △ parts per million (ppm) 100 200 300 400; ✳ Passing 75 um (%) ○ Moisture Content (%) 20 40 60 80	INSTRUMENTATION INSTALLATION	no installation, only bentonite
	brown ORGANICS										
	brown SAND some gravel trace silt frozen 0.1										BH16A submitted for metals analysis BH16B submitted for metals analysis
	grey SILTY CLAY moist 0.4					0.5					
	END OF BOREHOLE (no refusal) 0.8										

AMEC Environment & Infrastructure
A Division of AMEC Americas Limited
131 Fielding Road
Lively, Ontario
Canada P3Y 1L7
Tel +1(705) 682-2632
Fax +1(705) 682-2260
www.amec.com

No freestanding groundwater measured in open borehole on completion of drilling.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commissioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 10

APPENDIX B

LABORATORY CERTIFICATES OF ANALYSIS

Bulk Asbestos Analysis
by Transmission Electron Microscopy

Semi-Quantitative
Chatfield SOP 1988-02 Rev. 1

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Justin Tse
Jason Rice

Project: TC150101

Lab Order ID: 1504931

Analysis ID: 1504931_TBS
Date Received: 3/13/2015
Date Reported: 3/19/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Organic *(Wt. %)*	Acid Sol. *(Wt. %)*	Asbestos *(Wt. %)*	LCL-UCL *(Wt. %)*
6a / *1504931TBS_1*	VSF brown square pattern / *vinyl sheet flooring only*	53%	-	None Detected	
6b / *1504931TBS_2*	VSF brown square pattern / *vinyl sheet flooring only*	33%	-	None Detected	
6c / *1504931TBS_3*	VSF brown square pattern / *vinyl sheet flooring only*	83%	-	None Detected	

Ired Gulley (3)

Analyst

Approved Signatory

1504931
~~1502280~~

Version 1-15-2012

Client:	AMEC Environment & Infrastructure	***Instructions:***
Contact:	Jason Rice	*Use Column "B" for your contact info*
Address:	900 Maple Grove Rd., Unit 10, Cambrige, ON, N3H 4R7	
Phone:	519-820-3812	*To See an Example Click the bottom Example Tab.*
Fax:	519-653-6554	
Email:	jason.rice@amec.com justin.tse@amec.com	***Enter samples between "<<" and ">>"***
Project:	TC150101	***Begin Samples with a "<< "above the first sample and end with a ">>" below the last sample.***
Client Notes:	***see note below at end of sample list**	*Only Enter your data on the first sheet "Sheet1"*
P.O. #.		*Note: Data 1 and Data 2 are optional fields that do not show up on the official lab report, however they will be included in the electronic data returned to you to facilitate your reintegration of the report data.*
Date Submitted:	03/02/2015	
Analysis:	PLM EPA600 - Positive Stop	
TurnAroundTime:	5-day TAT	

Scientific Analytical Institute

4604 Dundas Drive
Greensboro, NC 27407
Phone: 336.292.3888
Fax: 336.292.3313
Email: lab@sailab.com

Sample Number	Data 1	Sample Description	Data 2
<<			
1a	[Enter data of your choosing here]	2x4 Ceiling Tile Sq Pattern with pinhole	[Enter data of your choosing here]
1b	[Enter data of your choosing here]	2x4 Ceiling Tile Sq Pattern with pinhole	[Enter data of your choosing here]
1c	[Enter data of your choosing here]	2x4 Ceiling Tile Sq Pattern with pinhole	[Enter data of your choosing here]
2a	[Enter data of your choosing here]	9x9 VFT brown with brown streaks and mastic	[Enter data of your choosing here]
2b	[Enter data of your choosing here]	9x9 VFT brown with brown streaks and mastic	[Enter data of your choosing here]
2c	[Enter data of your choosing here]	9x9 VFT brown with brown streaks and mastic	[Enter data of your choosing here]
3a		12x12 VFT brown with brown white streaks and mastic	
3b		12x12 VFT brown with brown white streaks and mastic	
3c		12x12 VFT brown with brown white streaks and mastic	
4a		VSF green with green pattern	
4b		VSF green with green pattern	
4c		VSF green with green pattern	
5a		Plaster and white skim coat	
5b		Plaster and white skim coat	
5c		Plaster and white skim coat	
5d		Plaster and white skim coat	
5e		Plaster and white skim coat	
5f		Plaster and white skim coat	
5g		Plaster and white skim coat	
6a		VSF brown square pattern	
6b		VSF brown square pattern	
6c		VSF brown square pattern	
7a		Parging over stone foundation	
7b		Parging over stone foundation	
7c		Parging over stone foundation	

Accepted ☑

Rejected ☐

WSCup
2/5 10AM

1S04931

~~1502280~~

8a	window caulking white
8b	window caulking white
8c	window caulking white
9a	drywall joint compound
9b	drywall joint compound
9c	drywall joint compound
10a	mortar
10b	mortar
10c	mortar
11a	window caulking grey
11b	window caulking grey
11c	window caulking grey

>>

***Please analyze all layers to O.Reg. 278/05**
All layers are to be analyzed separately

1S04931

Scientific Analytical Institute

From: Rice, Jason [jason.rice@amecfw.com]
Sent: Friday, March 13, 2015 12:55 PM
To: Scientific Analytical Institute
Subject: RE: TC150101.1000 - Amec Sample #6A-C

Categories: Courtney

Hello

As per my phone call just now from the lab representative, please go ahead with the TEM Chatfield analysis for sample set 6 A-C, positive stop, 5 day turnaround.

Thanks!

Jason Rice, P.Eng.
Southwest HazMat & Hygiene Lead
Amec Foster Wheeler plc

900 Maple Grove Road, Unit 10
Cambridge, Ontario N3H 4R7
D +(519) 650-7100 x7109
M +(519) 820-3812

E jason.rice@amecfw.com
www.amecfw.com

From: Scientific Analytical Institute [mailto:lab@sailab.com]
Sent: March-13-15 11:01 AM
To: Rice, Jason
Subject: RE: TC150101.1000 - Amec Sample #6A-C

Jason,
I have notified the analyst of your request. I will let you know as soon as I am notified. Please let me know if you need anything else.

Thanks,
Courtney

Choose Quality.

Scientific Analytical Institute, Inc.
4604 Dundas Drive
Greensboro NC 27407

lab@sailab.com
www.sailab.com

tel: 877.292.3888
fax: 336.292.3313

1S04931

From: Rice, Jason [mailto:jason.rice@amecfw.com]
Sent: Friday, March 13, 2015 10:39 AM
To: Scientific Analytical Institute
Subject: TC150101.1000 - Amec Sample #6A-C
Importance: High

Can you please let me know if you happen to have any bulk sample left of AmecFW sample #6A-C (vinyl sheet flooring) in the attached PLM report?

Regards,

Jason Rice, P.Eng.
Southwest HazMat & Hygiene Lead
Amec Foster Wheeler plc

900 Maple Grove Road, Unit 10
Cambridge, Ontario N3H 4R7
D +(519) 650-7100 x7109
M +(519) 820-3812

E jason.rice@amecfw.com
www.amecfw.com

amec
foster
wheeler

[redacted]

AMEC FOSTER WHEELER ENVIRONMENT
& INFRASTRUCTURE
ATTN: DAVID RAYMOND
900 MAPLE GROVE ROAD
UNIT 10
CAMBRIDGE ON N3H 4R7

Date Received: 29-JAN-15
Report Date: 04-FEB-15 13:22 (MT)
Version: FINAL

Client Phone: 519-650-7100

Certificate of Analysis

Lab Work Order #: L1572369

Project P.O. #: NOT SUBMITTED
Job Reference: TC150101
C of C Numbers:
Legal Site Desc:

[redacted]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047

[redacted]

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-1	BH1A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	19300		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	8.56		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	349		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.00		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	57.3		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	1.37		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	55400		100	ug/g	02-FEB-15				
	Chromium (Cr)	31.0		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	13.0		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	51.6		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	34300		50	ug/g	02-FEB-15				
	Lead (Pb)	2520		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	31.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	18200		20	ug/g	02-FEB-15				
	Manganese (Mn)	1760		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	31.6		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	2420		50	ug/g	02-FEB-15				
	Potassium (K)	5230		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	180		100	ug/g	02-FEB-15				
	Strontium (Sr)	91.3		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	3.40		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	14.3		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	90.6		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	38.3		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	1960		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-2	BH1B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	18000		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.88		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	124		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.90		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	46.7		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	0.75		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	73800		100	ug/g	02-FEB-15				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-2	BH1B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Chromium (Cr)	26.8		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	11.9		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	38.4		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	30800		50	ug/g	02-FEB-15				
	Lead (Pb)	1100		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	30.6		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	29900		20	ug/g	02-FEB-15				
	Manganese (Mn)	890		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	28.1		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	2220		50	ug/g	02-FEB-15				
	Potassium (K)	4650		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	150		100	ug/g	02-FEB-15				
	Strontium (Sr)	75.6		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	1.60		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	7.7		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	57.3		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	31.5		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	1060		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-3	BH2A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	18700		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.35		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	75.2		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.94		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	50.8		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	26700		100	ug/g	02-FEB-15				
	Chromium (Cr)	36.0		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	12.0		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	45.6		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	28600		50	ug/g	02-FEB-15				
	Lead (Pb)	132		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	31.8		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	11700		20	ug/g	02-FEB-15				
	Manganese (Mn)	423		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-3	BH2A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Nickel (Ni)	30.8		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1980		50	ug/g	02-FEB-15				
	Potassium (K)	5600		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	56.2		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	33.5		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	31.7		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	133		5.0	ug/g	02-FEB-15	200	200		
L1572369-4	BH2B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	26000		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.27		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	60.7		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.31		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	64.4		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	19600		100	ug/g	02-FEB-15				
	Chromium (Cr)	36.8		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	15.8		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	32.0		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	36900		50	ug/g	02-FEB-15				
	Lead (Pb)	14.8		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	41.4		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	14200		20	ug/g	02-FEB-15				
	Manganese (Mn)	449		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	36.0		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1450		50	ug/g	02-FEB-15				
	Potassium (K)	7640		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	140		100	ug/g	02-FEB-15				
	Strontium (Sr)	37.3		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-4	BH2B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Titanium (Ti)	71.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	43.8		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	76.1		5.0	ug/g	02-FEB-15	200	200		
L1572369-5	BH3A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	5030		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	1.84		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	22.2		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	13.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	37900		100	ug/g	02-FEB-15				
	Chromium (Cr)	10.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	3.5		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	13.6		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	10700		50	ug/g	02-FEB-15				
	Lead (Pb)	15.1		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	7.0		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	8050		20	ug/g	02-FEB-15				
	Manganese (Mn)	151		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	9.5		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	490		50	ug/g	02-FEB-15				
	Potassium (K)	1190		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	110		100	ug/g	02-FEB-15				
	Strontium (Sr)	124		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	273		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	20.3		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	22.3		5.0	ug/g	02-FEB-15	200	200		
L1572369-6	BH3B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-6	BH3B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	26800		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.01		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	50.5		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	79.0		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	6610		100	ug/g	02-FEB-15				
	Chromium (Cr)	37.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	16.3		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	31.3		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	40900		50	ug/g	02-FEB-15				
	Lead (Pb)	11.5		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	46.5		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	11800		20	ug/g	02-FEB-15				
	Manganese (Mn)	434		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	39.6		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1510		50	ug/g	02-FEB-15				
	Potassium (K)	8630		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	140		100	ug/g	02-FEB-15				
	Strontium (Sr)	27.3		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	75.8		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	45.9		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	68.4		5.0	ug/g	02-FEB-15	200	200		
L1572369-7	BH4A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	19400		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.01		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	174		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.08		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	57.5		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	28100		100	ug/g	02-FEB-15				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-7	BH4A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Chromium (Cr)	32.2		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	12.5		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	48.6		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	31900		50	ug/g	02-FEB-15				
	Lead (Pb)	1080		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	34.6		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	12400		20	ug/g	02-FEB-15				
	Manganese (Mn)	610		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	34.4		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	2290		50	ug/g	02-FEB-15				
	Potassium (K)	5280		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	150		100	ug/g	02-FEB-15				
	Strontium (Sr)	63.6		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	1.60		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	9.1		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	50.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	33.3		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	527		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-8	BH4B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	16300		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	4.77		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	55.0		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.90		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	41.4		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	64700		100	ug/g	02-FEB-15				
	Chromium (Cr)	25.3		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	10.8		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	33.9		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	27100		50	ug/g	02-FEB-15				
	Lead (Pb)	301		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	29.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	15800		20	ug/g	02-FEB-15				
	Manganese (Mn)	401		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-8	BH4B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Nickel (Ni)	26.9		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1520		50	ug/g	02-FEB-15				
	Potassium (K)	4270		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	91.2		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	0.52		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	35.0		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	27.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	153		5.0	ug/g	02-FEB-15	200	200		
L1572369-9	BH5A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	12900		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.45		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	46.3		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.59		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	31.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	19800		100	ug/g	02-FEB-15				
	Chromium (Cr)	24.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	8.0		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	26.7		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	20700		50	ug/g	02-FEB-15				
	Lead (Pb)	217		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	19.6		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	8600		20	ug/g	02-FEB-15				
	Manganese (Mn)	290		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	1.3		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	20.9		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1220		50	ug/g	02-FEB-15				
	Potassium (K)	2940		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	44.2		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-9	BH5A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Titanium (Ti)	160		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	32.7		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	106		5.0	ug/g	02-FEB-15	200	200		
L1572369-10	BH5B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	12000		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.89		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	62.5		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.66		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	37.7		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	159000		100	ug/g	02-FEB-15				
	Chromium (Cr)	16.5		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	7.2		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	17.2		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	19700		50	ug/g	02-FEB-15				
	Lead (Pb)	64.8		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	19.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	49100		20	ug/g	02-FEB-15				
	Manganese (Mn)	482		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	16.5		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1240		50	ug/g	02-FEB-15				
	Potassium (K)	3730		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	150		100	ug/g	02-FEB-15				
	Strontium (Sr)	159		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	47.4		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	21.5		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	47.6		5.0	ug/g	02-FEB-15	200	200		
L1572369-11	BH6A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-11	BH6A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	15900		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	4.58		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	55.1		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.79		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	39.5		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	22300		100	ug/g	02-FEB-15				
	Chromium (Cr)	24.5		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	9.8		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	28.4		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	24500		50	ug/g	02-FEB-15				
	Lead (Pb)	203		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	24.6		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	10800		20	ug/g	02-FEB-15				
	Manganese (Mn)	300		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	24.3		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1330		50	ug/g	02-FEB-15				
	Potassium (K)	4120		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	110		100	ug/g	02-FEB-15				
	Strontium (Sr)	44.4		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	107		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	32.9		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	112		5.0	ug/g	02-FEB-15	200	200		
L1572369-12	BH6B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	25000		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.19		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	66.3		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.28		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	64.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	23500		100	ug/g	02-FEB-15				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-12	BH6B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Chromium (Cr)	33.6		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	15.4		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	31.2		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	37900		50	ug/g	02-FEB-15				
	Lead (Pb)	103		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	39.3		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	15300		20	ug/g	02-FEB-15				
	Manganese (Mn)	526		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	36.0		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1530		50	ug/g	02-FEB-15				
	Potassium (K)	7310		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	46.0		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	60.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	42.0		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	89.5		5.0	ug/g	02-FEB-15	200	200		
L1572369-13	BH7A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	16500		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	4.75		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	74.6		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.87		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	36.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	25500		100	ug/g	02-FEB-15				
	Chromium (Cr)	24.7		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	10.4		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	36.9		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	27100		50	ug/g	02-FEB-15				
	Lead (Pb)	184		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	32.0		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	11700		20	ug/g	02-FEB-15				
	Manganese (Mn)	321		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-13	BH7A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Nickel (Ni)	27.7		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1740		50	ug/g	02-FEB-15				
	Potassium (K)	3820		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	100		100	ug/g	02-FEB-15				
	Strontium (Sr)	54.2		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	23.5		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	27.0		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	158		5.0	ug/g	02-FEB-15	200	200		
L1572369-14	BH7B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	25600		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.12		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	50.3		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.44		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	64.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	6520		100	ug/g	02-FEB-15				
	Chromium (Cr)	35.3		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	16.2		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	32.9		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	39100		50	ug/g	02-FEB-15				
	Lead (Pb)	21.7		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	48.2		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	11600		20	ug/g	02-FEB-15				
	Manganese (Mn)	379		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	41.3		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1410		50	ug/g	02-FEB-15				
	Potassium (K)	7560		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	28.7		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-14	BH7B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Titanium (Ti)	72.8		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	40.4		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	71.4		5.0	ug/g	02-FEB-15	200	200		
L1572369-15	BH8A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	18200		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	4.79		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	78.3		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.98		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	54.7		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	30500		100	ug/g	02-FEB-15				
	Chromium (Cr)	29.2		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	11.7		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	43.7		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	29000		50	ug/g	02-FEB-15				
	Lead (Pb)	310		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	31.2		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	13100		20	ug/g	02-FEB-15				
	Manganese (Mn)	389		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	31.5		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	2350		50	ug/g	02-FEB-15				
	Potassium (K)	5300		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	140		100	ug/g	02-FEB-15				
	Strontium (Sr)	72.3		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	0.57		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	36.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	30.8		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	211		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-16	BH8B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-16	BH8B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	26600		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.07		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	60.0		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.35		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	65.7		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	18800		100	ug/g	02-FEB-15				
	Chromium (Cr)	35.0		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	15.6		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	32.3		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	38900		50	ug/g	02-FEB-15				
	Lead (Pb)	31.9		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	43.1		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	12600		20	ug/g	02-FEB-15				
	Manganese (Mn)	492		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	37.6		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1470		50	ug/g	02-FEB-15				
	Potassium (K)	7930		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	43.4		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	51.5		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	42.4		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	76.7		5.0	ug/g	02-FEB-15	200	200		
L1572369-17	BH9A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	7270		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.81		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	114		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	21.8		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	0.89		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	130000		100	ug/g	02-FEB-15				

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-17	BH9A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Chromium (Cr)	15.9		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	6.1		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	33.1		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	19500		50	ug/g	02-FEB-15				
	Lead (Pb)	168		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	13.1		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	24300		20	ug/g	02-FEB-15				
	Manganese (Mn)	630		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	1.1		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	15.9		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1720		50	ug/g	02-FEB-15				
	Potassium (K)	1930		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	110		100	ug/g	02-FEB-15				
	Strontium (Sr)	134		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	60.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	15.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	150		5.0	ug/g	02-FEB-15	200	200		
L1572369-18	BH9B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	10600		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.60		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	111		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.56		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	25.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	103000		100	ug/g	02-FEB-15				
	Chromium (Cr)	17.1		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	8.1		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	37.6		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	25700		50	ug/g	02-FEB-15				
	Lead (Pb)	33.6		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	17.4		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	28100		20	ug/g	02-FEB-15				
	Manganese (Mn)	753		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-18	BH9B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Nickel (Ni)	17.9		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1640		50	ug/g	02-FEB-15				
	Potassium (K)	2800		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	94.8		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	55.0		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	21.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	72.4		5.0	ug/g	02-FEB-15	200	200		
L1572369-19	BH10A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	8500		50	ug/g	02-FEB-15				
	Antimony (Sb)	3.4		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	16.7		0.20	ug/g	02-FEB-15	*12	*12		
	Barium (Ba)	1170		1.0	ug/g	02-FEB-15	*500	*500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	1.4		1.0	ug/g	02-FEB-15				
	Boron (B)	29.1		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	2.01		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	74900		100	ug/g	02-FEB-15				
	Chromium (Cr)	23.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	9.2		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	240		1.0	ug/g	02-FEB-15	*63	*63		
	Iron (Fe)	22700		50	ug/g	02-FEB-15				
	Lead (Pb)	7010		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	10.2		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	16800		20	ug/g	02-FEB-15				
	Manganese (Mn)	750		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	1.5		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	41.1		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	4820		50	ug/g	02-FEB-15				
	Potassium (K)	1650		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	0.47		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	330		100	ug/g	02-FEB-15				
	Strontium (Sr)	143		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	10.2		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	71.6		5.0	ug/g	02-FEB-15	*50	*50		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-19	BH10A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Titanium (Ti)	87.4		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	12.0		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	1560		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-20	BH10B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	10700		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.79		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	208		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.57		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	23.9		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	96300		100	ug/g	02-FEB-15				
	Chromium (Cr)	16.6		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	8.4		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	43.1		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	24900		50	ug/g	02-FEB-15				
	Lead (Pb)	422		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	18.5		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	24300		20	ug/g	02-FEB-15				
	Manganese (Mn)	719		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	18.5		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	2460		50	ug/g	02-FEB-15				
	Potassium (K)	2460		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	111		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	0.67		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	13.1		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	48.1		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	20.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	219		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-21	BH11A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-21	BH11A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	16700		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	6.30		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	165		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.86		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	39.0		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	53800		100	ug/g	02-FEB-15				
	Chromium (Cr)	23.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	11.8		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	33.5		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	29200		50	ug/g	02-FEB-15				
	Lead (Pb)	639		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	25.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	13700		20	ug/g	02-FEB-15				
	Manganese (Mn)	605		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	29.5		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1990		50	ug/g	02-FEB-15				
	Potassium (K)	4730		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	<100		100	ug/g	02-FEB-15				
	Strontium (Sr)	59.9		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	1.01		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	30.9		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	27.9		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	154		5.0	ug/g	02-FEB-15	200	200		
L1572369-22	BH11B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	11100		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.27		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	95.0		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.62		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	28.0		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	160000		100	ug/g	02-FEB-15				

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-22	BH11B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Chromium (Cr)	16.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	8.1		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	17.7		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	25800		50	ug/g	02-FEB-15				
	Lead (Pb)	142		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	18.2		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	44100		20	ug/g	02-FEB-15				
	Manganese (Mn)	692		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	19.2		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1750		50	ug/g	02-FEB-15				
	Potassium (K)	3170		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	199		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	47.6		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	20.5		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	53.2		5.0	ug/g	02-FEB-15	200	200		
L1572369-23	BH12A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	12300		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.78		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	513		1.0	ug/g	02-FEB-15	*500	*500		
	Beryllium (Be)	0.69		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	33.9		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	0.74		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	89200		100	ug/g	02-FEB-15				
	Chromium (Cr)	20.8		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	8.9		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	27.0		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	25000		50	ug/g	02-FEB-15				
	Lead (Pb)	2090		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	21.9		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	29500		20	ug/g	02-FEB-15				
	Manganese (Mn)	585		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-23	BH12A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Nickel (Ni)	21.9		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1570		50	ug/g	02-FEB-15				
	Potassium (K)	3580		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	89.5		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	3.14		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	53.5		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	24.0		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	627		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-24	BH12B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	9450		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.01		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	404		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	19.8		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	80600		100	ug/g	02-FEB-15				
	Chromium (Cr)	15.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	7.7		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	28.1		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	23100		50	ug/g	02-FEB-15				
	Lead (Pb)	1420		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	17.8		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	23200		20	ug/g	02-FEB-15				
	Manganese (Mn)	676		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	18.2		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1350		50	ug/g	02-FEB-15				
	Potassium (K)	2100		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	<100		100	ug/g	02-FEB-15				
	Strontium (Sr)	85.9		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	2.14		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-24	BH12B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Titanium (Ti)	44.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	19.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	324		5.0	ug/g	02-FEB-15	*200	*200		
L1572369-25	BH13A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	19800		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.90		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	149		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.06		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	35.7		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	13700		100	ug/g	02-FEB-15				
	Chromium (Cr)	27.7		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	15.2		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	32.3		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	32800		50	ug/g	02-FEB-15				
	Lead (Pb)	622		1.0	ug/g	02-FEB-15	*140	*140		
	Lithium (Li)	33.1		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	9790		20	ug/g	02-FEB-15				
	Manganese (Mn)	574		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	35.1		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1740		50	ug/g	02-FEB-15				
	Potassium (K)	5230		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	<100		100	ug/g	02-FEB-15				
	Strontium (Sr)	24.6		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	1.05		0.50	ug/g	02-FEB-15	*1	*1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	31.7		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	31.1		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	200		5.0	ug/g	02-FEB-15	200	200		
L1572369-26	BH13B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-26	BH13B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	7860		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.16		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	35.9		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	19.2		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	228000		100	ug/g	02-FEB-15				
	Chromium (Cr)	13.6		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	6.3		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	12.8		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	14500		50	ug/g	02-FEB-15				
	Lead (Pb)	137		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	14.1		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	13400		20	ug/g	02-FEB-15				
	Manganese (Mn)	437		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	14.3		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1070		50	ug/g	02-FEB-15				
	Potassium (K)	2260		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	346		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	22.7		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	14.5		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	52.3		5.0	ug/g	02-FEB-15	200	200		
L1572369-27	BH14A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	7760		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.82		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	52.1		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	23.9		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	127000		100	ug/g	02-FEB-15				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-27	BH14A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Chromium (Cr)	12.9		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	6.2		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	23.4		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	16900		50	ug/g	02-FEB-15				
	Lead (Pb)	131		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	15.2		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	37700		20	ug/g	02-FEB-15				
	Manganese (Mn)	510		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	14.7		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1940		50	ug/g	02-FEB-15				
	Potassium (K)	2230		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	113		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	65.1		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	16.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	124		5.0	ug/g	02-FEB-15	200	200		
L1572369-28	BH14B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	9340		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	4.75		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	65.6		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.51		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	22.6		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	146000		100	ug/g	02-FEB-15				
	Chromium (Cr)	13.6		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	6.8		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	28.8		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	20300		50	ug/g	02-FEB-15				
	Lead (Pb)	71.7		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	16.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	35800		20	ug/g	02-FEB-15				
	Manganese (Mn)	634		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-28	BH14B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Nickel (Ni)	15.4		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1940		50	ug/g	02-FEB-15				
	Potassium (K)	2550		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	139		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	32.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	17.7		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	79.2		5.0	ug/g	02-FEB-15	200	200		
L1572369-29	BH15A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	7570		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.92		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	194		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	20.4		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	160000		100	ug/g	02-FEB-15				
	Chromium (Cr)	12.0		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	5.8		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	20.3		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	17900		50	ug/g	02-FEB-15				
	Lead (Pb)	61.3		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	13.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	38200		20	ug/g	02-FEB-15				
	Manganese (Mn)	582		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	12.8		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1600		50	ug/g	02-FEB-15				
	Potassium (K)	2020		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	159		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572369-29	BH15A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Titanium (Ti)	35.9		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	15.0		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	79.7		5.0	ug/g	02-FEB-15	200	200		
L1572369-30	BH15B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	5150		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.94		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	36.8		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	19.3		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	248000		100	ug/g	02-FEB-15				
	Chromium (Cr)	7.9		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	4.1		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	11.3		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	13700		50	ug/g	02-FEB-15				
	Lead (Pb)	7.6		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	10.7		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	33700		20	ug/g	02-FEB-15				
	Manganese (Mn)	570		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	8.7		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1700		50	ug/g	02-FEB-15				
	Potassium (K)	1690		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	140		100	ug/g	02-FEB-15				
	Strontium (Sr)	284		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	45.0		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	10.9		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	30.5		5.0	ug/g	02-FEB-15	200	200		
L1572369-31	BH16A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-31	BH16A									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	9900		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	4.17		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	47.3		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	24.2		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	34400		100	ug/g	02-FEB-15				
	Chromium (Cr)	22.8		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	7.1		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	25.8		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	18700		50	ug/g	02-FEB-15				
	Lead (Pb)	136		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	16.4		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	11400		20	ug/g	02-FEB-15				
	Manganese (Mn)	315		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	1.4		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	18.8		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1070		50	ug/g	02-FEB-15				
	Potassium (K)	2470		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	170		100	ug/g	02-FEB-15				
	Strontium (Sr)	54.0		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	87.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	22.0		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	75.2		5.0	ug/g	02-FEB-15	200	200		
L1572369-32	BH16B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	19500		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.12		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	44.0		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	1.03		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	46.2		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	13900		100	ug/g	02-FEB-15				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-32	BH16B									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Chromium (Cr)	29.7		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	12.9		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	28.1		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	32800		50	ug/g	02-FEB-15				
	Lead (Pb)	16.0		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	31.6		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	10800		20	ug/g	02-FEB-15				
	Manganese (Mn)	347		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	32.0		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1470		50	ug/g	02-FEB-15				
	Potassium (K)	5370		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	33.8		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	80.3		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	34.8		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	53.8		5.0	ug/g	02-FEB-15	200	200		
L1572369-33	DUP1									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	8310		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.09		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	67.5		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.51		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	20.4		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	137000		100	ug/g	02-FEB-15				
	Chromium (Cr)	13.4		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	7.1		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	16.5		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	24200		50	ug/g	02-FEB-15				
	Lead (Pb)	105		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	14.8		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	40000		20	ug/g	02-FEB-15				
	Manganese (Mn)	686		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-33	DUP1									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Nickel (Ni)	16.8		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1420		50	ug/g	02-FEB-15				
	Potassium (K)	2210		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	02-FEB-15				
	Strontium (Sr)	218		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	44.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	16.2		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	46.5		5.0	ug/g	02-FEB-15	200	200		
L1572369-34	DUP2									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	9130		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	5.27		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	59.5		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.53		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	18.3		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	89700		100	ug/g	02-FEB-15				
	Chromium (Cr)	14.7		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	7.7		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	32.3		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	25400		50	ug/g	02-FEB-15				
	Lead (Pb)	13.1		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	18.1		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	27400		20	ug/g	02-FEB-15				
	Manganese (Mn)	738		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	17.3		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1630		50	ug/g	02-FEB-15				
	Potassium (K)	2120		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	100		100	ug/g	02-FEB-15				
	Strontium (Sr)	87.4		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-34 DUP2										
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Titanium (Ti)	32.1		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	18.6		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	53.1		5.0	ug/g	02-FEB-15	200	200		
L1572369-35 DUP3										
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	10300		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.36		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	54.6		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	0.71		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	31.0		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	154000		100	ug/g	02-FEB-15				
	Chromium (Cr)	14.7		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	7.0		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	13.9		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	19600		50	ug/g	02-FEB-15				
	Lead (Pb)	39.7		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	21.3		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	56600		20	ug/g	02-FEB-15				
	Manganese (Mn)	455		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	15.3		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1070		50	ug/g	02-FEB-15				
	Potassium (K)	3060		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	142		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	44.2		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	17.9		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	35.2		5.0	ug/g	02-FEB-15	200	200		
L1572369-36 DUP4										
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572369-36	DUP4									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	6200		50	ug/g	02-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	02-FEB-15	20	20		
	Arsenic (As)	3.25		0.20	ug/g	02-FEB-15	12	12		
	Barium (Ba)	151		1.0	ug/g	02-FEB-15	500	500		
	Beryllium (Be)	<0.50		0.50	ug/g	02-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	02-FEB-15				
	Boron (B)	19.3		5.0	ug/g	02-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	02-FEB-15	10	10		
	Calcium (Ca)	199000		100	ug/g	02-FEB-15				
	Chromium (Cr)	10.6		1.0	ug/g	02-FEB-15	64	64		
	Cobalt (Co)	4.7		1.0	ug/g	02-FEB-15	50	50		
	Copper (Cu)	15.8		1.0	ug/g	02-FEB-15	63	63		
	Iron (Fe)	15200		50	ug/g	02-FEB-15				
	Lead (Pb)	52.0		1.0	ug/g	02-FEB-15	140	140		
	Lithium (Li)	11.0		1.0	ug/g	02-FEB-15				
	Magnesium (Mg)	40800		20	ug/g	02-FEB-15				
	Manganese (Mn)	531		1.0	ug/g	02-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	02-FEB-15	10	10		
	Nickel (Ni)	10.4		1.0	ug/g	02-FEB-15	50	50		
	Phosphorus (P)	1390		50	ug/g	02-FEB-15				
	Potassium (K)	1850		100	ug/g	02-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	02-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	02-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	02-FEB-15				
	Strontium (Sr)	189		1.0	ug/g	02-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	02-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	02-FEB-15	50	50		
	Titanium (Ti)	36.1		5.0	ug/g	02-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	02-FEB-15	23	23		
	Vanadium (V)	12.8		1.0	ug/g	02-FEB-15	130	130		
	Zinc (Zn)	72.2		5.0	ug/g	02-FEB-15	200	200		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
MET-UG/G-CCMS-WT	Soil	Metal Scan Collision Cell ICPMS	EPA 200.2/6020A

Sample is vigorously digested with nitric and hydrochloric acid. Analysis is conducted by ICP/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142978								
WG2035178-2 CVS								
Aluminum (Al)			107.6		%		70-130	02-FEB-15
Antimony (Sb)			95.9		%		70-130	02-FEB-15
Arsenic (As)			102.6		%		70-130	02-FEB-15
Barium (Ba)			102.9		%		70-130	02-FEB-15
Beryllium (Be)			103.3		%		70-130	02-FEB-15
Bismuth (Bi)			89.6		%		70-130	02-FEB-15
Boron (B)			103.9		%		70-130	02-FEB-15
Cadmium (Cd)			100.7		%		70-130	02-FEB-15
Calcium (Ca)			102.8		%		70-130	02-FEB-15
Chromium (Cr)			100.0		%		70-130	02-FEB-15
Cobalt (Co)			100.0		%		70-130	02-FEB-15
Copper (Cu)			99.1		%		70-130	02-FEB-15
Iron (Fe)			103.5		%		70-130	02-FEB-15
Lead (Pb)			97.7		%		70-130	02-FEB-15
Lithium (Li)			98.4		%		70-130	02-FEB-15
Magnesium (Mg)			102.5		%		70-130	02-FEB-15
Manganese (Mn)			103.7		%		70-130	02-FEB-15
Molybdenum (Mo)			97.1		%		70-130	02-FEB-15
Nickel (Ni)			98.6		%		70-130	02-FEB-15
Phosphorus (P)			105.6		%		70-130	02-FEB-15
Potassium (K)			108.3		%		70-130	02-FEB-15
Selenium (Se)			100.5		%		70-130	02-FEB-15
Silver (Ag)			96.7		%		70-130	02-FEB-15
Sodium (Na)			105.7		%		70-130	02-FEB-15
Strontium (Sr)			105.2		%		70-130	02-FEB-15
Thallium (Tl)			93.5		%		70-130	02-FEB-15
Tin (Sn)			102.1		%		70-130	02-FEB-15
Titanium (Ti)			104.7		%		70-130	02-FEB-15
Uranium (U)			90.1		%		70-130	02-FEB-15
Vanadium (V)			102.6		%		70-130	02-FEB-15
Zinc (Zn)			93.4		%		70-130	02-FEB-15
WG2035102-5 DUP		**L1572369-1**						
Aluminum (Al)		19300	16700		ug/g	8.3	40	02-FEB-15
Antimony (Sb)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142978								
WG2035102-5 DUP		**L1572369-1**						
Arsenic (As)		8.56	8.22		ug/g	2.9	30	02-FEB-15
Barium (Ba)		349	292		ug/g	1.0	40	02-FEB-15
Beryllium (Be)		1.00	0.85		ug/g	4.9	30	02-FEB-15
Bismuth (Bi)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Boron (B)		57.3	45.9		ug/g	16	30	02-FEB-15
Cadmium (Cd)		1.37	1.24		ug/g	4.6	30	02-FEB-15
Calcium (Ca)		55400	48100		ug/g	1.2	30	02-FEB-15
Chromium (Cr)		31.0	27.2		ug/g	2.8	30	02-FEB-15
Cobalt (Co)		13.0	12.1		ug/g	0.8	30	02-FEB-15
Copper (Cu)		51.6	47.9		ug/g	1.2	30	02-FEB-15
Iron (Fe)		34300	31300		ug/g	1.2	30	02-FEB-15
Lead (Pb)		2520	2270		ug/g	0.8	40	02-FEB-15
Lithium (Li)		31.7	27.2		ug/g	5.9	30	02-FEB-15
Magnesium (Mg)		18200	16300		ug/g	0.7	30	02-FEB-15
Manganese (Mn)		1760	1690		ug/g	4.6	30	02-FEB-15
Molybdenum (Mo)		<1.0	<1.0	RPD-NA	ug/g	N/A	40	02-FEB-15
Nickel (Ni)		31.6	29.8		ug/g	0.6	30	02-FEB-15
Phosphorus (P)		2420	2160		ug/g	3.7	30	02-FEB-15
Potassium (K)		5230	4570		ug/g	7.9	40	02-FEB-15
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Silver (Ag)		<0.20	<0.20	RPD-NA	ug/g	N/A	40	02-FEB-15
Sodium (Na)		180	170		ug/g	4.2	40	02-FEB-15
Strontium (Sr)		91.3	74.9		ug/g	8.1	40	02-FEB-15
Thallium (Tl)		3.40	3.17		ug/g	1.7	30	02-FEB-15
Tin (Sn)		14.3	13.7		ug/g	1.8	40	02-FEB-15
Titanium (Ti)		90.6	69.5		ug/g	27	40	02-FEB-15
Uranium (U)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Vanadium (V)		38.3	32.4		ug/g	5.6	30	02-FEB-15
Zinc (Zn)		1960	1820		ug/g	1.2	30	02-FEB-15
WG2035102-2 IRM		**ALS MET IRM1**						
Aluminum (Al)			110.0		%		70-130	02-FEB-15
Antimony (Sb)			92.2		%		70-130	02-FEB-15
Arsenic (As)			105.2		%		70-130	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142978								
WG2035102-2 IRM		**ALS MET IRM1**						
Barium (Ba)			104.9		%		70-130	02-FEB-15
Beryllium (Be)			108.0		%		70-130	02-FEB-15
Boron (B)			112.5		%		70-130	02-FEB-15
Cadmium (Cd)			99.5		%		70-130	02-FEB-15
Calcium (Ca)			121.9		%		70-130	02-FEB-15
Chromium (Cr)			106.2		%		70-130	02-FEB-15
Cobalt (Co)			103.8		%		70-130	02-FEB-15
Copper (Cu)			99.9		%		70-130	02-FEB-15
Iron (Fe)			105.8		%		70-130	02-FEB-15
Lead (Pb)			96.6		%		70-130	02-FEB-15
Lithium (Li)			106.1		%		70-130	02-FEB-15
Magnesium (Mg)			107.6		%		70-130	02-FEB-15
Manganese (Mn)			116.3		%		70-130	02-FEB-15
Molybdenum (Mo)			1.9		ug/g		1.1-3.1	02-FEB-15
Nickel (Ni)			103.5		%		70-130	02-FEB-15
Phosphorus (P)			110.3		%		70-130	02-FEB-15
Potassium (K)			120.6		%		70-130	02-FEB-15
Selenium (Se)			103.0		%		70-130	02-FEB-15
Silver (Ag)			91.3		%		70-130	02-FEB-15
Sodium (Na)			121.0		%		70-130	02-FEB-15
Strontium (Sr)			104.4		%		70-130	02-FEB-15
Thallium (Tl)			94.9		%		70-130	02-FEB-15
Tin (Sn)			104.1		%		70-130	02-FEB-15
Titanium (Ti)			114.5		%		70-130	02-FEB-15
Uranium (U)			1.6		ug/g		0.8-2.8	02-FEB-15
Vanadium (V)			107.7		%		70-130	02-FEB-15
Zinc (Zn)			101.9		%		70-130	02-FEB-15
WG2035102-3 LCS								
Aluminum (Al)			107.9		%		80-120	02-FEB-15
Antimony (Sb)			94.8		%		80-120	02-FEB-15
Arsenic (As)			101.8		%		80-120	02-FEB-15
Barium (Ba)			96.1		%		80-120	02-FEB-15
Beryllium (Be)			100.4		%		80-120	02-FEB-15
Bismuth (Bi)			91.7		%		80-120	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142978								
WG2035102-3 LCS								
Boron (B)			97.4		%		80-120	02-FEB-15
Cadmium (Cd)			94.4		%		80-120	02-FEB-15
Calcium (Ca)			101.0		%		80-120	02-FEB-15
Chromium (Cr)			99.1		%		80-120	02-FEB-15
Cobalt (Co)			98.3		%		80-120	02-FEB-15
Copper (Cu)			94.7		%		80-120	02-FEB-15
Iron (Fe)			105.2		%		80-120	02-FEB-15
Lead (Pb)			99.2		%		80-120	02-FEB-15
Lithium (Li)			99.3		%		80-120	02-FEB-15
Magnesium (Mg)			98.2		%		80-120	02-FEB-15
Manganese (Mn)			101.8		%		80-120	02-FEB-15
Molybdenum (Mo)			95.5		%		80-120	02-FEB-15
Nickel (Ni)			96.4		%		80-120	02-FEB-15
Phosphorus (P)			110.2		%		80-120	02-FEB-15
Potassium (K)			103.8		%		80-120	02-FEB-15
Selenium (Se)			99.0		%		80-120	02-FEB-15
Silver (Ag)			92.0		%		80-120	02-FEB-15
Sodium (Na)			103.5		%		80-120	02-FEB-15
Strontium (Sr)			105.2		%		80-120	02-FEB-15
Thallium (Tl)			99.1		%		80-120	02-FEB-15
Tin (Sn)			96.5		%		80-120	02-FEB-15
Titanium (Ti)			98.0		%		80-120	02-FEB-15
Uranium (U)			87.3		%		80-120	02-FEB-15
Vanadium (V)			102.1		%		80-120	02-FEB-15
Zinc (Zn)			92.6		%		80-120	02-FEB-15
WG2035102-1 MB								
Aluminum (Al)			<50		ug/g		50	02-FEB-15
Antimony (Sb)			<1.0		ug/g		1	02-FEB-15
Arsenic (As)			<0.20		ug/g		0.2	02-FEB-15
Barium (Ba)			<1.0		ug/g		1	02-FEB-15
Beryllium (Be)			<0.50		ug/g		0.5	02-FEB-15
Bismuth (Bi)			<1.0		ug/g		1	02-FEB-15
Boron (B)			<5.0		ug/g		5	02-FEB-15
Cadmium (Cd)			<0.50		ug/g		0.5	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142978								
WG2035102-1 MB								
Calcium (Ca)			<100		ug/g		100	02-FEB-15
Chromium (Cr)			<1.0		ug/g		1	02-FEB-15
Cobalt (Co)			<1.0		ug/g		1	02-FEB-15
Copper (Cu)			<1.0		ug/g		1	02-FEB-15
Iron (Fe)			<50		ug/g		50	02-FEB-15
Lead (Pb)			<1.0		ug/g		1	02-FEB-15
Lithium (Li)			<1.0		ug/g		1	02-FEB-15
Magnesium (Mg)			<20		ug/g		20	02-FEB-15
Manganese (Mn)			<1.0		ug/g		1	02-FEB-15
Molybdenum (Mo)			<1.0		ug/g		1	02-FEB-15
Nickel (Ni)			<1.0		ug/g		1	02-FEB-15
Phosphorus (P)			<50		ug/g		50	02-FEB-15
Potassium (K)			<100		ug/g		100	02-FEB-15
Selenium (Se)			<1.0		ug/g		1	02-FEB-15
Silver (Ag)			<0.20		ug/g		0.2	02-FEB-15
Sodium (Na)			<100		ug/g		100	02-FEB-15
Strontium (Sr)			<1.0		ug/g		1	02-FEB-15
Thallium (Tl)			<0.50		ug/g		0.5	02-FEB-15
Tin (Sn)			<5.0		ug/g		5	02-FEB-15
Titanium (Ti)			<5.0		ug/g		5	02-FEB-15
Uranium (U)			<1.0		ug/g		1	02-FEB-15
Vanadium (V)			<1.0		ug/g		1	02-FEB-15
Zinc (Zn)			<5.0		ug/g		5	02-FEB-15
Batch R3142985								
WG2035204-2 CVS								
Aluminum (Al)			108.1		%		70-130	02-FEB-15
Antimony (Sb)			97.3		%		70-130	02-FEB-15
Arsenic (As)			104.0		%		70-130	02-FEB-15
Barium (Ba)			98.9		%		70-130	02-FEB-15
Beryllium (Be)			100.5		%		70-130	02-FEB-15
Bismuth (Bi)			90.6		%		70-130	02-FEB-15
Boron (B)			99.7		%		70-130	02-FEB-15
Cadmium (Cd)			97.1		%		70-130	02-FEB-15
Calcium (Ca)			104.4		%		70-130	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142985								
WG2035204-2 CVS								
Chromium (Cr)			101.4		%		70-130	02-FEB-15
Cobalt (Co)			100.6		%		70-130	02-FEB-15
Copper (Cu)			98.3		%		70-130	02-FEB-15
Iron (Fe)			104.2		%		70-130	02-FEB-15
Lead (Pb)			99.7		%		70-130	02-FEB-15
Lithium (Li)			98.8		%		70-130	02-FEB-15
Magnesium (Mg)			102.3		%		70-130	02-FEB-15
Manganese (Mn)			103.8		%		70-130	02-FEB-15
Molybdenum (Mo)			95.3		%		70-130	02-FEB-15
Nickel (Ni)			98.5		%		70-130	02-FEB-15
Phosphorus (P)			108.9		%		70-130	02-FEB-15
Potassium (K)			107.8		%		70-130	02-FEB-15
Selenium (Se)			100.3		%		70-130	02-FEB-15
Silver (Ag)			99.3		%		70-130	02-FEB-15
Sodium (Na)			109.5		%		70-130	02-FEB-15
Strontium (Sr)			103.6		%		70-130	02-FEB-15
Thallium (Tl)			94.8		%		70-130	02-FEB-15
Tin (Sn)			100.8		%		70-130	02-FEB-15
Titanium (Ti)			107.1		%		70-130	02-FEB-15
Uranium (U)			87.7		%		70-130	02-FEB-15
Vanadium (V)			103.9		%		70-130	02-FEB-15
Zinc (Zn)			92.8		%		70-130	02-FEB-15
WG2035104-5 DUP		**L1572369-21**						
Aluminum (Al)		16700	16200		ug/g	3.5	40	02-FEB-15
Antimony (Sb)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Arsenic (As)		6.30	6.69		ug/g	7.8	30	02-FEB-15
Barium (Ba)		165	178		ug/g	1.1	40	02-FEB-15
Beryllium (Be)		0.86	0.89		ug/g	7.9	30	02-FEB-15
Bismuth (Bi)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Boron (B)		39.0	39.8		ug/g	18	30	02-FEB-15
Cadmium (Cd)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	02-FEB-15
Calcium (Ca)		53800	52500		ug/g	1.1	30	02-FEB-15
Chromium (Cr)		23.4	23.4		ug/g	4.9	30	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142985								
WG2035104-5 DUP		**L1572369-21**						
Cobalt (Co)		11.8	12.0		ug/g	3.5	30	02-FEB-15
Copper (Cu)		33.5	35.9		ug/g	8.6	30	02-FEB-15
Iron (Fe)		29200	29500		ug/g	3.8	30	02-FEB-15
Lead (Pb)		639	606		ug/g	2.0	40	02-FEB-15
Lithium (Li)		25.7	26.1		ug/g	2.1	30	02-FEB-15
Magnesium (Mg)		13700	14100		ug/g	4.2	30	02-FEB-15
Manganese (Mn)		605	629		ug/g	4.9	30	02-FEB-15
Molybdenum (Mo)		<1.0	<1.0	RPD-NA	ug/g	N/A	40	02-FEB-15
Nickel (Ni)		29.5	30.4		ug/g	3.4	30	02-FEB-15
Phosphorus (P)		1990	2070		ug/g	3.8	30	02-FEB-15
Potassium (K)		4730	4520		ug/g	11	40	02-FEB-15
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Silver (Ag)		<0.20	<0.20	RPD-NA	ug/g	N/A	40	02-FEB-15
Sodium (Na)		<100	<100	RPD-NA	ug/g	N/A	40	02-FEB-15
Strontium (Sr)		59.9	59.3		ug/g	2.2	40	02-FEB-15
Thallium (Tl)		1.01	1.04		ug/g	4.1	30	02-FEB-15
Tin (Sn)		<5.0	<5.0	RPD-NA	ug/g	N/A	40	02-FEB-15
Titanium (Ti)		30.9	31.9		ug/g	16	40	02-FEB-15
Uranium (U)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	02-FEB-15
Vanadium (V)		27.9	28.7		ug/g	8.8	30	02-FEB-15
Zinc (Zn)		154	159		ug/g	3.9	30	02-FEB-15
WG2035104-2 IRM		**ALS MET IRM1**						
Aluminum (Al)			109.7		%		70-130	02-FEB-15
Antimony (Sb)			91.7		%		70-130	02-FEB-15
Arsenic (As)			115.5		%		70-130	02-FEB-15
Barium (Ba)			105.5		%		70-130	02-FEB-15
Beryllium (Be)			107.2		%		70-130	02-FEB-15
Boron (B)			110.1		%		70-130	02-FEB-15
Cadmium (Cd)			99.0		%		70-130	02-FEB-15
Calcium (Ca)			114.1		%		70-130	02-FEB-15
Chromium (Cr)			106.4		%		70-130	02-FEB-15
Cobalt (Co)			103.0		%		70-130	02-FEB-15
Copper (Cu)			99.5		%		70-130	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142985								
WG2035104-2 IRM		**ALS MET IRM1**						
Iron (Fe)			106.9		%		70-130	02-FEB-15
Lead (Pb)			98.4		%		70-130	02-FEB-15
Lithium (Li)			100.4		%		70-130	02-FEB-15
Magnesium (Mg)			106.8		%		70-130	02-FEB-15
Manganese (Mn)			109.5		%		70-130	02-FEB-15
Molybdenum (Mo)			2.1		ug/g		1.1-3.1	02-FEB-15
Nickel (Ni)			101.8		%		70-130	02-FEB-15
Phosphorus (P)			109.9		%		70-130	02-FEB-15
Potassium (K)			121.6		%		70-130	02-FEB-15
Selenium (Se)			96.9		%		70-130	02-FEB-15
Silver (Ag)			96.1		%		70-130	02-FEB-15
Sodium (Na)			117.2		%		70-130	02-FEB-15
Strontium (Sr)			101.9		%		70-130	02-FEB-15
Thallium (Tl)			96.7		%		70-130	02-FEB-15
Tin (Sn)			103.4		%		70-130	02-FEB-15
Titanium (Ti)			106.5		%		70-130	02-FEB-15
Uranium (U)			1.6		ug/g		0.8-2.8	02-FEB-15
Vanadium (V)			108.1		%		70-130	02-FEB-15
Zinc (Zn)			102.2		%		70-130	02-FEB-15
WG2035104-3 LCS								
Aluminum (Al)			102.6		%		80-120	02-FEB-15
Antimony (Sb)			98.3		%		80-120	02-FEB-15
Arsenic (As)			101.8		%		80-120	02-FEB-15
Barium (Ba)			98.5		%		80-120	02-FEB-15
Beryllium (Be)			98.6		%		80-120	02-FEB-15
Bismuth (Bi)			96.4		%		80-120	02-FEB-15
Boron (B)			93.9		%		80-120	02-FEB-15
Cadmium (Cd)			94.4		%		80-120	02-FEB-15
Calcium (Ca)			98.1		%		80-120	02-FEB-15
Chromium (Cr)			98.7		%		80-120	02-FEB-15
Cobalt (Co)			96.3		%		80-120	02-FEB-15
Copper (Cu)			93.4		%		80-120	02-FEB-15
Iron (Fe)			103.1		%		80-120	02-FEB-15
Lead (Pb)			100.9		%		80-120	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142985								
WG2035104-3 LCS								
Lithium (Li)			96.1		%		80-120	02-FEB-15
Magnesium (Mg)			98.7		%		80-120	02-FEB-15
Manganese (Mn)			100.3		%		80-120	02-FEB-15
Molybdenum (Mo)			97.7		%		80-120	02-FEB-15
Nickel (Ni)			95.1		%		80-120	02-FEB-15
Phosphorus (P)			102.2		%		80-120	02-FEB-15
Potassium (K)			102.3		%		80-120	02-FEB-15
Selenium (Se)			97.9		%		80-120	02-FEB-15
Silver (Ag)			92.7		%		80-120	02-FEB-15
Sodium (Na)			99.8		%		80-120	02-FEB-15
Strontium (Sr)			102.0		%		80-120	02-FEB-15
Thallium (Tl)			97.3		%		80-120	02-FEB-15
Tin (Sn)			98.6		%		80-120	02-FEB-15
Titanium (Ti)			100.1		%		80-120	02-FEB-15
Uranium (U)			84.8		%		80-120	02-FEB-15
Vanadium (V)			100.5		%		80-120	02-FEB-15
Zinc (Zn)			91.8		%		80-120	02-FEB-15
WG2035104-1 MB								
Aluminum (Al)			<50		ug/g		50	02-FEB-15
Antimony (Sb)			<1.0		ug/g		1	02-FEB-15
Arsenic (As)			<0.20		ug/g		0.2	02-FEB-15
Barium (Ba)			<1.0		ug/g		1	02-FEB-15
Beryllium (Be)			<0.50		ug/g		0.5	02-FEB-15
Bismuth (Bi)			<1.0		ug/g		1	02-FEB-15
Boron (B)			<5.0		ug/g		5	02-FEB-15
Cadmium (Cd)			<0.50		ug/g		0.5	02-FEB-15
Calcium (Ca)			<100		ug/g		100	02-FEB-15
Chromium (Cr)			<1.0		ug/g		1	02-FEB-15
Cobalt (Co)			<1.0		ug/g		1	02-FEB-15
Copper (Cu)			<1.0		ug/g		1	02-FEB-15
Iron (Fe)			<50		ug/g		50	02-FEB-15
Lead (Pb)			<1.0		ug/g		1	02-FEB-15
Lithium (Li)			<1.0		ug/g		1	02-FEB-15
Magnesium (Mg)			<20		ug/g		20	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3142985								
WG2035104-1 MB								
Manganese (Mn)			<1.0		ug/g		1	02-FEB-15
Molybdenum (Mo)			<1.0		ug/g		1	02-FEB-15
Nickel (Ni)			<1.0		ug/g		1	02-FEB-15
Phosphorus (P)			<50		ug/g		50	02-FEB-15
Potassium (K)			<100		ug/g		100	02-FEB-15
Selenium (Se)			<1.0		ug/g		1	02-FEB-15
Silver (Ag)			<0.20		ug/g		0.2	02-FEB-15
Sodium (Na)			<100		ug/g		100	02-FEB-15
Strontium (Sr)			<1.0		ug/g		1	02-FEB-15
Thallium (Tl)			<0.50		ug/g		0.5	02-FEB-15
Tin (Sn)			<5.0		ug/g		5	02-FEB-15
Titanium (Ti)			<5.0		ug/g		5	02-FEB-15
Uranium (U)			<1.0		ug/g		1	02-FEB-15
Vanadium (V)			<1.0		ug/g		1	02-FEB-15
Zinc (Zn)			<5.0		ug/g		5	02-FEB-15

Quality Control Report

Workorder: L1572369 Report Date: 04-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7
Contact: DAVID RAYMOND

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1572369-COFC

COC Number: 14 -

Report To	
Company:	AMEC
Contact:	Adam Poplawski
Address:	131 Fielding Road Lively, ON P3Y 1L7
Phone:	705-690-5847 cell

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2 david.raymond@amecfw.com

Select below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☒ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To	☑ Yes ☐ No
	Copy of Invoice with Report	☑ Yes ☐ No
Company:		
Contact:		

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2

Project Information

ALS Quote #:

Job #: TC150101

PO / AFE:

LSD:

Oil and Gas Required Fields (client use)

Approver ID: Cost Center:

GL Account: Routing Code:

Activity Code:

Location:

ALS Lab Work Order # (lab use only): 29-JAN-15 12:29 CS L1572369 R880

ALS Contact: Mary Pires Sampler: AMP

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals	TCLP-Metals	Number of Containers
1	BH1A	27-1-15	2:00	Soil	X		1
2	BH1B						
3	BH2A						
4	BH2B						
5	BH3A						
6	BH3B						
7	BH4A						
8	BH4B						
9	BH5A						
10	BH5B						
11	BH6A						
12	BH6B						

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☒ No

Are samples for human drinking water use? ☐ Yes ☒ No

Special Instructions / Specify Criteria to add on report (client Use)

CEQG Soil Residential

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☒ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			8.7		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 28-1-2015	Time: 5:00	Received by:	Date:	Time:	Received by:	Date: 29-JAN-15	Time: 10:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1572369-COFC

COC Number: 14 -

Report To	
Company:	AMEC
Contact:	Adam Poplawski
Address:	131 Fielding Road Lively, ON P3Y 1L7
Phone:	705-690-5847 cell

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☒ Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2 david-raymond@amecfw.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To ☑ Yes ☐ No
	Copy of Invoice with Report ☑ Yes ☐ No
Company:	
Contact:	

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2

Project Information

ALS Quote #:	
Job #:	TC150101
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only)	29/1/15 12:24 09 L1572369 B810

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Contact: Mary Pires Sampler: [illegible]

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals	TCLP-Metals	Number of Containers
13	BH7A	27-1-15	2:00	Soil	X		1
14	BH7B						
15	BH8A						
16	BH8B						
17	BH9A						
18	BH9B						
19	BH10A						
20	BH10B						
21	BH11A						
22	BH11B						
23	BH12A						
24	BH12B						

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☒ No

Special Instructions / Specify Criteria to add on report (client Use)

CEQG Soil Residential

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☒ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
			5.1		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: [illegible]	Date: 28-1-15	Time: 5:00	Received by:	Date:	Time:	Received by: [illegible]	Date: 29/1/15	Time: 10:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0325e v08 Front/04 January 2014

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1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1572369-COFC

COC Number: 14 -

Report To	
Company:	AMEC
Contact:	Adam Poplawski
Address:	131 Fielding Road Lively, ON P3Y 1L7
Phone:	705-690-5847 cell

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2 david.raymond@amecfw.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☒ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To ☑ Yes ☐ No
	Copy of Invoice with Report ☑ Yes ☐ No
Company:	
Contact:	

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2

Project Information

ALS Quote #:	
Job #:	TC150101
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only)	29/1/15 12:29 pm L1572369 PSD

Oil and Gas Required Fields (client use)

Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Contact: Mary Pires Sampler: AMP

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals	TCLP-Metals	Number of Containers
25	BH13A	27-1-15	2:00	Soil	X		1
26	BH13B	↓	↓	↓	↓		↓
27	BH14A						
28	BH14B						
29	BH15A						
30	BH15B						
31	BH16A						
32	BH16B						
33	Dup1						
34	Dup2						
35	Dup3						
36	Dup4	↓	↓	↓	↓		↓

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☒ No

Are samples for human drinking water use? ☐ Yes ☒ No

Special Instructions / Specify Criteria to add on report (client Use)

CEQG Soil Residential

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☑ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	Soil

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 28-1-15	Time: 5:00	Received by:	Date:	Time:	Received by:	Date: 29/1/15	Time: 10:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326a v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

[redacted]

AMEC FOSTER WHEELER ENVIRONMENT
& INFRASTRUCTURE
ATTN: DAVID RAYMOND
900 MAPLE GROVE ROAD
UNIT 10
CAMBRIDGE ON N3H 4R7

Date Received: 29-JAN-15
Report Date: 10-FEB-15 13:24 (MT)
Version: FINAL

Client Phone: 519-650-7100

Certificate of Analysis

Lab Work Order #: L1572360

Project P.O. #: NOT SUBMITTED
Job Reference: TC150101
C of C Numbers:
Legal Site Desc:

[redacted]

[redacted]

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572360-1	BH1C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	16300		50	ug/g	10-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	10-FEB-15	20	20		
	Arsenic (As)	7.56		0.20	ug/g	10-FEB-15	12	12		
	Barium (Ba)	41.9		1.0	ug/g	10-FEB-15	500	500		
	Beryllium (Be)	0.81		0.50	ug/g	10-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	10-FEB-15				
	Boron (B)	33.8		5.0	ug/g	10-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	10-FEB-15	10	10		
	Calcium (Ca)	61800		100	ug/g	10-FEB-15				
	Chromium (Cr)	23.4		1.0	ug/g	10-FEB-15	64	64		
	Cobalt (Co)	11.9		1.0	ug/g	10-FEB-15	50	50		
	Copper (Cu)	32.2		1.0	ug/g	10-FEB-15	63	63		
	Iron (Fe)	30900		50	ug/g	10-FEB-15				
	Lead (Pb)	39.3		1.0	ug/g	10-FEB-15	140	140		
	Lithium (Li)	28.3		1.0	ug/g	10-FEB-15				
	Magnesium (Mg)	19800		20	ug/g	10-FEB-15				
	Manganese (Mn)	494		1.0	ug/g	10-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	10-FEB-15	10	10		
	Nickel (Ni)	28.3		1.0	ug/g	10-FEB-15	50	50		
	Phosphorus (P)	1790		50	ug/g	10-FEB-15				
	Potassium (K)	4110		100	ug/g	10-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	10-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	10-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	10-FEB-15				
	Strontium (Sr)	74.0		1.0	ug/g	10-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	10-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	10-FEB-15	50	50		
	Titanium (Ti)	56.0		5.0	ug/g	10-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	10-FEB-15	23	23		
	Vanadium (V)	28.5		1.0	ug/g	10-FEB-15	130	130		
	Zinc (Zn)	175		5.0	ug/g	10-FEB-15	200	200		
L1572360-4	BH4C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	24300		50	ug/g	10-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	10-FEB-15	20	20		
	Arsenic (As)	5.53		0.20	ug/g	10-FEB-15	12	12		
	Barium (Ba)	44.3		1.0	ug/g	10-FEB-15	500	500		
	Beryllium (Be)	1.25		0.50	ug/g	10-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	10-FEB-15				
	Boron (B)	62.3		5.0	ug/g	10-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	10-FEB-15	10	10		
	Calcium (Ca)	6250		100	ug/g	10-FEB-15				

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572360-4	BH4C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Chromium (Cr)	34.0		1.0	ug/g	10-FEB-15	64	64		
	Cobalt (Co)	16.4		1.0	ug/g	10-FEB-15	50	50		
	Copper (Cu)	30.6		1.0	ug/g	10-FEB-15	63	63		
	Iron (Fe)	37700		50	ug/g	10-FEB-15				
	Lead (Pb)	11.4		1.0	ug/g	10-FEB-15	140	140		
	Lithium (Li)	44.1		1.0	ug/g	10-FEB-15				
	Magnesium (Mg)	11800		20	ug/g	10-FEB-15				
	Manganese (Mn)	485		1.0	ug/g	10-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	10-FEB-15	10	10		
	Nickel (Ni)	39.2		1.0	ug/g	10-FEB-15	50	50		
	Phosphorus (P)	1180		50	ug/g	10-FEB-15				
	Potassium (K)	7360		100	ug/g	10-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	10-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	10-FEB-15	20	20		
	Sodium (Na)	110		100	ug/g	10-FEB-15				
	Strontium (Sr)	22.9		1.0	ug/g	10-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	10-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	10-FEB-15	50	50		
	Titanium (Ti)	89.7		5.0	ug/g	10-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	10-FEB-15	23	23		
	Vanadium (V)	40.7		1.0	ug/g	10-FEB-15	130	130		
	Zinc (Zn)	66.0		5.0	ug/g	10-FEB-15	200	200		
L1572360-10	BH10C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	26100		50	ug/g	10-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	10-FEB-15	20	20		
	Arsenic (As)	5.84		0.20	ug/g	10-FEB-15	12	12		
	Barium (Ba)	38.3		1.0	ug/g	10-FEB-15	500	500		
	Beryllium (Be)	1.33		0.50	ug/g	10-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	10-FEB-15				
	Boron (B)	72.0		5.0	ug/g	10-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	10-FEB-15	10	10		
	Calcium (Ca)	11800		100	ug/g	10-FEB-15				
	Chromium (Cr)	35.6		1.0	ug/g	10-FEB-15	64	64		
	Cobalt (Co)	16.4		1.0	ug/g	10-FEB-15	50	50		
	Copper (Cu)	27.7		1.0	ug/g	10-FEB-15	63	63		
	Iron (Fe)	38700		50	ug/g	10-FEB-15				
	Lead (Pb)	13.8		1.0	ug/g	10-FEB-15	140	140		
	Lithium (Li)	43.4		1.0	ug/g	10-FEB-15				
	Magnesium (Mg)	11700		20	ug/g	10-FEB-15				
	Manganese (Mn)	483		1.0	ug/g	10-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	10-FEB-15	10	10		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572360-10	BH10C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Nickel (Ni)	42.4		1.0	ug/g	10-FEB-15	50	50		
	Phosphorus (P)	1600		50	ug/g	10-FEB-15				
	Potassium (K)	8150		100	ug/g	10-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	10-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	10-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	10-FEB-15				
	Strontium (Sr)	32.0		1.0	ug/g	10-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	10-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	10-FEB-15	50	50		
	Titanium (Ti)	77.0		5.0	ug/g	10-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	10-FEB-15	23	23		
	Vanadium (V)	41.9		1.0	ug/g	10-FEB-15	130	130		
	Zinc (Zn)	73.4		5.0	ug/g	10-FEB-15	200	200		
L1572360-11	BH11C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	21200		50	ug/g	10-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	10-FEB-15	20	20		
	Arsenic (As)	5.85		0.20	ug/g	10-FEB-15	12	12		
	Barium (Ba)	47.0		1.0	ug/g	10-FEB-15	500	500		
	Beryllium (Be)	1.14		0.50	ug/g	10-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	10-FEB-15				
	Boron (B)	56.9		5.0	ug/g	10-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	10-FEB-15	10	10		
	Calcium (Ca)	20200		100	ug/g	10-FEB-15				
	Chromium (Cr)	30.6		1.0	ug/g	10-FEB-15	64	64		
	Cobalt (Co)	15.2		1.0	ug/g	10-FEB-15	50	50		
	Copper (Cu)	26.9		1.0	ug/g	10-FEB-15	63	63		
	Iron (Fe)	37500		50	ug/g	10-FEB-15				
	Lead (Pb)	14.7		1.0	ug/g	10-FEB-15	140	140		
	Lithium (Li)	35.9		1.0	ug/g	10-FEB-15				
	Magnesium (Mg)	15400		20	ug/g	10-FEB-15				
	Manganese (Mn)	715		1.0	ug/g	10-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	10-FEB-15	10	10		
	Nickel (Ni)	36.4		1.0	ug/g	10-FEB-15	50	50		
	Phosphorus (P)	1620		50	ug/g	10-FEB-15				
	Potassium (K)	6370		100	ug/g	10-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	10-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	10-FEB-15	20	20		
	Sodium (Na)	120		100	ug/g	10-FEB-15				
	Strontium (Sr)	29.8		1.0	ug/g	10-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	10-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	10-FEB-15	50	50		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L1572360-11	BH11C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Titanium (Ti)	72.1		5.0	ug/g	10-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	10-FEB-15	23	23		
	Vanadium (V)	37.1		1.0	ug/g	10-FEB-15	130	130		
	Zinc (Zn)	78.3		5.0	ug/g	10-FEB-15	200	200		
L1572360-12	BH12C									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										
	Aluminum (Al)	16500		50	ug/g	10-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	10-FEB-15	20	20		
	Arsenic (As)	6.88		0.20	ug/g	10-FEB-15	12	12		
	Barium (Ba)	43.6		1.0	ug/g	10-FEB-15	500	500		
	Beryllium (Be)	0.84		0.50	ug/g	10-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	10-FEB-15				
	Boron (B)	40.5		5.0	ug/g	10-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	10-FEB-15	10	10		
	Calcium (Ca)	41500		100	ug/g	10-FEB-15				
	Chromium (Cr)	25.3		1.0	ug/g	10-FEB-15	64	64		
	Cobalt (Co)	13.4		1.0	ug/g	10-FEB-15	50	50		
	Copper (Cu)	28.7		1.0	ug/g	10-FEB-15	63	63		
	Iron (Fe)	33900		50	ug/g	10-FEB-15				
	Lead (Pb)	40.4		1.0	ug/g	10-FEB-15	140	140		
	Lithium (Li)	28.9		1.0	ug/g	10-FEB-15				
	Magnesium (Mg)	19000		20	ug/g	10-FEB-15				
	Manganese (Mn)	595		1.0	ug/g	10-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	10-FEB-15	10	10		
	Nickel (Ni)	29.9		1.0	ug/g	10-FEB-15	50	50		
	Phosphorus (P)	1360		50	ug/g	10-FEB-15				
	Potassium (K)	4300		100	ug/g	10-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	10-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	10-FEB-15	20	20		
	Sodium (Na)	<100		100	ug/g	10-FEB-15				
	Strontium (Sr)	48.8		1.0	ug/g	10-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	10-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	10-FEB-15	50	50		
	Titanium (Ti)	60.5		5.0	ug/g	10-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	10-FEB-15	23	23		
	Vanadium (V)	31.4		1.0	ug/g	10-FEB-15	130	130		
	Zinc (Zn)	68.5		5.0	ug/g	10-FEB-15	200	200		
L1572360-17	DUPC1									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL						#1	#2		
Metals										

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

ANALYTICAL GUIDELINE REPORT

TC150101

Sample Details Grouping	Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2		
L1572360-17	DUPC1									
Sampled By:	A. POPLAWSKI on 27-JAN-15 @ 1									
Matrix:	SOIL									
Metals										
	Aluminum (Al)	25200		50	ug/g	10-FEB-15				
	Antimony (Sb)	<1.0		1.0	ug/g	10-FEB-15	20	20		
	Arsenic (As)	6.40		0.20	ug/g	10-FEB-15	12	12		
	Barium (Ba)	36.8		1.0	ug/g	10-FEB-15	500	500		
	Beryllium (Be)	1.34		0.50	ug/g	10-FEB-15	4	4		
	Bismuth (Bi)	<1.0		1.0	ug/g	10-FEB-15				
	Boron (B)	68.0		5.0	ug/g	10-FEB-15				
	Cadmium (Cd)	<0.50		0.50	ug/g	10-FEB-15	10	10		
	Calcium (Ca)	7880		100	ug/g	10-FEB-15				
	Chromium (Cr)	35.5		1.0	ug/g	10-FEB-15	64	64		
	Cobalt (Co)	16.6		1.0	ug/g	10-FEB-15	50	50		
	Copper (Cu)	31.0		1.0	ug/g	10-FEB-15	63	63		
	Iron (Fe)	41100		50	ug/g	10-FEB-15				
	Lead (Pb)	34.9		1.0	ug/g	10-FEB-15	140	140		
	Lithium (Li)	45.7		1.0	ug/g	10-FEB-15				
	Magnesium (Mg)	11000		20	ug/g	10-FEB-15				
	Manganese (Mn)	477		1.0	ug/g	10-FEB-15				
	Molybdenum (Mo)	<1.0		1.0	ug/g	10-FEB-15	10	10		
	Nickel (Ni)	45.8		1.0	ug/g	10-FEB-15	50	50		
	Phosphorus (P)	1940		50	ug/g	10-FEB-15				
	Potassium (K)	7270		100	ug/g	10-FEB-15				
	Selenium (Se)	<1.0		1.0	ug/g	10-FEB-15	1	1		
	Silver (Ag)	<0.20		0.20	ug/g	10-FEB-15	20	20		
	Sodium (Na)	130		100	ug/g	10-FEB-15				
	Strontium (Sr)	29.2		1.0	ug/g	10-FEB-15				
	Thallium (Tl)	<0.50		0.50	ug/g	10-FEB-15	1	1		
	Tin (Sn)	<5.0		5.0	ug/g	10-FEB-15	50	50		
	Titanium (Ti)	82.2		5.0	ug/g	10-FEB-15				
	Uranium (U)	<1.0		1.0	ug/g	10-FEB-15	23	23		
	Vanadium (V)	40.9		1.0	ug/g	10-FEB-15	130	130		
	Zinc (Zn)	70.1		5.0	ug/g	10-FEB-15	200	200		

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Federal CCME Canadian Environmental Quality Guidelines (JUL, 2012) = [Suite] - CA_CCME-Soil-RPL-C/F-GW Protected

#1: CCME - Soil(coarse)-IACR 1 in 1000000-Residential/Parkland **#2: CCME - Soil(fine)-IACR 1 in 1000000-RPL- Groundwater Protected**

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
MET-UG/G-CCMS-WT	Soil	Metal Scan Collision Cell ICPMS	EPA 200.2/6020A

Sample is vigorously digested with nitric and hydrochloric acid. Analysis is conducted by ICP/MS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011), unless a subset of the Analytical Test Group (ATG) has been requested (the Protocol states that all analytes in an ATG must be reported).

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information.

Quality Control Report

Workorder: L1572360 Report Date: 10-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3145569								
WG2038766-2 CVS								
Aluminum (Al)			100.8		%		70-130	10-FEB-15
Antimony (Sb)			96.9		%		70-130	10-FEB-15
Arsenic (As)			102.4		%		70-130	10-FEB-15
Barium (Ba)			93.2		%		70-130	10-FEB-15
Beryllium (Be)			97.1		%		70-130	10-FEB-15
Bismuth (Bi)			94.9		%		70-130	10-FEB-15
Boron (B)			97.5		%		70-130	10-FEB-15
Cadmium (Cd)			93.1		%		70-130	10-FEB-15
Calcium (Ca)			100.8		%		70-130	10-FEB-15
Chromium (Cr)			99.6		%		70-130	10-FEB-15
Cobalt (Co)			101.7		%		70-130	10-FEB-15
Copper (Cu)			100.1		%		70-130	10-FEB-15
Iron (Fe)			100.4		%		70-130	10-FEB-15
Lead (Pb)			96.3		%		70-130	10-FEB-15
Lithium (Li)			94.0		%		70-130	10-FEB-15
Magnesium (Mg)			98.1		%		70-130	10-FEB-15
Manganese (Mn)			102.7		%		70-130	10-FEB-15
Molybdenum (Mo)			98.4		%		70-130	10-FEB-15
Nickel (Ni)			101.3		%		70-130	10-FEB-15
Phosphorus (P)			99.99		%		70-130	10-FEB-15
Potassium (K)			99.7		%		70-130	10-FEB-15
Selenium (Se)			99.1		%		70-130	10-FEB-15
Silver (Ag)			101.4		%		70-130	10-FEB-15
Sodium (Na)			100.3		%		70-130	10-FEB-15
Strontium (Sr)			101.0		%		70-130	10-FEB-15
Thallium (Tl)			94.7		%		70-130	10-FEB-15
Tin (Sn)			94.3		%		70-130	10-FEB-15
Titanium (Ti)			102.1		%		70-130	10-FEB-15
Uranium (U)			96.1		%		70-130	10-FEB-15
Vanadium (V)			101.2		%		70-130	10-FEB-15
Zinc (Zn)			95.4		%		70-130	10-FEB-15
WG2038762-5 DUP		**L1572360-1**						
Aluminum (Al)		16300	16200		ug/g	2.6	40	10-FEB-15
Antimony (Sb)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	10-FEB-15

Quality Control Report

Workorder: L1572360 Report Date: 10-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3145569								
WG2038762-5 DUP		**L1572360-1**						
Arsenic (As)		7.56	7.34		ug/g	3.3	30	10-FEB-15
Barium (Ba)		41.9	42.8		ug/g	2.7	40	10-FEB-15
Beryllium (Be)		0.81	0.84		ug/g	0.7	30	10-FEB-15
Bismuth (Bi)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	10-FEB-15
Boron (B)		33.8	37.5		ug/g	0.2	30	10-FEB-15
Cadmium (Cd)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	10-FEB-15
Calcium (Ca)		61800	58900		ug/g	0.3	30	10-FEB-15
Chromium (Cr)		23.4	23.7		ug/g	1.1	30	10-FEB-15
Cobalt (Co)		11.9	11.9		ug/g	1.3	30	10-FEB-15
Copper (Cu)		32.2	31.7		ug/g	0.5	30	10-FEB-15
Iron (Fe)		30900	30000		ug/g	0.3	30	10-FEB-15
Lead (Pb)		39.3	38.2		ug/g	5.0	40	10-FEB-15
Lithium (Li)		28.3	28.9		ug/g	4.1	30	10-FEB-15
Magnesium (Mg)		19800	19400		ug/g	2.1	30	10-FEB-15
Manganese (Mn)		494	492		ug/g	0.6	30	10-FEB-15
Molybdenum (Mo)		<1.0	<1.0	RPD-NA	ug/g	N/A	40	10-FEB-15
Nickel (Ni)		28.3	27.8		ug/g	1.5	30	10-FEB-15
Phosphorus (P)		1790	1660		ug/g	6.1	30	10-FEB-15
Potassium (K)		4110	4230		ug/g	6.4	40	10-FEB-15
Selenium (Se)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	10-FEB-15
Silver (Ag)		<0.20	<0.20	RPD-NA	ug/g	N/A	40	10-FEB-15
Sodium (Na)		120	110		ug/g	2.2	40	10-FEB-15
Strontium (Sr)		74.0	75.3		ug/g	6.1	40	10-FEB-15
Thallium (Tl)		<0.50	<0.50	RPD-NA	ug/g	N/A	30	10-FEB-15
Tin (Sn)		<5.0	<5.0	RPD-NA	ug/g	N/A	40	10-FEB-15
Titanium (Ti)		56.0	72.5		ug/g	4.2	40	10-FEB-15
Uranium (U)		<1.0	<1.0	RPD-NA	ug/g	N/A	30	10-FEB-15
Vanadium (V)		28.5	29.5		ug/g	3.9	30	10-FEB-15
Zinc (Zn)		175	174		ug/g	1.5	30	10-FEB-15
WG2038762-2 IRM		**ALS MET IRM1**						
Aluminum (Al)			105.0		%		70-130	10-FEB-15
Antimony (Sb)			97.6		%		70-130	10-FEB-15
Arsenic (As)			103.4		%		70-130	10-FEB-15

Quality Control Report

Workorder: L1572360 Report Date: 10-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3145569								
WG2038762-2 IRM		**ALS MET IRM1**						
Barium (Ba)			96.3		%		70-130	10-FEB-15
Beryllium (Be)			100.4		%		70-130	10-FEB-15
Boron (B)			95.6		%		70-130	10-FEB-15
Cadmium (Cd)			97.4		%		70-130	10-FEB-15
Calcium (Ca)			104.8		%		70-130	10-FEB-15
Chromium (Cr)			105.2		%		70-130	10-FEB-15
Cobalt (Co)			102.5		%		70-130	10-FEB-15
Copper (Cu)			100.7		%		70-130	10-FEB-15
Iron (Fe)			101.7		%		70-130	10-FEB-15
Lead (Pb)			102.0		%		70-130	10-FEB-15
Lithium (Li)			102.3		%		70-130	10-FEB-15
Magnesium (Mg)			103.3		%		70-130	10-FEB-15
Manganese (Mn)			107.2		%		70-130	10-FEB-15
Molybdenum (Mo)			2.2		ug/g		1.1-3.1	10-FEB-15
Nickel (Ni)			102.0		%		70-130	10-FEB-15
Phosphorus (P)			105.1		%		70-130	10-FEB-15
Potassium (K)			105.9		%		70-130	10-FEB-15
Selenium (Se)			106.0		%		70-130	10-FEB-15
Silver (Ag)			102.0		%		70-130	10-FEB-15
Sodium (Na)			102.0		%		70-130	10-FEB-15
Strontium (Sr)			98.4		%		70-130	10-FEB-15
Thallium (Tl)			103.3		%		70-130	10-FEB-15
Tin (Sn)			96.9		%		70-130	10-FEB-15
Titanium (Ti)			102.3		%		70-130	10-FEB-15
Uranium (U)			1.8		ug/g		0.8-2.8	10-FEB-15
Vanadium (V)			103.6		%		70-130	10-FEB-15
Zinc (Zn)			101.6		%		70-130	10-FEB-15
WG2038762-3 LCS								
Aluminum (Al)			96.3		%		80-120	10-FEB-15
Antimony (Sb)			96.3		%		80-120	10-FEB-15
Arsenic (As)			101.4		%		80-120	10-FEB-15
Barium (Ba)			96.3		%		80-120	10-FEB-15
Beryllium (Be)			86.8		%		80-120	10-FEB-15
Bismuth (Bi)			97.0		%		80-120	10-FEB-15

Quality Control Report

Workorder: L1572360 Report Date: 10-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3145569								
WG2038762-3 LCS								
Boron (B)			86.2		%		80-120	10-FEB-15
Cadmium (Cd)			97.6		%		80-120	10-FEB-15
Calcium (Ca)			97.3		%		80-120	10-FEB-15
Chromium (Cr)			100.0		%		80-120	10-FEB-15
Cobalt (Co)			98.4		%		80-120	10-FEB-15
Copper (Cu)			96.4		%		80-120	10-FEB-15
Iron (Fe)			97.9		%		80-120	10-FEB-15
Lead (Pb)			98.2		%		80-120	10-FEB-15
Lithium (Li)			85.4		%		80-120	10-FEB-15
Magnesium (Mg)			97.8		%		80-120	10-FEB-15
Manganese (Mn)			100.5		%		80-120	10-FEB-15
Molybdenum (Mo)			92.2		%		80-120	10-FEB-15
Nickel (Ni)			98.4		%		80-120	10-FEB-15
Phosphorus (P)			107.2		%		80-120	10-FEB-15
Potassium (K)			98.1		%		80-120	10-FEB-15
Selenium (Se)			99.8		%		80-120	10-FEB-15
Silver (Ag)			99.7		%		80-120	10-FEB-15
Sodium (Na)			96.2		%		80-120	10-FEB-15
Strontium (Sr)			96.4		%		80-120	10-FEB-15
Thallium (Tl)			96.0		%		80-120	10-FEB-15
Tin (Sn)			98.4		%		80-120	10-FEB-15
Titanium (Ti)			96.7		%		80-120	10-FEB-15
Uranium (U)			98.8		%		80-120	10-FEB-15
Vanadium (V)			101.3		%		80-120	10-FEB-15
Zinc (Zn)			96.2		%		80-120	10-FEB-15
WG2038762-1 MB								
Aluminum (Al)			<50		ug/g		50	10-FEB-15
Antimony (Sb)			<1.0		ug/g		1	10-FEB-15
Arsenic (As)			<0.20		ug/g		0.2	10-FEB-15
Barium (Ba)			<1.0		ug/g		1	10-FEB-15
Beryllium (Be)			<0.50		ug/g		0.5	10-FEB-15
Bismuth (Bi)			<1.0		ug/g		1	10-FEB-15
Boron (B)			<5.0		ug/g		5	10-FEB-15
Cadmium (Cd)			<0.50		ug/g		0.5	10-FEB-15

Quality Control Report

Workorder: L1572360 Report Date: 10-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7

Contact: DAVID RAYMOND

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-UG/G-CCMS-WT	**Soil**							
Batch R3145569								
WG2038762-1 MB								
Calcium (Ca)			<100		ug/g		100	10-FEB-15
Chromium (Cr)			<1.0		ug/g		1	10-FEB-15
Cobalt (Co)			<1.0		ug/g		1	10-FEB-15
Copper (Cu)			<1.0		ug/g		1	10-FEB-15
Iron (Fe)			<50		ug/g		50	10-FEB-15
Lead (Pb)			<1.0		ug/g		1	10-FEB-15
Lithium (Li)			<1.0		ug/g		1	10-FEB-15
Magnesium (Mg)			<20		ug/g		20	10-FEB-15
Manganese (Mn)			<1.0		ug/g		1	10-FEB-15
Molybdenum (Mo)			<1.0		ug/g		1	10-FEB-15
Nickel (Ni)			<1.0		ug/g		1	10-FEB-15
Phosphorus (P)			<50		ug/g		50	10-FEB-15
Potassium (K)			<100		ug/g		100	10-FEB-15
Selenium (Se)			<1.0		ug/g		1	10-FEB-15
Silver (Ag)			<0.20		ug/g		0.2	10-FEB-15
Sodium (Na)			<100		ug/g		100	10-FEB-15
Strontium (Sr)			<1.0		ug/g		1	10-FEB-15
Thallium (Tl)			<0.50		ug/g		0.5	10-FEB-15
Tin (Sn)			<5.0		ug/g		5	10-FEB-15
Titanium (Ti)			<5.0		ug/g		5	10-FEB-15
Uranium (U)			<1.0		ug/g		1	10-FEB-15
Vanadium (V)			<1.0		ug/g		1	10-FEB-15
Zinc (Zn)			<5.0		ug/g		5	10-FEB-15

Quality Control Report

Workorder: L1572360 Report Date: 10-FEB-15

Client: AMEC FOSTER WHEELER ENVIRONMENT & INFRASTRUCTURE
900 MAPLE GROVE ROAD UNIT 10
CAMBRIDGE ON N3H 4R7
Contact: DAVID RAYMOND

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1572360-COFC

COC Number: 14 -

Page 1 of 2

Report To	
Company:	AMEC
Contact:	Adam Poplawski
Address:	131 Fielding Road Lively, ON P3Y 1L7
Phone:	705-690-5847 cell

Report Format / Distribution

Select Report Format: ☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)

Quality Control (QC) Report with Report ☑ Yes ☐ No

☑ Criteria on Report - provide details below if box checked

Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2 david.raymond@amecfw.com

Turnaround Time (TAT) (Rush Turnaround Time (TAT) is not available for all tests)

- R ☒ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To	☑ Yes ☐ No
	Copy of Invoice with Report	☑ Yes ☐ No
Company:		
Contact:		

Invoice Distribution

Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX

Email 1 or Fax adam.poplawski@amecfw.com

Email 2

Project Information

ALS Quote #:	
Job #:	TC150101
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)

Approver ID:		Cost Center:	
GL Account:		Routing Code:	
Activity Code:			
Location:			

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Lab Work Order # (lab use only): L1572360

ALS Contact: Mary Pires

Sampler: AMP

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report) B809	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals	TCLP-Metals	Number of Containers
1	BH1C	27-1-15	1:00	Soil	X		1
2	BH2C	↓	↓	↓	↓		↓
3	BH3C						
4	BH4C						
5	BH5C						
6	BH6C						
7	BH7C						
8	BH8C						
9	BH9C						
10	BH10C						
11	BH11C						
12	BH12C	↓	↓	↓	↓		↓

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

CCME Soil Residential

Hold Analysis until Approved by AMEC

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☒ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated	☐		

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	5.7

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
							8/1/15	10:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1572360-COFC

COC Number: 14 -

Report To	
Company:	AMEC
Contact:	Adam Poplawski
Address:	131 Fielding Road Lively, ON P3Y 1L7
Phone:	705-690-5847 cell

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ Yes ☐ No
☒ Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	adam.poplawski@amecfw.com
Email 2	david.raymond@amecfw.com

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☒ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Invoice To	Same as Report To	☑ Yes ☐ No
	Copy of Invoice with Report	☑ Yes ☐ No
Company:		
Contact:		

Invoice Distribution	
Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	adam.poplawski@amecfw.com
Email 2	

Project Information	
ALS Quote #:	
Job #:	TC150101
PO / AFE:	
LSD:	
ALS Lab Work Order # (lab use only)	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Contact: Mary Pires Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Metals	TCLP-Metals	Number of Containers
13	BH13C	27-1-15	1:00	Soil	X		1
14	BH14C	↓	↓	↓	↓		↓
15	BH15C						
16	BH16C						
17	DupC1						
18	DupC2	↓	↓	↓	↓		↓

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☒ No

Are samples for human drinking water use? ☐ Yes ☒ No

Special Instructions / Specify Criteria to add on report (client Use)

CEQG Soil Residential

Hold Analysis until Approved by AMEC

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐ No ☐
Ice packs	Yes ☐ No ☐	Custody seal intact	Yes ☐ No ☐
Cooling Initiated	☐		

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

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1. If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form**.

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #173190

NVLAP Lab Code: 200664-0

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502280
Analysis ID: 1502280_PLM
Date Received: 2/5/2015
Date Reported: 2/11/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
1a / *1502280PLM_1*	2x4 Ceiling Tile Sq Pattern with pinhole	**None Detected**	**40% Cellulose** **40% Mineral Wool**	**10% Perlite** **10% Other**	Tan Fibrous Heterogeneous Teased
1b / *1502280PLM_2*	2x4 Ceiling Tile Sq Pattern with pinhole	**None Detected**	**40% Cellulose** **40% Mineral Wool**	**10% Perlite** **10% Other**	Tan Fibrous Heterogeneous Teased
1c / *1502280PLM_3*	2x4 Ceiling Tile Sq Pattern with pinhole	**None Detected**	**40% Cellulose** **40% Mineral Wool**	**10% Perlite** **10% Other**	Tan Fibrous Heterogeneous Teased
2a - A / *1502280PLM_4*	9x9 VFT brown with brown streaks and mastic *tile*	**5% Chrysotile**		**95% Other**	Gray Non Fibrous Heterogeneous Dissolved
2a - B / *1502280PLM_38*	9x9 VFT brown with brown streaks and mastic *mastic*	**3% Chrysotile**		**97% Other**	Black Non Fibrous Heterogeneous Dissolved
2b - A / *1502280PLM_5*	9x9 VFT brown with brown streaks and mastic *tile*	**Not Analyzed**			
2b - B / *1502280PLM_39*	9x9 VFT brown with brown streaks and mastic *mastic*	**Not Analyzed**			
2c - A / *1502280PLM_6*	9x9 VFT brown with brown streaks and mastic *tile*	**Not Analyzed**			

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommended that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Estimated MDL is 0.1%.

Charmel Dozier (53)

Analyst

Approved Signatory

P-F-002 r15 1/15/2018

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #173190

NVLAP Lab Code: 200664-0

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502280
Analysis ID: 1502280_PLM
Date Received: 2/5/2015
Date Reported: 2/11/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
2c - B / *1502280PLM_40*	9x9 VFT brown with brown streaks and mastic / *mastic*	**Not Analyzed**			
3a - A / *1502280PLM_7*	12x12 VFT brown with brown white streaks and mastic / *tile*	**3% Chrysotile**		**97% Other**	Tan Non Fibrous Heterogeneous Dissolved
3a - B / *1502280PLM_41*	12x12 VFT brown with brown white streaks and mastic / *mastic*	**None Detected**		**100% Other**	Brown Non Fibrous Heterogeneous Dissolved
3b - A / *1502280PLM_8*	12x12 VFT brown with brown white streaks and mastic / *tile*	**Not Analyzed**			
3b - B / *1502280PLM_42*	12x12 VFT brown with brown white streaks and mastic / *mastic*	**None Detected**		**100% Other**	Brown Non Fibrous Heterogeneous Dissolved
3c - A / *1502280PLM_9*	12x12 VFT brown with brown white streaks and mastic / *tile*	**Not Analyzed**			
3c - B / *1502280PLM_43*	12x12 VFT brown with brown white streaks and mastic / *mastic*	**None Detected**		**100% Other**	Brown Non Fibrous Heterogeneous Dissolved
4a / *1502280PLM_10*	VSF green with green pattern / *vinyl sheet flooring only*	**25% Chrysotile**	**5% Cellulose**	**70% Other**	Green, Cream Fibrous Heterogeneous Dissolved

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Charmel Dozier (53)

Analyst

Approved Signatory

P-F-002 r15 1/15/2018

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #173190

NVLAP Lab Code: 200664-0

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502280
Analysis ID: 1502280_PLM
Date Received: 2/5/2015
Date Reported: 2/11/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
4b / *1502280PLM_11*	VSF green with green pattern	**Not Analyzed**			
4c / *1502280PLM_12*	VSF green with green pattern	**Not Analyzed**			
5a - A / *1502280PLM_13*	Plaster and white skim coat / *skim*	**None Detected**		**100% Other**	White Non Fibrous Heterogeneous / Crushed
5a - B / *1502280PLM_44*	Plaster and white skim coat / *base*	**None Detected**	**2% Hair**	**98% Other**	Gray Non Fibrous Heterogeneous / Crushed
5b - A / *1502280PLM_14*	Plaster and white skim coat / *skim*	**None Detected**		**100% Other**	White Non Fibrous Heterogeneous / Crushed
5b - B / *1502280PLM_45*	Plaster and white skim coat / *base*	**None Detected**	**2% Hair**	**98% Other**	Gray Non Fibrous Heterogeneous / Crushed
5c - A / *1502280PLM_15*	Plaster and white skim coat / *skim*	**None Detected**		**100% Other**	White Non Fibrous Heterogeneous / Crushed
5c - B / *1502280PLM_46*	Plaster and white skim coat / *base*	**None Detected**	**2% Hair**	**98% Other**	Gray Non Fibrous Heterogeneous / Crushed

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Charmel Dozier (53)
Analyst

Approved Signatory

P-F-002 r15 1/15/2018

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #173190

NVLAP Lab Code: 200664-0

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502280
Analysis ID: 1502280_PLM
Date Received: 2/5/2015
Date Reported: 2/11/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
5d - A	Plaster and white skim coat	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_16	*skim*				Crushed
5d - B	Plaster and white skim coat	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_47	*base*				Crushed
5e - A	Plaster and white skim coat	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_17	*skim*				Crushed
5e - B	Plaster and white skim coat	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_48	*base*				Crushed
5f - A	Plaster and white skim coat	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_18	*skim*				Crushed
5f - B	Plaster and white skim coat	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_49	*base*				Crushed
5g - A	Plaster and white skim coat	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_19	*skim*				Crushed
5g - B	Plaster and white skim coat	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_50	*base*				Crushed

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Charmel Dozier (53)

Analyst

Approved Signatory

P-F-002 r15 1/15/2018

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #173190

NVLAP Lab Code: 200664-0

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502280
Analysis ID: 1502280_PLM
Date Received: 2/5/2015
Date Reported: 2/11/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
6a	VSF brown square pattern	None Detected	25% Cellulose 5% Fiber Glass	70% Other	Gray Fibrous Heterogeneous
1502280PLM_20	*vinyl sheet flooring only*				Teased, Dissolved
6b	VSF brown square pattern	None Detected	25% Cellulose 5% Fiber Glass	70% Other	Gray Fibrous Heterogeneous
1502280PLM_21	*vinyl sheet flooring only*				Teased, Dissolved
6c	VSF brown square pattern	None Detected	25% Cellulose 5% Fiber Glass	70% Other	Gray Fibrous Heterogeneous
1502280PLM_22	*vinyl sheet flooring only*				Teased, Dissolved
7a - A	Parging over stone foundation	None Detected	1% Cellulose	99% Other	White Non Fibrous Heterogeneous
1502280PLM_23	*surfacing*				Crushed
7a - B	Parging over stone foundation	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_51	*parging*				Crushed
7b - A	Parging over stone foundation	None Detected	1% Cellulose	99% Other	White Non Fibrous Heterogeneous
1502280PLM_24	*surfacing*				Crushed
7b - B	Parging over stone foundation	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_52	*parging*				Crushed
7c - A	Parging over stone foundation	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_25	*surfacing*				Crushed

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommended that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Estimated MDL is 0.1%.

Charmel Dozier (53)

Analyst

Approved Signatory

P-F-002 r15 1/15/2018

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

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Date Received: 2/5/2015
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Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
7c - B	Parging over stone foundation	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_53	*parging*				Crushed
8a	window caulking white	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_26					Dissolved
8b	window caulking white	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_27					Dissolved
8c	window caulking white	None Detected		100% Other	Gray Non Fibrous Heterogeneous
1502280PLM_28					Dissolved
9a	drywall joint compound	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_29					Crushed
9b	drywall joint compound	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_30					Crushed
9c	drywall joint compound	None Detected		100% Other	White Non Fibrous Heterogeneous
1502280PLM_31					Crushed
10a	mortar	None Detected		100% Other	Tan Non Fibrous Heterogeneous
1502280PLM_32					Crushed

Disclaimer: Due to the nature of the EPA 600 method, asbestos may not be detected in samples containing low levels of asbestos. We strongly recommended that analysis of floor tiles, vermiculite, and/or heterogeneous soil samples be conducted by TEM for confirmation of "None Detected" by PLM. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. This report may not be used by the client to claim product endorsement by NVLAP or any other agency of the U.S. government. Estimated MDL is 0.1%.

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P-F-002 r15 1/15/2018

Bulk Asbestos Analysis

By Polarized Light Microscopy
EPA Method: 600/R-93/116 and 600/M4-82-020

AIHA LAP, LLC ACCREDITED LABORATORY INDUSTRIAL HYGIENE ISO/IEC 17025:2005 www.aihaaccreditedlabs.org LAB #173190

NVLAP Lab Code: 200664-0

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502280
Analysis ID: 1502280_PLM
Date Received: 2/5/2015
Date Reported: 2/11/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Asbestos	Fibrous Components	Non-Fibrous Components	Attributes / Treatment
10b / *1502280PLM_33*	mortar	**None Detected**		**100% Other**	Tan Non Fibrous Heterogeneous Crushed
10c / *1502280PLM_34*	mortar	**None Detected**		**100% Other**	Tan Non Fibrous Heterogeneous Crushed
11a / *1502280PLM_35*	window caulking grey	**None Detected**		**100% Other**	Gray Non Fibrous Heterogeneous Dissolved
11b / *1502280PLM_36*	window caulking grey	**None Detected**		**100% Other**	Gray Non Fibrous Heterogeneous Dissolved
11c / *1502280PLM_37*	window caulking grey	**None Detected**		**100% Other**	Gray Non Fibrous Heterogeneous Dissolved

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Charmel Dozier (53)

Analyst

Approved Signatory

P-F-002 r15 1/15/2018

1502280

Version 1-15-2012

Client:	AMEC Environment & Infrastructure	***Instructions:***
Contact:	Jason Rice	*Use Column "B" for your contact info*
Address:	900 Maple Grove Rd., Unit 10, Cambrige, ON, N3H 4R7	
Phone:	519-820-3812	*To See an Example Click the*
Fax:	519-653-6554	*bottom Example Tab.*
Email:	jason.rice@amec.com	
	justin.tse@amec.com	***Enter samples between "<<" and ">>"***
Project:	TC150101	***Begin Samples with a "<< "above the first sample***
		and end with a ">>" below the last sample.
Client Notes:	***see note below at end of sample list**	*Only Enter your data on the first sheet "Sheet1"*
P.O. #.		*Note: Data 1 and Data 2 are optional*
Date Submitted:	03/02/2015	*fields that do not show up on the official*
		lab report, however they will be included
Analysis:	PLM EPA600 - Positive Stop	*in the electronic data returned to you*
TurnAroundTime:	5-day TAT	*to facilitate your reintegration of the report data.*

Scientific Analytical Institute

4604 Dundas Drive
Greensboro, NC 27407
Phone: 336.292.3888
Fax: 336.292.3313
Email: lab@sailab.com

Sample Number	Data 1	Sample Description	Data 2
<<			
1a	[Enter data of your choosing here]	2x4 Ceiling Tile Sq Pattern with pinhole	[Enter data of your choosing here]
1b	[Enter data of your choosing here]	2x4 Ceiling Tile Sq Pattern with pinhole	[Enter data of your choosing here]
1c	[Enter data of your choosing here]	2x4 Ceiling Tile Sq Pattern with pinhole	[Enter data of your choosing here]
2a	[Enter data of your choosing here]	9x9 VFT brown with brown streaks and mastic	[Enter data of your choosing here]
2b	[Enter data of your choosing here]	9x9 VFT brown with brown streaks and mastic	[Enter data of your choosing here]
2c	[Enter data of your choosing here]	9x9 VFT brown with brown streaks and mastic	[Enter data of your choosing here]
3a		12x12 VFT brown with brown white streaks and mastic	
3b		12x12 VFT brown with brown white streaks and mastic	
3c		12x12 VFT brown with brown white streaks and mastic	
4a		VSF green with green pattern	
4b		VSF green with green pattern	
4c		VSF green with green pattern	
5a		Plaster and white skim coat	
5b		Plaster and white skim coat	
5c		Plaster and white skim coat	
5d		Plaster and white skim coat	
5e		Plaster and white skim coat	
5f		Plaster and white skim coat	
5g		Plaster and white skim coat	
6a		VSF brown square pattern	
6b		VSF brown square pattern	
6c		VSF brown square pattern	
7a		Parging over stone foundation	
7b		Parging over stone foundation	
7c		Parging over stone foundation	

Accepted ☑

Rejected ☐

MSCup
2/5 10AM

150 2280

8a	window caulking white
8b	window caulking white
8c	window caulking white
9a	drywall joint compound
9b	drywall joint compound
9c	drywall joint compound
10a	mortar
10b	mortar
10c	mortar
11a	window caulking grey
11b	window caulking grey
11c	window caulking grey

>>

***Please analyze all layers to O.Reg. 278/05**
All layers are to be analyzed separately

Analysis for Lead Concentration in Paint Chips

by Flame Atomic Absorption Spectroscopy
EPA SW-846 3050B/6010C/7420

AIHA LAP, LLC
ACCREDITED LABORATORY
ENVIRONMENTAL LEAD
ISO/IEC 17025:2005
www.aihaaccreditedlabs.org
LAB #173190

Customer: Amec Foster Wheeler Environment & Infrastructure
900 Maple Grove Road
Cambridge ON N3H 4R7

Attn: Jason Rice
Justin Tse

Project: TC150101

Lab Order ID: 1502282
Analysis ID: 1502282_PBP
Date Received: 2/5/2015
Date Reported: 2/12/2015

Sample ID / *Lab Sample ID*	Description / *Lab Notes*	Mass *(g)*	Concentration *(ppm)*	Concentration *(% by weight)*
P1 / 1502282PBP_1	Yellow	0.0519	250	**0.024%**
P2 / 1502282PBP_2	Beige	0.0761	370	**0.037%**
P3 / 1502282PBP_3	White int.	0.0830	180000	**18%**
P4 / 1502282PBP_4	Gray int.	0.0755	76000	**7.6%**
P5 / 1502282PBP_5	Red ext.	0.0921	140000	**14%**
P6 / 1502282PBP_6	White ext.	0.0946	100000	**10%**

Unless otherwise noted blank sample correction was not performed on analytical results. Scientific Analytical Institute participates in the AIHA IHPAT program. IHPAT Laboratory ID: 173190. This report relates only to the samples tested and may not be reproduced, except in full, without the written approval of SAI. Analytical uncertainty available upon request. The quality control samples run with the samples in this report have passed all EPA required specifications unless otherwise noted. RL: (Report Limit for an undiluted 50ml sample is 4µg Total Pb).

Daniel Olson (6)

Analyst

Laboratory Director

1502282

C of C #

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
Toll Free: 1-800-668-9878

ALS

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Page 1 of 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required	Service requested		
	5 day (regular)	X	2 day TAT (50%)
	3-4 day (25%)		Next day TAT (100%)
			Same day TAT (200%)

COMPANY NAME: AMEC
OFFICE: Cambridge
PROJECT MANAGER: Jason Rice / Justin Tse
PROJECT #: TC150101
PHONE: 519-650-7109
FAX: —
ACCOUNT #: —
QUOTATION #: —
PO #: —

CRITERIA — Criteria on report YES___ NO___
Reg 153/04 Reg 511/09
Table 1 2 3
TCLP ____ MISA ____ PWQO ____
ODWS ____ OTHER ____

REPORT FORMAT/DISTRIBUTION
EMAIL X ____ FAX ____ BOTH ____
SELECT: PDF ____ DIGITAL ____ BOTH ____
EMAIL 1 jason.rice@amec.com
EMAIL 2 justin.tse@amec.com

PLEASE INDICATE FILTERED, PRESERVED OR BOTH <----- (F, P, F/P)

SUBMISSION #:
ENTERED BY:
DATE/TIME ENTERED:
BIN #:

SAMPLING INFORMATION

Date (dd-mm-yy)	Time (24hr) (hh:mm)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	LEAD in Paint	PCB in Paint	COMMENTS	LAB ID
3/02/15	1000					X	P1 - yellow	2	X	X		
						X	P2 Beige	2	X	X		
						X	P3 - White int.	2	X	X		
						X	P4 Gray int	2	X	X		
						X	P5 Red! ext	2	X	X		
						X	P6 White ext	2	X	X		

Accepted ☑
Rejected ☐

SPECIAL INSTRUCTIONS/COMMENTS

THE QUESTIONS BELOW MUST BE ANSWERED FOR WATER SAMPLES (CHECK Yes OR No)
Are any samples taken from a regulated DW System? Yes ___ No ___
If yes, an authorized drinking water COC MUST be used for this submission.
Is the water sampled intended to be potable for human consumption? Yes ___ No ___

SAMPLE CONDITION
___ FROZEN
___ COLD
___ COOLING INITIATED
___ AMBIENT
MEAN TEMP
OBSERVATIONS Yes___ No___ If yes add SIF
INIT

SAMPLED BY: JT	DATE & TIME	RECEIVED BY:	DATE & TIME 2:50 100
RELINQUISHED BY: JT	DATE & TIME 3 Feb 15	RECEIVED AT LAB BY:	DATE & TIME

Notes

1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

Analytics Corporation
10329 Stony Run Lane
Ashland, VA 23005
Phone: (804) 365-3000
Fax: (908) 365-3002

February 18, 2015

MAMIE POPE
SCIENTIFIC ANALYTICAL INSTITUTE

4604 DUNDAS DRIVE
Greensboro, NC 27407

Account ID:	32302015 32302015
Purchase Order:	N/A
Client ID:	1502283
Work Order:	1025078

Dear MAMIE POPE

Enclosed are the analytical results for sample(s) received by the laboratory on Monday, February 09, 2015. The signature below certifies that the results are based on the referenced methods and applicable certifications or accreditations are noted for each parameter reported (see key at end of report).

Unless otherwise specified all analyses of solid materials are based on dry weight.

Reported results relate only to the items tested, as received by the laboratory.

On-site analysis (analysis ASAP) is recommended for the following tests: pH, temperature, dissolved oxygen, residual chlorine and sulfite. When performed off-site, these tests do not meet NELAC standards.

Abbreviations:ug/L = micrograms per Liter, mg/L = milligrams per Liter, ug/g = micrograms per gram, mg/kg = milligrams per kilogram ug/wp = micrograms per wipe, ug/ml = micrograms per millimeter, uS/cm = microsiemens per centimeter at 25 degrees Celcius ppb = parts per billion, DF = Dilution Factor.

If you have any questions concerning this report, please feel free to call Client Services at 1-800-888-8061.

Sincerely,

Dawn Casto
Technical Director (or designee)

Enclosures

CERTIFICATE OF ANALYSIS

Analytics Corporation
10329 Stony Run Lane
Ashland, VA 23005
Phone: (804) 365-3000
Fax: (908) 365-3002

ANALYTICAL RESULTS

Workorder: 1025078 1502283

Lab ID:	**1025078001**	Date Received:	02/09/2015 13:00	Matrix	Paint
Sample ID:	**P1 YELLOW**	Date Collected:	02/06/2015 0:00	Sample Type:	NA

Analytical Method: SW-846 8082 Preparation Method: SW-846 3550B (PCB)

Parameters	Results	Units	Report Limi	DF	Prepared	By	Analyzed	By	Qual	Certifications
Aroclor 1016	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		
Aroclor 1221	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		
Aroclor 1232	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		
Aroclor 1242	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		
Aroclor 1248	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		
Aroclor 1254	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		
Aroclor 1260	<0.694	mg/Kg	0.694	1	02/12/2015 18:50	TDJ	2/14/2015 05:15	MBC		

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Ashland, VA 23005
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ANALYTICAL RESULTS

Workorder: 1025078 1502283

Lab ID:	**1025078002**	Date Received:	02/09/2015 13:00	Matrix	Paint
Sample ID:	**P2 BEIGE**	Date Collected:	02/06/2015 0:00	Sample Type:	NA

Analytical Method: SW-846 8082 Preparation Method: SW-846 3550B (PCB)

Parameters	Results	Units	Report Limi	DF	Prepared	By	Analyzed	By	Qual	Certifications
Aroclor 1016	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		
Aroclor 1221	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		
Aroclor 1232	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		
Aroclor 1242	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		
Aroclor 1248	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		
Aroclor 1254	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		
Aroclor 1260	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 05:45	MBC		

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Ashland, VA 23005
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ANALYTICAL RESULTS

Workorder: 1025078 1502283

Lab ID:	**1025078003**	Date Received:	02/09/2015 13:00	Matrix	Paint
Sample ID:	**P3 WHITE INT**	Date Collected:	02/06/2015 0:00	Sample Type:	NA

Parameters	Results	Units	Report Limi	DF	Prepared	By	Analyzed	By	Qual	Certifications
Analytical Method: SW-846 8082					Preparation Method: SW-846 3550B (PCB)					
Aroclor 1016	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC
Aroclor 1221	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC
Aroclor 1232	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC
Aroclor 1242	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC
Aroclor 1248	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC
Aroclor 1254	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC
Aroclor 1260	<1.09	mg/Kg	1.09	1	02/12/2015	18:50	TDJ	2/14/2015 06:16		MBC

Analytics Corporation
10329 Stony Run Lane
Ashland, VA 23005
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ANALYTICAL RESULTS

Workorder: 1025078 1502283

Lab ID:	**1025078004**	Date Received:	02/09/2015 13:00	Matrix	Paint
Sample ID:	**P4 GRAY INT**	Date Collected:	02/06/2015 0:00	Sample Type:	NA

Parameters	Results	Units	Report Limi	DF	Prepared	By	Analyzed	By	Qual	Certifications
Analytical Method: SW-846 8082					Preparation Method: SW-846 3550B (PCB)					
Aroclor 1016	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		
Aroclor 1221	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		
Aroclor 1232	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		
Aroclor 1242	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		
Aroclor 1248	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		
Aroclor 1254	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		
Aroclor 1260	<1.04	mg/Kg	1.04	1	02/12/2015	18:50 TDJ	2/14/2015	06:46 MBC		

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ANALYTICAL RESULTS

Workorder: 1025078 1502283

Lab ID:	**1025078005**	Date Received:	02/09/2015 13:00	Matrix	Paint
Sample ID:	**P5 RED EXT**	Date Collected:	02/06/2015 0:00	Sample Type:	NA

Analytical Method: SW-846 8082 Preparation Method: SW-846 3550B (PCB)

Parameters	Results	Units	Report Limi	DF	Prepared	By	Analyzed	By	Qual	Certifications
Aroclor 1016	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		
Aroclor 1221	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		
Aroclor 1232	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		
Aroclor 1242	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		
Aroclor 1248	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		
Aroclor 1254	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		
Aroclor 1260	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:17	MBC		

Analytics Corporation
10329 Stony Run Lane
Ashland, VA 23005
Phone: (804) 365-3000
Fax: (908) 365-3002

ANALYTICAL RESULTS

Workorder: 1025078 1502283

Lab ID:	**1025078006**	Date Received:	02/09/2015 13:00	Matrix	Paint
Sample ID:	**P6 WHITE EXT**	Date Collected:	02/06/2015 0:00	Sample Type:	NA

Analytical Method: SW-846 8082 Preparation Method: SW-846 3550B (PCB)

Parameters	Results	Units	Report Limi	DF	Prepared	By	Analyzed	By	Qual	Certifications
Aroclor 1016	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:47	MBC		
Aroclor 1221	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:47	MBC		
Aroclor 1232	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:47	MBC		
Aroclor 1242	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:47	MBC		
Aroclor 1248	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:47	MBC		
Aroclor 1254	1.64	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/17/2015 16:44	MBC		
Aroclor 1260	<0.500	mg/Kg	0.500	1	02/12/2015 18:50	TDJ	2/14/2015 07:47	MBC		

Analytics Corporation
10329 Stony Run Lane
Ashland, VA 23005
Phone: (804) 365-3000
Fax: (908) 365-3002

ANALYTICAL RESULTS

Workorder: 1025078 1502283

Work Order Qualifiers

-- Sample received out of the 2-6 C temperature range.

Qualifiers

--

Certification Index:

Virginia (NELAC) - 1 VAC 30-46 H 1, Laboratory ID: 460160

1S02283 PCB

C of C #

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
Toll Free: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Page 1 of 1

Note: all TAT Quoted material is in business days which exclude statutory holidays and weekends. TAT samples received past 3:00 pm or Saturday/Sunday begin the next day.

Specify date required	Service requested		
	5 day (regular)	X	2 day TAT (50%)
	3-4 day (25%)		Next day TAT (100%)
			Same day TAT (200%)

COMPANY NAME: Amec
OFFICE: Cambridge
PROJECT MANAGER: Jason Rice / Justin Tse
PROJECT #: TC150101
PHONE: 519-650-7109
FAX: —
ACCOUNT #: —
QUOTATION #: —
PO #: —

CRITERIA — Criteria on report YES___ NO___
Reg 153/04 Reg 511/09
Table 1 2 3
TCLP ___ MISA ___ PWQO ___
ODWS ___ OTHER ___

REPORT FORMAT/DISTRIBUTION
EMAIL X FAX ___ BOTH ___
SELECT: PDF ___ DIGITAL ___ BOTH ___
EMAIL 1: Jason.rice@amec.com
EMAIL 2: justin.tse@amec.com

ANALYSIS REQUEST

PLEASE INDICATE FILTERED, PRESERVED OR BOTH <------ (F, P, F/P)

SAMPLING INFORMATION

Sample Date/Time: Date (dd-mm-yy)	Time (24hr) (hh:mm)	TYPE: COMP	TYPE: GRAB	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	Lead in Paint	PCB in Paint	COMMENTS	LAB ID
3/02/15	1000					X	P1 - yellow	2	X	X		
						X	P2 Beige	2	X	X		
						X	P3 - white int.	2	X	X		
						X	P4 Gray int	2	X	X		
						X	P5 Red! ext	2	X	X		
						X	P6 White ext	2	X	X		

Accepted ☑
Rejected ☐

SAMPLED BY: JT
RELINQUISHED BY: JT
DATE & TIME: 3 Feb 15
RECEIVED BY: [illegible]
DATE & TIME: 2:50 pm

Notes

1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

APPENDIX C
SUMMARY OF DESIGNATED SUBSTANCES & HAZARDOUS MATERIALS

LOCATION ID:	1	**LEVEL:**	1	**DESCRIPTION:**	Kitchen		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	Yellow	~300 sq.ft.	Lead in Paint	G	1	3	Sample P1
Wall	White – Interior	~300 sq.ft.	Lead in Paint	G	1	3	Sample P3
Floor	Grey	~150 sq.ft.	Lead in Paint	G	1	3	Sample P4
MERCURY							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Fluorescent Light Tubes	4	Mercury Vapour	G	2	3	Assumed
PCBs							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Fluorescent Light Ballasts	2	Potential PCBs	G	2	3	Suspect

LOCATION ID:	2	**LEVEL:**	1	**DESCRIPTION:**	Living Room		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	Yellow	~300 sq.ft.	Lead in Paint	G	1	3	Sample P1
Wall	White – Interior	~300 sq.ft.	Lead in Paint	G	1	3	Sample P3
Floor	Grey	~150 sq.ft.	Lead in Paint	G	1	3	Sample P4
MERCURY							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Fluorescent Light Tubes	2	Mercury Vapour	G	2	3	Assumed
PCBs							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Fluorescent Light Ballasts	1	Potential PCBs	G	2	3	Suspect

LOCATION ID:	3	**LEVEL:**	1	**DESCRIPTION:**	Office		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	White – Interior	~200 sq.ft.	Lead in Paint	G	1	3	Sample P3
Floor	Grey	~100 sq.ft.	Lead in Paint	G	1	3	Sample P4
MERCURY							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Fluorescent Light Tubes	2	Mercury Vapour	G	2	3	Assumed
PCBs							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Light Ballasts	1	Potential PCBs	G	2	3	Suspect

LOCATION ID:	4	**LEVEL:**	1	**DESCRIPTION:**	Washroom		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	Yellow	~50 sq.ft.	Lead in Paint	G	1	3	Sample P1

LOCATION ID:	5	**LEVEL:**	1	**DESCRIPTION:**	Foyer		
ASBESTOS							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Floor	Green with green pattern vinyl sheet floor	50	25% Chrysotile asbestos	**G**	**1**	**3**	**Sample 4A-C**
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	White – Interior	~100 sq.ft.	Lead in Paint	G	1	3	Sample P3
Floor	Grey	~50 sq.ft.	Lead in Paint	G	1	3	Sample P4
MERCURY							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**

Lights	Fluorescent Light Tubes	2	Mercury Vapour	G	2	3	Assumed
PCBs							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Lights	Fluorescent Light Ballasts	1	Potential PCBs	G	2	3	Suspect

LOCATION ID:	6	**LEVEL:**	1	**DESCRIPTION:**	Living Room		
ASBESTOS							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Floor	9”x9” Brown with brown streaks vinyl floor tile & mastic	25 sq.ft.	5% (tile) & 3% (mastic) Chrysotile asbestos	G	1	3	Sample 2A-C
Floor	12”x12” Brown with brown white streaks	75 sq.ft.	3% Chrysotile asbestos	G	1	3	Sample 3A-C

LOCATION ID:	8	**LEVEL:**	2	**DESCRIPTION:**	Stairs/Family Room		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	Beige	~200 sq.ft.	Lead in Paint	G	1	3	Sample P2
Wall	White – Interior	~400 sq.ft.	Lead in Paint	G	1	3	Sample P3
Floor	Grey	~250 sq.ft.	Lead in Paint	G	1	3	Sample P4

LOCATION ID:	9/10/11	**LEVEL:**	2	**DESCRIPTION:**	Bedrooms		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Wall	White – Interior	~100 sq.ft.	Lead in Paint	G	1	3	Sample P3
Floor	Grey	~300 sq.ft.	Lead in Paint	G	1	3	Sample P4

LOCATION ID:	Exterior	**LEVEL:**	-	**DESCRIPTION:**	Building Exterior		
LEAD							
COMPONENT	**DESCRIPTION**	**QUANTITY**	**CONTENT**	**CONDITION**	**ACCESSIBILITY**	**PRIORITY**	**NOTES**
Trim & Soffit	White	~400 sq.ft.	Lead in Paint	Good	2	3	Sample P6 – 10%
Roof Cap & Framing	Red	~500 sq.ft.	Lead in Paint	**Poor (flaking)**	2	1	Sample P5 – 14%

APPENDIX D
PHOTOGRAPHIC LOG

Photo 1: Historical photo of light station in early 1900's

Photo 2: North (front) elevation in 2015

Photo 3: West (side) elevation

Photo 4: South (rear) elevation

Photo 5 : East (side) elevation

Photo 6: North foundation wall under front stairs

Photo 7: Northwest corner foundation – below tower

Photo 8: Northwest corner looking along west foundation wall - below tower

Photo 9: West foundation wall – south section

Photo 10: South foundation wall – west corner

Photo 11: South foundation wall

Photo 12: East foundation wall

Photo 13: North foundation wall – east end

Photo 14: Vinyl siding over aged wood cladding

Photo 15: Front stair structure

Photo 16: Side stair structure

Photo 17: Brick chimney

Photo 18: Beacon house and walkaround platform

Photo 19: Beacon house and walkaround platform

Photo 20: Beacon house

Photo 21: Stair to basement

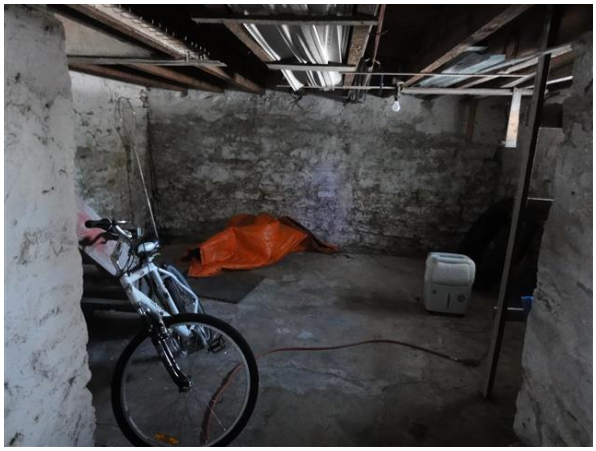


Photo 22: Stone foundation walls below tower

Photo 23: Deteriorated mortar in tower's stone foundation

Photo 24: Cracked cement parging on stone and mortar

Photo 25: Dry rot in base of tower's wall stringers

Photo 26: Differential cracks in heaved basement floor

Photo 27: Tower's wood corner post and support beams on top of stone foundation wall

Photo 28: Tower's wood corner post and support beams on top of stone foundation wall

Photo 29: Support beams on top of stone foundation

Photo 30: Support beams on top of stone foundation

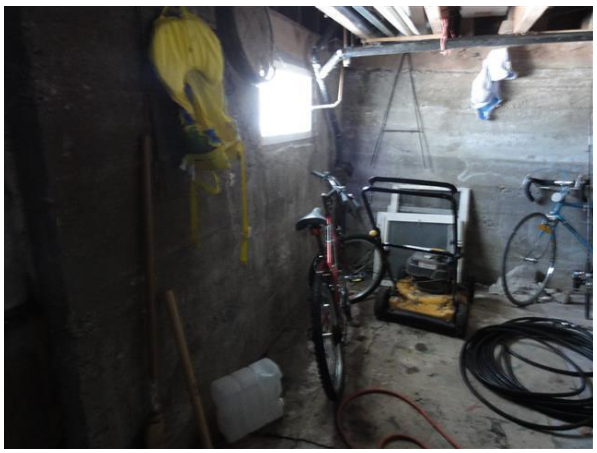


Photo 31: Poured–in-place concrete foundation walls below light station residence

Photo 32: Poured–in-place concrete foundation walls and wood floor joists supporting light station residence

Photo 33: Differential cracks in heaved basement floor

Photo 34: Differential cracks in heaved basement floor

Photo 35: Deflected floor joist framing around fireplace chimney base

Photo 36: Deflected floor joist framing around fireplace chimney base

Photo 37: Differential cracks in heaved basement floor

Photo 38: Differential cracks in heaved basement floor

Photo 39: Poured-in-place concrete and stone foundation walls under south section

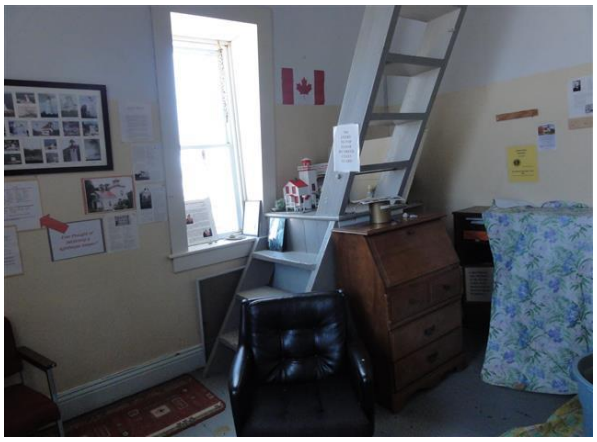


Photo 40: Second storey interior of tower

Photo 41: Beacon house platform framing, access ladder and floor hatch

Photo 42: Beacon house interior

Photo 43: Square pattern with pinhole ceiling. Samples 1A-C

Photo 44: Vinyl floor tile and mastic. Samples 2A-C

Photo 45: Vinyl floor tile. Samples 3A-C

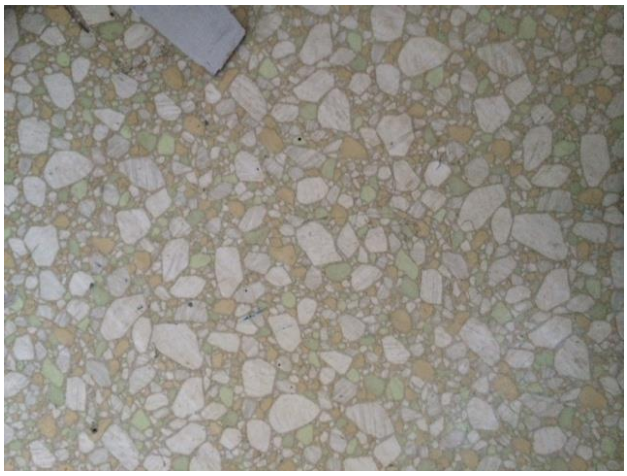


Photo 46: Vinyl sheet flooring. Samples 4A-C

Photo 47: White plaster and skim coat. Samples 5A-G

Photo 48: Vinyl sheet flooring. Samples 6A-C

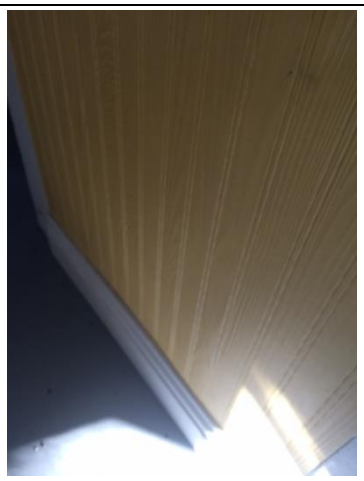
	
Photo 49: White parging on stone found. Samples 7A-C.	**Photo 50**: White window caulking. Samples 8A-C
	
Photo 51: Drywall joint compound. Samples 9A-C	**Photo 52**: Grey mortar on concrete. Samples 10A-C
	
Photo 53: Grey window caulking. Samples 11A-C	**Photo 54**: Yellow paint, Sample P1

Photo 55: Beige paint. Sample P2

Photo 56: White interior paint. Sample P3

Photo 57: Grey floor paint. Sample P4.

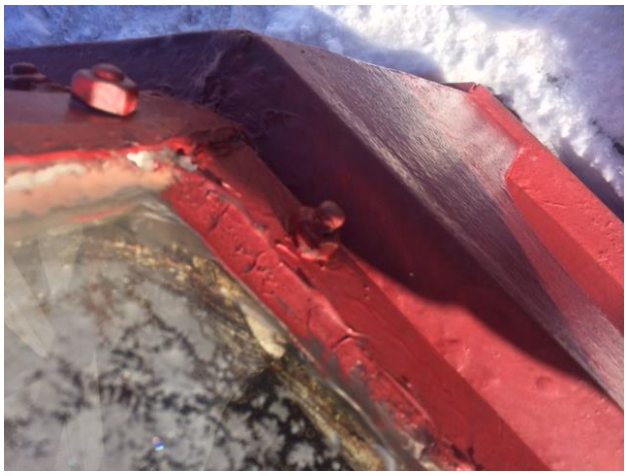


Photo 58: Red paint on light house exterior. Sample P5

Photo 59: White exterior paint. Sample P6

APPENDIX E
ENVIRONMENTAL CONDITION SUMMARY

Property Description

The Gore Bay (Janet Head) Light Station (L.L 1023) is located on the western shore of Manitoulin Island, near Gore Bay Ontario (hereafter referred to as the "Site"). The CCG property covers a total area of approximately 1.3 hectares on the south shore of the North Channel at the entrance to Gore Bay. The original lighthouse was constructed in 1879 as a navigation aid for vessels along the northern shore of Lake Huron.

The light station is situated on the land side of the road that parallels the shoreline of the North Channel of Lake Huron. The light station structure, situated on a gentle slope, is a wood-framed, pyramid-shaped, two-storey tower plus a 3rd level beacon house with an exterior walkaround platform. Adjoining the tower on its east and south elevations is a wood-framed, one-and-a-half storey structure. The tower and adjoining structure have a finished interior, occupied during the summer season. An unfinished basement was observed below the entire footprint area. At the time of the site visit the entire facility was unheated.

The basement foundation supporting the square base of the pyramid tower is of stone and mortar construction. The basement foundation supporting the adjoining structure is of poured-in-place concrete with either a parged exterior finish (east elevation) or a formed "architectural-block" type exterior finish above grade (south and part of north elevations). The foundations rise approximately 18 to 30 inches above the exterior, varying grade elevation.

The property is of some historical significance and is a tourist attraction, although evidence suggests that the welling is also used as a seasonal cottage and in this respect Amec Foster Wheeler assumed residential land use was appropriate for regulatory purposes (as described below).

Environmental Summary of Site Conditions

Remediation Activities Undertaken	DCS, 1998	Remove former AST	Near Dwelling
ESA and DSS Details	DCS, 1998	One soil sample Multiple DSS Samples	Near Dwelling Throughout Lighthouse
	DCS, 2002	Soil Sampling	Former dump area, across site
ESA and DSS Summary of Findings	Lead impacts detected near former AST. Metal impacts (predominantly lead) detected throughout the site with elevated concentrations near the former dump area and proximal to the lighthouse. Presumed to be largely derived from weathered lead		

	containing paint. Estimate of volume of impacted material on Site was 200m^3. No PHC impacts noted. ACM (vinyl flooring and mastic), lead and PCB in paint, possible PCB in light ballast, possible ODS in refrigerator and freezer.		
Risk Assessment Details	Dillon, 2006	SLRA	Entire Site
Risk Assessment Summary of Findings	Risk assessment considered that all age groups might visit the light station including frequent visits by local residents, as well as potential exposure for an on-Site maintenance worker. Risk levels were generally deemed to be acceptable for the human receptors considered. Overall it was concluded that the soil contamination (particularly by lead) posed no immediate risk but that it should be addressed due to frequent potential exposure by residents. The RA also indicated that potential concerns with soil organisms may also exist. Based on the lack of visual evidence of stressed vegetation they were not anticipated to be adversely affected by the soil impacts. The predicted risks to birds and mammals were found to be acceptable with a significant factor being the limited spatial extent of the contamination. No evaluation of invertebrate health was conducted.		
Supplemental ESA and DSS Details	Amec Foster Wheeler, 2015	16 boreholes, 48 samples, plus duplicates soil samples. Various building materials.	Outside previously identified areas of soil impact. Throughout building.
Supplemental ESA and DSS Summary of findings	Verified widespread distribution of lead and several other metals, focussed in the vicinity of former dump area. Fully delineated vertical extent of impacts to <40 cm. Noted widespread impacts of Zinc and Thallium along with lead. Revised estimated volume of lead impacted material on-Site to between 230 and 280 m^3. Evidence suggests that the location of the former dump is larger than previously identified. DSS samples verified presence of ACM, lead and PCB in Paint, also identified possible PCB in Light ballast and ODS in Refrigerator/freezer.		
Remedial Activities Recommendations	• Widespread remedial excavation or limited remedial excavation with completion of additional site specific risk assessment. • Abatement of DSS containing items on-Site if restoration of the facility is desired. • Substantial restoration required eminently.		

APPENDIX F

LIMITATIONS

LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:

   (a) The terms of the Standing Offer Agreement (EQ447-141528/001/TOR dated September 11, 2014) between Amec Foster Wheeler and Public Works and Government Services Canada PWGSC);
   (b) The Scope of Services;
   (c) Time and Budgetary limitations as described in our Contract; and,
   (d) The Limitations stated herein.

2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.

3. The conclusions presented in this report were based, in part, on visual observations of the site and attendant structures. Our conclusions cannot and are not extended to include those portions of the site or structures, which were not reasonably available, in Amec Foster Wheeler's opinion, for direct observation.

4. The environmental conditions at the site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the site with any applicable local, provincial or federal by-laws, orders-in- council, legislative enactments and regulations was not performed.

5. The site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.

6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on site and may be revealed by different or other testing not provided for in our contract.

7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, Amec Foster Wheeler must be notified in order that it may determine if modifications to the conclusions in the report are necessary.

8. The utilization of Amec Foster Wheeler's services during the implementation of any remedial measures will allow Amec Foster Wheeler to observe compliance with the conclusions and recommendations contained in the report. Amec Foster Wheeler's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.

9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report, is the sole responsibility of such third party. Amec Foster Wheeler accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set our therein.

10. Provided that the report is still reliable, and less than 12 months old, Amec Foster Wheeler will issue a third-party reliance letter to parties client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on Amec Foster Wheeler's report, by such reliance agree to be bound by our proposal and Amec Foster Wheeler's standard reliance letter. Amec Foster Wheeler's standard reliance letter indicates that in no event shall Amec Foster Wheeler be liable for any damages, howsoever arising, relating to third-party reliance on Amec Foster Wheeler's report. No reliance by any party is permitted without such agreement