

**SITE INFRASTRUCTURE
PROJECT B**

PROJECT NO. 7218202

SPECIFICATIONS

Issued for Tender
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DRAWINGS:

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	A101	ARCHITECTURAL DETAILS
ELECTRICAL	E1	ELECTRICAL COMMUNICATIONS NEW WORK
CIVIL	C601	NOTES & DETAILS: COMMUNICATIONS DUCTWORK
	C602	SITE SERVICING: COMMUNICATIONS DUCTWORK
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Part 1 General

1.1 MINIMUM STANDARDS

- .1 Materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada 2015 (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.

1.2 TAXES

- .1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

1.3 FEES, PERMITS AND CERTIFICATES

- .1 Pay all fees and obtain all permits except municipal building permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

1.4 FIRE SAFETY REQUIREMENTS

- .1 Submit “Third Party Work Permits” to Departmental Representative
- .2 Comply with both the National Building Code of Canada 2015 and the National Fire Code of Canada 2015 for safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire, as follows;
 - .1 The National Building Code (NBC): for fire safety and fire protection features that are required to be incorporated in a building during construction.
 - .2 The National Fire Code (NFC):
 - .1 The on-going maintenance and use of the fire safety and fire protection features incorporated in buildings.
 - .2 The conduct of activities that might cause fire hazards in and around buildings.
 - .3 Limitations on hazardous contents in and around buildings.
 - .4 The establishment of fire safety plans.
 - .5 Fire safety at construction and demolition sites.
- .3 Welding and cutting:
 - .1 Before welding, soldering, grinding and/or cutting work, obtain a permit from Real Property Service Provider as directed by the Departmental Representative. Store flammable liquids in approved CSA containers.
 - .2 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:
 - .1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.
 - .2 Completed welding permit as defined in by Departmental Representative.

- .3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.
- .3 “Fire Watchers” as described in NFC shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 15m may be ignited by conduction or radiation.
- .4 Where work requires interruption or cause activation of fire alarms or fire suppression, extinguishing or protection systems:
 - .1 Provide “Watchman Service” as required by Departmental Representative; In general, watchman service is defined as an individual conversant with “Fire Emergency Procedures”, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.
 - .2 Retain services of manufacturer for fire protection systems on daily basis or as approved by Departmental Representative, to isolate and protect all devices relating to:
 - .1 modification of fire alarms, fire suppression, extinguishing or protection systems; and/or
 - .2 cutting, welding, soldering or other construction activities that might activate fire protection systems.
 - .3 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.
 - .4 In coordination with Real Property Service Provider procedures and if applicable, inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

1.5 FIELD QUALITY CONTROL

- .1 Carry out Work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.
- .2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licenced workers.
- .3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

1.6 HAZARDOUS MATERIALS

- .1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources Development Canada, Labour Program.
- .2 For work in occupied buildings give the Departmental Representative 48 hours notice for work involving designated substances (Ontario Bill 208), hazardous substances (Canada Labour Code Part II Section 10), and before painting, caulking or using adhesives.
- .3 A Designated Substances Report is appended to the tender documents for reference.

1.7 TEMPORARY UTILITIES

- .1 Existing services required for work, may be used by the Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility and remove all such work after use.
- .2 Connect to existing power supply in accordance with Canadian Electrical Code.
- .3 Notify the Departmental Representative and utility companies of intended interruption of services, obtain requisite permission.

1.8 REMOVED MATERIALS

- .1 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site. Excavated materials associated with the removal of the 6 fuel lines are to be disposed of as hazardous waste unless the Contractor can demonstrate to the satisfaction of the Departmental Representative that it is not.

1.9 PROTECTION

- .1 Protect finished work against damage until take-over.
- .2 Protect adjacent work against the spread of dust and dirt beyond the work areas.
- .3 Protect operatives and other users of site from all hazards.

1.10 CUT, PATCH and MAKE GOOD

- .1 Cut surfaces as required to accommodate work.
- .2 Remove all items so shown or specified.
- .3 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

1.11 SLEEVES, HANGERS AND INSERTS

- .1 Co-ordinate setting and packing of sleeves and supply and installation of hangers and inserts. Obtain Departmental Representative's approval before cutting into structure.

1.12 EXAMINATION

- .1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.

1.13 SIGNS

- .1 Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etcetera, in both official languages or by the use of commonly-understood graphic symbols to the Departmental Representative's approval.
- .2 No advertising will be permitted on this project.

1.14 ACCESS AND EGRESS

- .1 Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders, independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
- .2 Access to the site will be restricted to only cleared personnel.
- .3 All deliveries by non-cleared personnel will have to be scheduled minimum 24 hours in advance providing the name, product, order number and delivery agent.
- .4 Deliveries not scheduled in advance will not be permitted on site.
- .5 A designated, limited site area will be assigned to the contractor for staging of work.
- .6 Temporary site area may be relocated to suit work location as approved by Departmental Representative.

1.15 SCAFFOLDS AND WORK PLATFORMS

- .1 Design, install, and inspect scaffolds and work platforms required for work in accordance with relevant municipal, provincial and other regulations.
- .2 Provide design drawings, signed and sealed by qualified Professional Engineer licensed in the province of Ontario, where prescribed.
- .3 Additions or modifications to scaffolding must be approved by Professional Engineer in writing.
- .4 All lifts and other equipment used within the building shall be electric-only.

1.16 OPERATIONS AND MAINTENANCE MANUALS

- .1 Submit to Departmental Representative six (6) copies of approved Operations Data and Maintenance Manual in both official languages, compiled as follows:
 - .1 Bind data in vinyl hard cover 3 "D" ring type loose leaf binders for 212 x 275mm size paper. Binders must not exceed 75mm thick or be more than 2/3 full.
 - .2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must appear on binder face and spine.
 - .3 Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.
- .2 Include following information plus data specified.
 - .1 Maintenance instruction for finished surface and materials.
 - .2 Copy of hardware and paint schedules.

- .3 Description: Operation of the equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set points that affect the efficiency of the operation. Include nameplate information such as make, size, capacity and serial number.
- .4 Maintenance: Use clear drawings, diagrams or manufacturers' literature which specifically apply and detail the following:
 - .1 lubrication products and schedules.
 - .2 trouble shooting procedures.
 - .3 adjustment techniques.
 - .4 operational checks.
 - .5 Suppliers names, addresses and telephone numbers and components supplied by them must be included in this section. Components must be identified by a description and manufacturers part number.
- .5 Guarantees showing:
 - .1 Name and address of projects.
 - .2 Guarantee commencement date (date of Interim Certificate of Completion).
 - .3 Duration of guarantee.
 - .4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
 - .5 Signature and seal of Guarantor.
- .6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.
- .3 Spare parts: List all recommended spares to be maintained on site to ensure optimum efficiency. List all special tools appropriate to unique application. All parts/tools detailed must be identified as to manufacturer, manufacturer part number and supplier (including address).
- .4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

1.17 RECORDS

- .1 As work progresses, maintain accurate records to show deviations from contract drawings. Just prior to Departmental Representative's inspection for issuance of final certificate of completion, supply to the Departmental Representative one (1) set of white prints with all deviations neatly inked in. The Departmental Representative will provide two sets of clean white prints for this purpose.

1.18 GUARANTEES AND WARRANTIES

- .1 Before completion of work collect all manufacturer's guarantees and warranties and deposit with Departmental Representative.
- .2 Work of this contract shall not compromise any warranties in effect for the existing building.

1.19 CLEANING

- .1 Clean up work area as work progresses. At the end of each work period, and more often if ordered by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.
- .2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.
- .3 Clean and polish glass, mirrors, ceramic tile, aluminum, chrome, stainless steel, baked or porcelain enamel, plastic laminate and other plastic surfaces, floors, hardware and washroom fixtures. Clean manufactured articles in accordance with manufacturer's instructions.
- .4 Clean areas under contract to a condition equal to what previously existed and to approval of Departmental Representative.

1.20 BUILDING SMOKING ENVIRONMENT

- .1 Smoking is not permitted on the site. Obey smoking restrictions on building property.

1.21 DUST CONTROL

- .1 Provide dust tight control on the construction site to localize dust generating activities, and for protection of workers, finished areas of work and public.

1.22 TESTING LABORATORY SERVICES

- .1 Departmental Representative will appoint and pay for costs of inspection and testing services, unless indicated otherwise.
- .2 Provide safe working areas and assist with testing procedures, including provisions for materials or services and co-ordination, as required by testing agency and as authorized by Departmental Representative.
- .3 Where tests indicate non-compliance with specifications, contractor to pay for initial test and all subsequent testing of work to verify acceptability of corrected work.

1.23 SCHEDULING

- .1 Within 5 days after award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Departmental Representative, make any corrections required and

- resubmit. Take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.
- .2 Interior works to be scheduled as a priority and completed prior to March 31, 2017.
 - .3 Work associated with the duct bank extension to Innes road may be performed 24 hours per day 7 days per week prior to March 31, 2017. Work associated with the duct bank extension to Innes road performed after April 1 may be restricted to hours from 1600 to 0700 Monday to Friday or anytime on weekends. Daily Work schedule for this portion of the work to be provided to the Departmental Representative weekly one week in advance.
 - .4 Ensure Project Schedule includes as minimum milestone and activity types the following (not necessarily in this order):
 - .1 Award
 - .2 Shop Drawings, Samples
 - .3 Permits
 - .4 Site Mobilization
 - .5 Excavation of Pits for Drilling
 - .6 Excavation and Removal of Fuel Lines
 - .7 Directional Drilling
 - .8 Open Cut Excavation
 - .9 Duct Bank
 - .10 Manholes
 - .11 Exterior Conduit
 - .12 Reinstatement of Pits
 - .13 Reinstatement of Slab and Asphalt
 - .14 Vehicle Barrier
 - .15 Electrical Conduit
 - .16 Conduit Metal Cover
 - .17 Pull boxes and Interior Conduit
 - .18 Testing and Commissioning
 - .19 Final Review/Substantial Performance
 - .20 Deficiencies/Completion
 - .5 Unless advised otherwise and approved, the work performed at the site by the Contractor shall be carried out during regular hours, 06:00 to 18:00 from Monday to Friday during the week and shall be carried out with the least possible interference or disturbance to other site activities or operations. Contractors wishing to work outside these hours will require approval from the Departmental Representative.
 - .6 Departmental representative will schedule and pay for Security escorts (2) during all hours of work scheduled a minimum of 72 hours in advance. Contractor will pay premiums incurred for security escorts for any work not scheduled in advance.
 - .7 All contractors personnel must obtain RCMP personnel security clearances to access the work site. Processing of clearances are expected to take 20 working days from the

submission of a fully completed application. The time for clearances must be accounted for in all schedules, work plans. No additional costs will be considered for delays related to processing of personnel clearances.

- .8 Update project schedule on a bi-weekly basis reflecting activity changes and completions, as well as activities in progress.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

REFER TO APPENDIX "A":

**PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY
ELECTRICAL COMMUNICATIONS NEW WORK
BUILDING 405 – TPOF COMPLEX - 1426 ST. JOSEPH BLVD, OTTAWA, ONTARIO**

Completed: November 17th, 2017

Prepared by: Greenough Environmental Consulting Inc.

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.

1.2 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.
- .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 days for Departmental Representative's review of each submission.
- .5 Adjustments made on shop drawings 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 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 transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
- .8 Submissions 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 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .9 After Departmental Representative's review, distribute copies.
- .10 Submit PDF electronic copy of shop drawings for each requirement requested in specification Sections or as Departmental Representative may request. PDF files shall be scaled so that a 1:1 print produces properly scaled drawings. Provide paper copies as requested, up to 6 copies as requested.

- .11 Submit PDF electronic copies of product data sheets or brochures for requirements requested in specification Sections or as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product. Provide paper copies as requested, up to 6 copies as requested.
- .12 Submit PDF electronic copies of test reports for requirements requested in specification Sections or as requested by Departmental Representative. Provide paper copies as requested, up to 6 copies as requested.
 - .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.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit PDF electronic copies of certificates for requirements requested in specification Sections or as requested by Departmental Representative. Provide paper copies as requested, up to 6 copies as requested.
 - .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 PDF electronic copies of manufacturers instructions for requirements requested in specification Sections or as requested by Departmental Representative. Provide paper copies as requested, up to 6 copies as requested.
 - .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 PDF electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections or as requested by Departmental Representative. Provide paper copies as requested, up to 6 copies as requested.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit PDF electronic copies of Operation and Maintenance Data for requirements requested in specification Sections or as requested by Departmental Representative. Provide paper copies as requested, up to 6 copies as requested.
- .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, copies 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 fabrication and installation of Work may proceed.

- .21 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the Departmental Representative 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 address(s) provided by Departmental Representative.
- .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.
- .7 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.4 PHOTOGRAPHIC DOCUMENTATION

- .1 Photography will be restricted on site to authorized contractor personnel only. No personal photographic devices are permitted on site
- .2 Departmental Representative will provide photographic digital photographic devices for use by the Contractor.
- .3 All photographs will be vetted by Security prior to being transferred from the device to a Contractor supplied USB stick prior to removal from site by any means.
- .4 Photographs must be restricted to the contract area and not include images of personnel, vehicles or buildings other than building elements affected by the work.

- .5 Submit electronic copy of colour digital photography in jpg format, fine resolution weekly and as directed by Departmental Representative
- .6 Project identification: name and number of project and date of exposure indicated.
- .7 Number of viewpoints: minimum 4 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.
- .8 Frequency of photographic documentation: weekly and as directed by Departmental Representative, but to include completion of excavation, removal of fuel lines, completion of duct bank, completion of manholes, services prior to concealment, and substantial completion. Photography on site is not permitted unless under the direct supervision of the Departmental representative or designated Security personnel. Notify Departmental representative 48 hours in advance of intent or requirement to take photographs on site.
 - .1 Upon completion of: excavation, foundation, framing and services before concealment, of Work, and as directed by Departmental Representative.

1.5 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

- .1 Section 01 00 10 - General Instructions.

1.2 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Province of Ontario
 - .1 Occupational Health and Safety Act, R.S.O. 1990 Updated 2017.
 - .2 Provincial legislation Bill 124, January 2006 concerning Building Code Identification Number (BCIN).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Submit site-specific Health and Safety Plan: Within 7 working 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 Written safe work procedures to address the known hazards.
 - .4 Details and certifications of special safety measures for lifting.
- .3 Submit 3 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative and, on request by authority having jurisdiction.
- .4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .5 Submit copies of incident and accident reports.
- .6 Submit WHMIS MSDS - Material Safety Data Sheets, where applicable.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 7 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 7 working days after receipt of comments from Departmental Representative.
- .8 Departmental Representative's review of Contractor's final Health and Safety plan should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety.

- .9 Medical Surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of Work, and submit additional certifications for any new site personnel to Departmental Representative.
- .10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.4 FILING OF NOTICE

- .1 File Notice of Project with Provincial authorities prior to beginning of Work.
- .2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

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 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.

1.8 RESPONSIBILITY

- .1 Contractor will be designated Constructor for all work of this contract. Simultaneous work under separate contract will be ongoing on site and will overlap at the main intersection identified on the drawings. Contractor to cooperate with other Contractor/Constructor to schedule work at no additional cost to ensure separation of time and space to satisfaction of Departmental Representative and Ministry of Labour requirements
- .2 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

- .3 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .4 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .5 Provide 5 hard hats and safety glasses for use by visitors.

1.9 COMPLIANCE REQUIREMENTS

- .1 Comply with Ontario Occupational Health and Safety Act, R.S.O. 1990, c. 0.1 and Ontario Regulations for Construction Projects, O. Reg. 213/91.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of the Province of Ontario and advise Departmental Representative verbally and in writing.

1.11 HEALTH AND SAFETY COORDINATOR

- .1 Employ and assign to Work, competent and authorized representative as Health and Safety Coordinator. Health and Safety Coordinator must:
 - .1 Have site-related working experience specific to activities associated with specified work. Submit relevant experience to Departmental Representative.
 - .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.

1.12 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 the Province of Ontario, and in consultation with Departmental Representative.

1.13 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.

1.14 BLASTING

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

1.15 POWDER ACTUATED DEVICES

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

1.16 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.

PART 2 PRODUCTS

2.1 NOT USED

- .1 Not used.

PART 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 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 will order part of Work to be examined/inspected/tested if Work is suspected to be not in accordance with Contract Documents. If, upon examination/inspection/testing such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination/inspection/testing and correction. If such Work is found in accordance with Contract Documents, Departmental Representative shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Departmental Representative for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Departmental Representative or Contractor subject to item 1.1.4 above.
- .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.
- .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.

1.3 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.

1.4 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 orderly sequence to not cause delays 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.

1.5 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 will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 REPORTS

- .1 Submit PDF electronic copies of inspection and test reports to Departmental Representative.
- .2 Provide copies to subcontractor of work being inspected or tested manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs as requested.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work will be appraised by Departmental Representative and may be authorized as recoverable.

1.8 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations acceptable to Departmental Representative or as specified in specific Section.
- .3 Prepare mock-ups for Departmental Representative review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups 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.

- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Remove mock-up at conclusion of Work or when acceptable to Departmental Representative.
- .7 Mock-ups may remain as part of Work at the discretion of Departmental Representative.

1.9 MILL TESTS

- .1 Submit mill test certificates as requested and required of specification Sections.

1.10 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (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-O121-17 - Douglas fir plywood.
 - .3 CAN/CSA-S269.2-16 - Access scaffolding for construction purposes
 - .4 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

- .1 Exterior areas adjacent to the building will be available for use subject to the approval of the Departmental Representative. Fence or otherwise secure all such areas, including areas for trailers, storage of materials, equipment and tools.
- .2 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, details of fence installation, for review/revision and approval by Departmental Representative.
- .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 ELECTRONIC DEVICES

- .1 Personal electronic devices with communications, photographic or recording capability including cell phones and cameras will not be permitted on site
- .2 All devices must be checked with Security upon access to the site.
- .3 Departmental Representative will supply a maximum of 3 cell phones to designated Contractor personnel for communications while on site.
- .4 Cell phones are to be signed out and returned on a daily basis at the site entrance security station.

1.5 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging platforms, temporary stairs.

1.6 HOISTING

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.
- .2 Hoists and cranes to be operated by qualified operator.
- .3 All hoist and cranes used within the building shall be electric only.

1.7 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.8 CONSTRUCTION PARKING

- .1 Parking will be permitted on site subject to approval of location and quantity by Departmental Representative, and provided it does not disrupt performance of Work and other Departmental Representative activities.
- .2 Personal vehicle parking and movement on site will be restricted to the designated area. Commercial vehicles required for the work will be permitted to circulate on site subject to verification with Security Escort.
- .3 Provide and maintain adequate access to project site.

1.9 SECURITY

- .1 Store all materials and equipment and keep it locked after-hours or when supervision is not provided on-site.

1.10 OFFICES

- .1 Site office to be located in area designated by the Departmental Representative.
- .2 Departmental Representative will provide a power source for connection by the Contractor.
- .3 Contractor to be responsible for installation and removal of temporary power connection.
- .4 Provide office heated to 22 degrees C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table and sufficient chairs for site meetings.

- .5 Site office to provide accommodation for Security escort. Provide desk, chair, two drawer lockable filing cabinet and a coat hook and minimum one 120v 15a power outlet.
- .6 Maintain a complete and updated set of all contract documents and approved submittals, including, but no limited to, drawings, specifications, addenda, shop drawings, site instructions, change orders
- .7 Provide marked and fully stocked first-aid case in a readily available location.
- .8 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable containers for storage of tools, equipment and materials.

1.12 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.13 CONSTRUCTION SIGNAGE

- .1 No advertising will be permitted on site.
- .2 Signs and notices for safety and instruction in both official languages and Graphic symbols.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.14 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 specifically directed by Departmental Representative.
 - .1 Maintain continuous access on roads affected by the Work.
 - .2 Coordinate and schedule all work affecting existing roads and use of the site to the approval of the Departmental Representative. Provide traffic management plan to 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 Provide snow removal during period of Work.

1.15 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 not in construction facilities.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Conform to reference standards in whole or in part as specifically requested in specifications.
- .2 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .3 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.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 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.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 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 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, 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.

1.4 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Departmental Representative will be paid for by Departmental Representative. Unload, handle and store such products.

1.5 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 will 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 Price or Contract Time.

1.6 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.

1.7 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.8 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.

1.9 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.10 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate and subject to relocation prior to installation within a radius of up to 3000mm from the location shown to suit site conditions, interferences or other conditions determined by the Departmental Representative.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

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.
- .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 parts of building. Do not cut, drill or sleeve 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. 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 OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .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 Departmental Representative 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 Departmental Representative 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 - Submittal Procedures.

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.
- .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 including excavation and fill, 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 as requested.
- .6 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .7 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .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 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .11 Seal all penetrations through exterior wall and roof liner panels.
- .12 Seal penetrations in wall, ceiling, or floor fire separations in accordance with applicable ULC listed firestop assemblies to maintain the integrity and indicated rating of the fire separation. Provide submittals for proposed firestop assemblies prior to installation for approval by Departmental Representative.
- .13 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 and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PSPC's waste management goal and Contractor's proposed Waste Reduction Workplan for Construction, Renovation and /or Demolition (CRD) waste to be project generated.
- .2 PSPC's waste management goal: to divert a minimum 75 percent of total Project Waste from landfill sites. Prior to project completion provide Departmental Representative documentation certifying that waste management, recycling, reuse of recyclable and reusable materials have been extensively practiced. The overall waste diversion goal for this project is 75%.
- .3 Specific material target percentages for reuse and/or recycling:
 - .1 Masonry and pavement: 75%.
 - .2 Metals: 75%.
 - .3 Wood: 75 %.
 - .4 Electrical - wiring/conduits/boxes: 75 %.
 - .5 Packaging: 75 %.
- .4 Target percentage goals are achievable for waste diversion. Contractor to review and confirm Departmental Representative's Waste Audit acceptable values.
- .5 Minimize amount of non-hazardous solid waste generated by project and accomplish maximum source reduction, reuse and recycling of solid waste produced by CRD activities.
- .6 Protect environment and prevent environmental pollution damage.

1.2 REFERENCE STANDARDS

- .1 Ontario Ministry of Environment
 - .1 Ontario 3 R's Regulations (regulation 102/94) for waste management programs applicable to construction and demolition projects greater than 2,000 m2.
 - .2 Ontario Environmental Protection Act (EPA)
 - .1 Regulation 102/94, Waste Audits and Waste Reduction Workplans.
 - .2 Regulation 103/94, Source Separation Programs.
 - .3 Canadian Construction Association (CCA)
 - .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
 - .4 Public Works and Government Services Canada (PSPC)
 - .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
 - .2 CRD Waste Management Market Research Report (available from PSPC's Environmental Services).

- .3 Sustainable Development Strategy 2007-2009: Target 2.1
Environmentally Sustainable Use of Natural Resources.
 - .1 Real Property projects over \$1 million and in communities where industrial recycling is supported, implementation of CRD waste management practices will be completed, with waste materials being reused or recycled.
 - .2 Contractually ensure resources used in construction or maintenance are consumed and recovered in a sustainable manner.

1.3 DEFINITIONS

- .1 Approved/Authorized recycling facility: waste recycler approved by applicable provincial authority or other users of material for recycling approved by the Departmental Representative.
- .2 Class III: non-hazardous waste - construction renovation and demolition waste.
- .3 Construction, Renovation and/or Demolition (CRD) Waste: Class III solid, non-hazardous waste materials generated during construction, demolition, and/or renovation activities
- .4 Cost/Revenue Analysis Workplan (CRAW): based on information from Waste Reduction Workplan, and intended as financial tracking tool for determining economic status of waste management practices (Schedule E).
- .5 Inert Fill: inert waste - exclusively asphalt and concrete.
- .6 Waste Source Separation Program (WSSP): implementation and co-ordination of ongoing activities to ensure designated waste materials will be sorted into pre-defined categories and sent for recycling and reuse, maximizing diversion and potential to reduce disposal costs.
- .7 Recyclable: ability of product or material to be recovered at end of its life cycle and re-manufactured into new product for reuse.
- .8 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.
- .9 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- .10 Reuse: repeated use of product in same form but not necessarily for same purpose. Reuse includes:
 - .1 Salvaging reusable materials from re-modelling projects, before demolition stage, for resale, reuse on current project or for storage for use on future projects.
 - .2 Returning reusable items including pallets or unused products to vendors.
- .11 Salvage: removal of structural and non-structural materials from deconstruction/disassembly projects for purpose of reuse or recycling.
- .12 Separate Condition: refers to waste sorted into individual types.

- .13 Source Separation: act of keeping different types of waste materials separate beginning from the point they became waste.
- .14 Waste Audit (WA): detailed inventory of estimated quantities of waste materials that will be generated during construction, demolition, deconstruction and/or renovation. Involves quantifying by volume/weight amounts of materials and wastes that will be reused, recycled or landfilled. Refer to Schedule A.
- .15 Waste Diversion Report: detailed report of final results, quantifying cumulative weights and percentages of waste materials reused, recycled and landfilled over course of project. Measures success against Waste Reduction Workplan (WRW) goals and identifies lessons learned.
- .16 Waste Management Co-ordinator (WMC): contractor representative responsible for supervising waste management activities as well as co-ordinating required submittal and reporting requirements.
- .17 Waste Reduction Workplan (WRW): written report which addresses opportunities for reduction, reuse, or recycling of materials generated by project. Specifies diversion goals, implementation and reporting procedures, anticipated results and responsibilities. Waste Reduction Workplan (Schedule B) information acquired from Waste Audit.

1.4 DOCUMENTS

- .1 Post and maintain in visible and accessible area at job site, one copy of following documents:
 - .1 Waste Audit (Schedule A).
 - .2 Waste Reduction Workplan (Schedule B).
 - .3 Waste Source Separation Program.
 - .4 Schedules B and A completed for project.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare and submit following prior to project start-up :
 - .1 1 copy and 1 electronic copy of completed Waste Audit (WA): Schedule A.
 - .2 1 copy and 1 electronic copy of completed Waste Reduction Workplan (WRW): Schedule B.
 - .3 1 copy and 1 electronic copy of Cost/Revenue Analysis Workplan (CRAW): Schedule E.
 - .4 1 copy and 1 electronic copy of Waste Source Separation Program (WSSP).
- .3 Prepare and submit on monthly basis, throughout project or at intervals agreed to by Departmental Representative the following:
 - .1 Receipts, scale tickets, waybills, and/or waste disposal receipts that show quantities and types of materials reused, recycled, or disposed of.
 - .2 Updated Waste Materials Tracking form (Schedule D).

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- .3 Written monthly summary report detailing cumulative amounts of waste materials reused, recycled and landfilled, and brief status of ongoing waste management activities.
 - .4 Submit prior to final payment the following:
 - .1 Waste Diversion Report, indicating final quantities in tones by material types salvaged for reuse, recycling or disposal in landfill and recycling centres, re-use depots, landfills and other waste processors that received waste materials (See Schedule C).
 - .2 Provide receipts, scale tickets, waybills, waste disposal receipts that confirm quantities and types of materials reused, recycled or disposed of and destination.

1.6 WASTE AUDIT (WA)

- .1 Departmental Representative will prepare WA prior to project start-up. WA will be provided with bid documentation (see Schedule A).
- .2 WA provides detailed inventory, estimated quantities and types of waste materials that will be generated as well as their potential to be reused and/or recycled and project's waste diversion goals and objectives.
- .3 After award of contract, contractor to review WA and confirm that anticipated quantities of waste generated are accurate and goals achievable.
- .4 If after review, contractor determines that indicated quantities or opportunities in WA are not accurate or achievable, contractor to provide written details of discrepancies and revised quantities for areas of concern. Contractor to meet with Departmental Representative to review and justify revisions.
- .5 Post on-site WA where contractor and sub-contractors are able to review content.

1.7 WASTE REDUCTION WORKPLAN (WRW)

- .1 Prepare and submit WRW (Schedule B) at least 10 days prior to project start-up.
- .2 WRW identifies strategies to optimize diversion through reduction, reuse, and recycling of materials and comply with applicable regulations, based on information acquired from WA.
- .3 WRW should include but not limited to:
 - .1 Applicable regulations.
 - .2 Specific goals for waste reduction, identify existing barriers and develop strategies to overcome them.
 - .3 Destination of materials identified.
 - .4 Deconstruction/disassembly techniques and schedules.
 - .5 Methods to collect, separate, and reduce generated wastes.
 - .6 Location of waste bins on-site.
 - .7 Security of on-site stock piles and waste bins.
 - .8 Protection of personnel, sub-contractors.
 - .9 Clear labelling of storage areas.
 - .10 Training plan for contractor and sub-contractors.

- .11 Methods to track and report results reliably (Schedule D).
- .12 Details on materials handling and removal procedures.
- .13 Recycler and reclaimer requirements.
- .14 Quantities of materials to be salvaged for reuse or recycled and materials sent to landfill.
- .15 Requirements for monitoring on-site wastes management activities.
- .4 Structure WRW to prioritize actions and follow 3R's hierarchy, with Reduction as first priority, followed by Reuse, then Recycle.
- .5 Post WRW or summary where workers at site are able to review content.
- .6 Monitor and report on waste reduction by documenting total volume (in tonnes) and cost of actual waste removed from project (Schedule D).

1.8 WASTE SOURCE SEPARATION PROGRAM (WSSP)

- .1 As part of Waste Reduction Workplan, prepare WSSP prior to project start-up.
- .2 WSSP will detail methodology and planned on-site activities for separation of reusable and recyclable materials from waste intended for landfill.
- .3 Provide list and drawings of locations that will be made available for sorting, collection, handling and storage of anticipated quantities of reusable and recyclable materials.
- .4 Provide sufficient on-site facilities and containers for collection, handling, and storage of anticipated quantities of reusable and recyclable materials.
- .5 Locate containers to facilitate deposit of materials without hindering daily operations.
- .6 Provide training for workers in handling and separation of materials for reuse and/or recycling.
- .7 Locate separated materials in areas which minimizes material damage.
- .8 Clearly and securely label containers to identify types/conditions of materials accepted and assist workers in separating materials accordingly.
- .9 Monitor on-site waste management activities by conducting periodic site inspections to verify: state of signage, contamination levels, bin locations and condition, personnel participation, use of waste tracking forms and collection of waybills, receipts and invoices.
- .10 On-site sale of salvaged materials is not permitted unless authorized in writing by Departmental Representative and provided that site safety regulations and security requirements are adhered to.

1.9 USE OF SITE AND FACILITIES

- .1 Execute Work with minimal interference and disturbance to normal use of premises.
- .2 Maintain security measures established by facility provide temporary security measures approved by Departmental Representative.

1.10 WASTE PROCESSING SITES

- .1 Contractor is responsible to research and locate waste diversion resources and service providers. Salvaged materials are to be transported off site to approved and/or authorized recycling facilities or to users of material for recycling.
- .2 Province of Ontario.
 - .1 Name: Ministry of Environment and Energy, 135 St. Clair Avenue West Toronto ON M4V 1P5.
 - .2 Telephone: 416-323-4321 800-565-4923.
 - .3 Fax: 416-323-4682.

1.11 QUALITY ASSURANCE

- .1 After award of Contract, a mandatory site examination will be held for this Project for Contractor and sub-contractors responsible for construction, renovation demolition/deconstruction waste management.
 - .1 Date, time and location will be arranged by Departmental Representative.
- .2 Waste Management Meeting: Waste Management Co-ordinator is to provide an update on status of waste diversion and management activities at each meeting. Written monthly Waste Diversion Report summary to be provided by Waste Management Coordinator (refer to the Waste Diversion Report form in Schedule C and Waste Materials Tracking form in Schedule D).

1.12 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative
- .2 Unless specified otherwise, materials for removal do not become Contractor's property.
- .3 Protect, stockpile, store and catalogue salvaged items.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility.
- .5 Protect structural components not removed and salvaged materials from movement or damage.
- .6 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .7 Protect surface drainage, mechanical and electrical from damage and blockage.
- .8 Provide on-site facilities and containers for collection and storage of reusable and recyclable materials.
- .9 Separate and store materials produced during project in designated areas.
- .10 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is recommended.
 - .2 Remove co-mingled materials to off site processing facility for separation.

-
- .3 Obtain waybills, receipts and/or scale tickets for separated materials removed from site.
 - .4 Materials reused on-site are considered to be diverted from landfill and as such are to be included in all reporting.

1.13 DISPOSAL OF WASTES

- .1 Assume excavated material and lines associated with the removal of abandoned fuel lines must be disposed of as hazardous waste. Pay all costs associated with disposal.
- .2 Do not bury rubbish or waste materials.
- .3 Do not dispose of oil, volatile materials, mineral spirits, paint thinner, and waste into waterways, storm, or sanitary sewers.
- .4 Keep records of construction waste including:
 - .1 Number and size of bins.
 - .2 Waste type of each bin.
 - .3 Total tonnage generated.
 - .4 Tonnage reused or recycled.
 - .5 Reused or recycled waste destination.
- .5 Remove materials on-site as Work progresses.
- .6 Prepare project summary to verify destination and quantities on a material-by-material basis as identified in the waste audit.

1.14 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 APPLICATION

- .1 Do Work in compliance with WRW and WSSP.
- .2 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.
 - .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 00 10 – General Instructions.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Source separate materials to be reused/recycled into specified sort areas.

3.3 DIVERSION OF MATERIALS

- .1 From following list, separate materials from general waste stream and stockpile in separate piles or containers, as reviewed by Departmental Representative, and consistent with applicable fire regulations.
 - .1 Mark containers or stockpile areas.
 - .2 Provide instruction on disposal practices.
- .2 On-site sale of recovered, recyclable, reusable, salvaged material is not permitted.

3.4 WASTE DIVERSION REPORT

- .1 At completion of Project, prepare written Waste Diversion Report indicating quantities of materials reused, recycled or disposed of as well as the following:
 - .1 Identify final diversion results and measure success against goals from Waste Reduction Workplan.
 - .2 Compare final quantities/percentages diverted with initial projections in Waste Audit and Waste Reduction Workplan and explain variances.
 - .1 Supporting documentation.
 - .2 Waybills and tracking forms.
 - .3 Description of issues, resolutions and lessons learned.

3.5 WASTE AUDIT (WA)

- .1 Schedule A - Waste Audit (WA)

(1) Material Category	(2) Material Quantity Unit	(3) Estimated Waste %	(4) Total Quantity of Waste (unit)	(5) Generation Point	(6) % Recycled	(7) % Reused
Wood and Plastics Material Description						
Off-cuts						
Warped Pallet Forms						
Plastic Packaging						
Cardboard Packaging						

Site Infrastructure -
 Project B

Other						
Wood						
Metal						
Other						

3.6 WASTE REDUCTION WORKPLAN (WRW)

.1 Schedule B

(1) Material Category	(2) Person(s) Respon- sible	(3) Total Quantity of Waste (unit)	(4) Reused Amount (units) Projected	Actual	(5) Recycled Amount (unit) Projected	Actual	(6) Material(s) Destina- tion
Wood and Plastics Material Description							
Chutes							
Warped Pallet Forms							
Plastic Packag ing							
Card- board Packag ing							
Other							
Wood							
Metal							
Other							

3.7 SCHEDULES

.1 Following Schedules are attached to this Specification:

- .1 Waste Audit - Schedule A.
- .2 Waste Reduction Workplan Form - Schedule B.
- .3 Waste Diversion Report Form - Schedule C.
- .4 Waste Materials Tracking Form - Schedule D.
- .5 Market Research Report - Schedule F (When Available).

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 81 00 – Applied Fireproofing

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S115-11(R2016), Standard Method of Fire Tests of Fire Stop Systems
 - .2 CAN-ULC-S101-14, Standard Methods of fire Endurance Tests of Building Construction and Materials.
 - .3 CAN-ULC-S102-10, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DEFINITIONS

- .1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.
- .2 Single Component Fire Stop System: fire stop material that has ULC-Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.
- .3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within ULC-Listed Systems Design to create on site fire stop system.
- .4 Tightly Fitted; (ref: NBC Part 3.1.9.1(1) and 9.10.9.6(1)): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.
 - .1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .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 two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 00 10 – General Instructions
- .3 Shop Drawings:
 - .1 Submit shop drawings to show location, proposed firestop system including material, reinforcement, anchorage, fastenings and method of installation. Refer to applicable ULC –listed assembly.
 - .2 Construction details shall accurately reflect actual job conditions.
 - .3 Provide Engineering Judgement when a ULC-listed firestop system is not available for, or requires modification to suit, site conditions, conforming that indicated firestop system meets requires fire resistance rating.
- .4 Quality assurance submittals: submit following in accordance with Section 01 00 10 – General Instructions.
 - .1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
 - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
 - .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.
 - .4 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.

1.5 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: Company specializing in fire stopping installations approved by manufacturer with documented 5 year experience.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and Departmental Representative 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.
- .3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
 - .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
 - .2 During progress of Work at 60% complete.
 - .3 Upon completion of Work, after cleaning is carried out.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC markings.
- .2 Storage and Protection:
 - .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new.
- .3 Waste Management and Disposal:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions

Part 2 Products

2.1 MATERIALS

- .1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3.
 - .2 Fire stop system rating: 2 hours.
- .2 Service penetration assemblies: systems tested to CAN-ULC-S115.
- .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.
- .4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.
- .5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.
- .6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
- .7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .10 Sealants for vertical joints: non-sagging.

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 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
- .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
- .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
- .4 Tool or trowel exposed surfaces to neat finish.
- .5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

- .1 Proceed with installation only when submittals have been reviewed by Departmental Representative.
- .2 Install floor fire stopping before interior partition erections.
- .3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

- .1 Inspections: notify Departmental Representative when ready for inspection and prior to concealing or enclosing fire stopping materials and service penetration assemblies.

- .2 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.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 00 10 – General Instructions.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

- .1 Provide 2 hour rated fire stop systems at:
 - .1 All penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions, walls and shafts.
 - .2 Top of fire-resistance rated masonry and gypsum board partitions.
 - .3 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .5 Penetrations through fire-resistance rated floor slabs, ceilings
 - .6 Openings and sleeves installed for future use through fire separations.
 - .7 Around mechanical and electrical assemblies penetrating fire separations.
 - .8 Assume that shafts are fire-resistance rated.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .2 Section 28 31 00.01 - Multiplex Fire Alarm System.

1.2 REFERENCES

- .1 Definitions:
 - .1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.
- .2 Reference Standards:
 - .1 CSA Group
 - .1 CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83 (R2015), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
 - .3 CSA C282-15, Emergency Electrical Power Supply for Buildings.
 - .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).
 - .3 Electrical Safety Authority (ESA)
 - .1 ESA OESC-2012, Ontario Electrical Safety Code, 25th Edition.
 - .4 Health Canada/Workplace Hazardous Materials Information Systems (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for new electrical equipment and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit WHMIS MSDS.
- .3 Submit for review updated as-built single line electrical diagram (emergency power) to be installed under plexiglass and locate as indicated.
 - .1 Electrical power generation and distribution systems.

- .4 Shop Drawings:
 - .1 Submit seismic restraint system drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Submit shop drawings with signed review stamp by general contractor.
 - .3 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.
 - .4 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .5 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .6 Submit required number of copies of drawings and product data to inspection authorities.
 - .7 If changes are required, notify Departmental Representative of these changes before they are made.

- .5 Certificates:
 - .1 Provide CSA certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to inspection authorities for special approval before delivery to site.
 - .3 Submit test results of installed electrical systems and instrumentation.
 - .4 Permits and fees: in accordance with General Conditions of contract.
 - .5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.
 - .6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative including ESA.

- .6 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

- .2 Operation and Maintenance Data: submit operation and maintenance data for power generation & distribution for incorporation into manual.
 - .1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.
 - .2 Operating instructions to include following:
 - .1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
 - .2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.
 - .3 Safety precautions.
 - .4 Procedures to be followed in event of equipment failure.
 - .5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

- .3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.
- .4 Post instructions where directed.
- .5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.
- .6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect new equipment from nicks, scratches, and blemishes.
 - .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 in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235.
- .2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.
 - .1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.
- .3 Language operating requirements: provide identification nameplates and labels for all equipment English and French.
- .4 Use one nameplate or label for each language.

2.2 MATERIALS AND EQUIPMENT

- .1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.
- .2 Control wiring and conduit: in accordance with Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections and as shown on mechanical drawings.

2.4 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of authority having jurisdiction.
- .2 Porcelain enamel decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

- .1 Ensure lugs, terminals, screws used for termination of wiring are suitable for copper conductors.

2.6 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid 3 mm thick plastic engraving sheet, lettering accurately aligned and engraved into core mechanically attached with self tapping screws. Emergency Power & Fire Alarm Systems: red face, white letters. Normal: blackface, white letters.

.2 Sizes as follows:

NAMEPLATE SIZES

Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

- .2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture. Provide both English & French nameplates & labels for each piece of equipment.
- .4 Allow for minimum of twenty-five (25) letters per nameplate and label.
- .5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. " as directed by Departmental Representative.
- .7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .8 Terminal cabinets and pull boxes: indicate system and voltage.
- .9 Generators: indicate capacity, and voltages.
- .10 Automatic transfer switches. Indicate all voltage sources & load.

2.7 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

- .1 Colour code conduits, boxes and metallic sheathed cables.

- .2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.
- .3 Colours: 25 mm wide prime colour and 20 mm wide auxiliary colour. Match existing building standard or as follows if no standard exists:

	Prime	Auxiliary
up to 250 V	Yellow	Yellow
up to 600 V	Yellow	Green
Emerg. up to 600V	Yellow	Red
Fire Alarm	Red	

2.9 FINISHES

- .1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.
 - .1 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y1.

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 equipment 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 complete installation in accordance with CSA C22.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

- .1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
 - .1 Sleeves through concrete: plastic, sized for free passage of conduit, and protruding 50 mm.
- .2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings and as indicated.
- .2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .4 Locate light switches on latch side of doors.

3.6 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.
- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights unless indicated otherwise.
 - .1 Local switches: 1100 mm.
 - .2 Wall receptacles:
 - .1 General: 400 mm.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Fire alarm manual pullstations: 1200 mm.
 - .5 Fire alarm horns: 2100 mm.
 - .6 Fire alarm strobe lights: 2100 mm.
 - .7 Emergency battery unit and remote heads: 2100 mm.

3.7 CO-ORDINATION OF PROTECTIVE DEVICES

- .1 Ensure circuit protective devices such as overcurrent trips, relays and fuses are installed to required values and settings.

3.8 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.
- .2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.
 - .1 Power generation and distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Lighting and its control.
 - .4 Motors and associated control equipment including sequenced operation of systems where applicable.
 - .5 Systems: fire alarm modifications in accordance with Section 28 31 00.01 - Multiplex Fire Alarm System.
 - .6 Insulation resistance testing:
 - .1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.
 - .2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.
 - .3 Check resistance to ground before energizing.
- .3 Notify and carry out tests in presence of Departmental Representative if requested.
- .4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.
- .5 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 - ACTION AND INFORMATIONAL 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 Perform initial installation performance field tests in accordance with CSA C282.

3.9 SYSTEM STARTUP

- .1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.
- .2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.
- .3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.10 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.
 - .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 00 10 - General Instructions.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

- END OF SECTION -

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted, suspended and set in poured concrete walls and ceilings.

Part 3 Execution

3.1 INSTALLATION

- .1 Secure equipment to poured concrete with expandable inserts.
- .2 Provide plastic and caps on all exposed channel ends.
- .3 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .4 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
 - .2 Two-hole steel straps for conduits and cables larger than 50 mm.
 - .3 Beam clamps to secure conduit to exposed steel work.

- .5 Suspended support systems.
 - .1 Support individual cable or conduit runs with 6 mm diameter threaded rods and spring clips.
 - .2 Support 2 or more cables or conduits on channels supported by 6 mm diameter threaded rod hangers where direct fastening to building construction is impractical.
- .6 For surface mounting of two or more conduits use channels at 1.5 m on centre spacing.
- .7 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .8 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .9 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .10 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative
- .11 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 - Cleaning.

- END OF SECTION -

Part 1 General

1.1 RELATED SECTIONS

- .1 This section shall be read in conjunction with specification Section 26 05 00 - Common Work Results for Electrical, all electrical sections, and all other disciplines related to the project.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-15, Canadian Electrical Code, Part 1, 23rd Edition.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.

1.4 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 SPLITTERS

- .1 Construction: sheet metal enclosure, welded corners and formed hinged cover suitable for locking in closed position.
- .2 Terminations: connection blocks to match required size and number of incoming and outgoing conductors as indicated.

- .3 Spare Terminals: minimum three spare terminals or lugs on each connection or lug block sized less than 400 A.

2.2 JUNCTION, SPLICE AND PULL BOXES.

- .1 Construction: welded steel enclosure.
- .2 Covers Flush Mounted: 25 mm minimum extension all around.
- .3 Covers Surface Mounted: screw-on turned edge covers.
- .4 Splice boxes sized for individual feeder conductors in and out.
- .5 Plated steel lugs suitable for copper conductors.

2.3 CABINETS

- .1 Construction: welded sheet steel as indicated hinged door, handle, latch and catch

Part 3 Execution

3.1 SPLITTER INSTALLATION

- .1 Mount plumb, true and square to building lines.
- .2 Extend splitters full length of equipment arrangement except where indicated otherwise.

3.2 JUNCTION, SPLICE, PULL BOXES AND CABINETS INSTALLATION

- .1 Install pull boxes in inconspicuous but accessible locations.
- .2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.
- .3 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.
- .4 Install all conductor splices in cabinet mounted on walls or suspended from hangers. Label all splice boxes with load designation.

3.3 IDENTIFICATION

- .1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.
- .2 Identification Labels: size 2 indicating system name, voltage and phase or as indicated.

- END OF SECTION -

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN/CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
 - .2 CSA C22.2 No. 45-M1981 (R2003), Rigid Metal Conduit.
 - .3 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
 - .4 CSA C22.2 No. 83-M1985 (R2013), Electrical Metallic Tubing.
 - .5 CSA C22.2 No. 211.2-06 (R2016), Rigid PVC (Unplasticized) Conduit.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product data: submit manufacturer's printed product literature, specifications and datasheets.
 - .1 Submit cable manufacturing data.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 CABLES AND REELS

- .1 Provide cables on reels or coils.
 - .1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.
- .2 Each coil or reel of cable to contain only one continuous cable without splices.
- .3 Identify cables for exclusively dc applications.
- .4 Reel and mark shielded cables rated 2,001 volts and above.

2.2 CONDUITS

- .1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.
- .2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.
- .3 Rigid PVC conduit: to CSA C22.2 No. 211.2.
- .4 Flexible metal conduit: to CSA C22.2 No. 56, steel liquid-tight flexible metal.

2.3 CONDUIT FASTENINGS

- .1 One hole steel straps to secure surface conduits 50 mm and smaller.
 - .1 Two hole steel straps for conduits larger than 50 mm.
- .2 Beam clamps to secure conduits to exposed steel work.
- .3 Channel type supports for two or more conduits at 1.5 m on centre.
- .4 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS.

- .1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified.
Coating: same as conduit.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Watertight steel connectors and couplings for EMT.
 - .1 Cast connectors with Set-screws are not acceptable.

2.5 FISH CORD

- .1 Polypropylene.

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 INSTALLATION

- .1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.
- .2 Conceal conduits in new block wall or concrete construction.
- .3 Surface mount conduits except as noted above.
- .4 Use rigid galvanized steel threaded conduit where indicated.
- .5 Use electrical metallic tubing (EMT) except in cast concrete.
- .6 Use rigid pvc conduit under slab or direct buried in concrete.
- .7 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment.
- .8 Use nylon bushings on ends of all empty conduits.
- .9 Minimum conduit size for lighting and power circuits: 21 mm.
- .10 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .11 Mechanically bend steel conduit over 19 mm diameter.
- .12 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.
- .13 Install fish cord in empty conduits.

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

- .3 Run conduits in flanged portion of structural steel.
- .4 Group conduits wherever possible on suspended or surface channels.
- .5 Do not pass conduits through structural members except as indicated or where approved by Departmental Representative.

3.4 CONCEALED CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Do not install horizontal runs in masonry walls.
- .3 Do not install conduits in concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

- .1 Locate to suit reinforcing steel.
 - .1 Install in centre one third of slab.
- .2 Protect conduits from damage where they stub out of concrete.
- .3 Install sleeves where conduits pass through slab or wall.
- .4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.
 - .1 Use cold mastic between sleeve and conduit.
- .5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.
- .6 Encase conduits completely in concrete with minimum 25 mm concrete cover.
- .7 Organize conduits in slab to minimize cross-overs.

3.6 CONDUITS UNDERGROUND

- .1 Slope conduits to provide drainage.
- .2 Waterproof joints (pvc excepted) with heavy coat of bituminous paint.

3.7 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

- END OF SECTION -

Appendix "A"

**PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY
ELECTRICAL COMMUNICATIONS NEW WORK
BUILDING 405 – TPOF COMPLEX - 1426 ST. JOSEPH BLVD, OTTAWA, ONTARIO**

Completed: November 17th, 2017

Prepared by: Greenough Environmental Consulting Inc.



Royal Canadian Mounted Police Gendarmerie royale du Canada

PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY
ELECTRICAL COMMUNICATIONS NEW WORK
BUILDING 405 – TPOF COMPLEX - 1426 ST. JOSEPH BLVD, OTTAWA, ONTARIO



GEC PROJECT No. 30271

REPORT TO:

MR. MARTIN PETERSONS
PROJECT LEAD

ON:

PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY
ELECTRICAL COMMUNICATIONS PROJECT
BUILDING 405 – TPOF COMPLEX - 1426 ST. JOSEPH BLVD, OTTAWA, ONTARIO

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Completed: November 17th, 2017

EXECUTIVE SUMMARY

Greenough Environmental Consulting Inc. (GEC) was commissioned by the Royal Canadian Mounted Police (RCMP) under the direction of Mr. Martin Petersons, to provide a designated substance report (DSR) for the upcoming Electrical Communications project within Building 405 located within the TPOF complex at 1426 St. Joseph Boulevard in Ottawa, Ontario.

The purpose of the investigation was to identify the quantity, location, and condition of designated substances located within the proposed project areas.

For the purpose of this survey, GEC made reference to the results obtained from previous reports associated with the Building 405.

Based on the visual inspections of the accessible areas conducted during the survey and analytical results, no asbestos-containing materials (ACMs) have been identified within the project areas. Lead, silica and mercury are assumed present in select building materials. Other designated substances may be present in low concentrations in building materials, paints and adhesives within the project areas but they do not represent a concern to occupational health at this time.

A summary of the designated substance survey results is presented in **Table 1**.

TABLE 1 – SUMMARY OF RESULTS & RECOMMENDATIONS PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY – BUILDING 405 ELECTRICAL COMMUNICATIONS PROJECT – NOVEMBER 2017		
Component	Comments	Recommendations
Acrylonitrile	None identified.	No recommendations warranted at this time.
Arsenic	None identified.	No recommendations warranted at this time.
Asbestos	Based on the findings of this survey as well as previous and current analytical results, no asbestos-containing material (ACM) has been identified within the project areas.	<u>General Recommendations:</u> <ul style="list-style-type: none"> ○ Suspect materials identified during renovation and/or demolition activities not discussed in this report herein should be treated as ACMs unless proven otherwise through material specific sampling and analysis in accordance with the requirements of Ontario Regulation 278/05. ○ RCMP should update their existing ACM inventory upon completion of the project. ○ That the roles and responsibility of “the owner” as stipulated in Section 8 of Ontario Regulation 278/05 be recognized and adhered to including, but not limited to, notification to occupiers and workers as well as training.
Benzene	None identified.	No recommendations warranted at this time.
Coke Oven Emissions	None identified.	No recommendations warranted at this time.
Ethylene Oxides	None identified.	No recommendations warranted at this time.
Isocyanates	None identified.	No recommendations warranted at this time.
Lead	Based on the analysis of the two (2) paint chip samples collected, lead concentrations ranged from below	In the event that any work is conducted that has the potential to create airborne lead, every employer shall take all necessary measures and

TABLE 1 – SUMMARY OF RESULTS & RECOMMENDATIONS
PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY – BUILDING 405
ELECTRICAL COMMUNICATIONS PROJECT – NOVEMBER 2017

Component	Comments	Recommendations
	<p>method of detection limit (<20 µg/g)t0 <31 µg/g.</p> <p>Based on the age of the building and historical applications, lead is assumed to be present in solder on joints of copper piping, caulking in bell fittings associated with cast iron drainage pipe joints and used on electrical wiring/systems (where observed within the renovation areas).</p> <p>In 1976, the Hazardous Products Act limited the amount of lead in interior paint to 0.5 % by weight (5,000 µg/g). Over the years, the amount of lead in paint has continued to decrease due to cooperative efforts of government and industry.</p>	<p>procedures by means of engineering controls, work practices and hygiene practices and facilities as outlined in the Ontario Ministry of Labour Guideline - Lead on Construction Projects dated April 2011.</p> <p>Every employer shall also ensure that the time-weighted average exposure of a worker to airborne lead, except tetraethyl lead, shall not exceed 0.05 milligrams lead per cubic metre of air, and in the case of exposure to tetraethyl lead 0.10 milligrams lead per cubic metre of air as per O.Reg 490/09, as amended to 148/12.</p> <p>The disposal of construction waste containing lead is controlled by Ontario Regulation 347/90 as amended to O. Reg. 302/14 – General Waste Management, under the Ontario Environmental Protection Act. Leachate tests for lead in construction waste must not exceed 5 mg/L in order to be disposed of at a local landfill without treatment.</p>
Mercury	<p>Mercury vapour is present in fluorescent light tubes identified throughout the survey areas. Additionally, mercury may also be present within thermostats, switches and thermometers (where present).</p> <p>Based on the age of the building and historical applications, mercury is also assumed to be present in painted surfaces; however, sampling of mercury in painted surfaces was not performed for the purpose of this</p>	<p>Mercury or mercury vapour within fluorescent light tubes and other equipment poses no risk to occupants provided the mercury containers remain intact.</p> <p>Best management practice for disposal of mercury-containing light tubes is to participate in the manufacturer’s recycling program or to release the material to an approved waste carrier for disposal and/or recycling.</p> <p>Exposure to mercury in industrial establishments is regulated under O. Reg.</p>

TABLE 1 – SUMMARY OF RESULTS & RECOMMENDATIONS
PROJECT SPECIFIC DESIGNATED SUBSTANCE SURVEY – BUILDING 405
ELECTRICAL COMMUNICATIONS PROJECT – NOVEMBER 2017

Component	Comments	Recommendations
	survey.	<p>490/09, amended to O. Reg. 148/12. The TWA should not exceed 0.025 mg/m³ for all forms except alkyl compounds. Alkyl compounds of mercury should not exceed 0.01 mg/m³.</p> <p>All waste material including switches, thermostats and thermometers, must be handled and disposed of according to O. Reg. 347, amended to O. Reg. 302/14. Leachate tests for mercury in construction waste must not exceed 0.1 mg/L in order to be disposed of at a local landfill without treatment.</p>
Silica	<p>Based on the age of the building and historical applications, silica is assumed to be present in gypsum (drywall), drywall joint compound, poured concrete, concrete block and cement mortar identified within the proposed renovation areas (where applicable).</p> <p>The potential for the generation of airborne silica dust exists when manipulating the noted building materials.</p>	<p>Silica dust can be generated by drilling, coring, blasting, grinding, crushing and sandblasting silica-containing materials.</p> <p>Prior to any renovation or demolition, ensure that all necessary measures and procedures by means of engineering controls, work practices and hygiene practices and facilities are implemented as outlined in the Ontario Ministry of Labour Guideline - Silica on Construction Projects dated April 2011</p> <p>Every employer shall also ensure that the TWAEV of a worker to silica is reduced to the lowest practical level and in any event shall not exceed 0.05 milligrams per cubic metre of air by volume for cristobalite and tridymite, and 0.10 milligrams silica per cubic metre of air by volume for quartz and tripoli.</p>
Vinyl Chloride	Likely present in stable form in pipes, paints and finishes.	No recommendations warranted at this time.

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APPENDICES

Appendix 1 – Asbestos Analytical – November 2017

Appendix 2 –Lead Analytical – November 2017

1.0 INTRODUCTION

Greenough Environmental Consulting Inc. (GEC) was commissioned by the Royal Canadian Mounted Police (RCMP) under the direction of Mr. Martin Petersons, to provide a designated substance report (DSR) for the upcoming Electrical Communications project within Building 405 located within the TPOF complex at 1426 St. Joseph Boulevard in Ottawa, Ontario.

The purpose of the investigation was to identify the quantity, location, and condition of designated substances located within the proposed renovation areas.

All DSR work meets the requirements of Section 30 of the Ontario Occupational Health and Safety Act and WHMIS Regulation (formerly Bill 208).

2.0 SCOPE AND METHODOLOGY

The scope of work followed during the assessment was in accordance with the scope of work agreed upon by GEC and RCMP.

All work was conducted in accordance with provincial regulations (O. Reg 490/09 and 278/05).

The survey included the following designated substances:

- Acrylonitrile
- Arsenic
- Asbestos
- Benzene
- Coke oven Emissions
- Ethylene Oxide
- Isocyanates
- Lead
- Mercury
- Silica
- Vinyl Chloride

Materials suspected to contain designated substances, were visually identified based on the surveyor's knowledge as well as historical application of building components. Where permitted, visual identification of materials suspected to contain asbestos was supported by the collection and analysis of representative samples as directed by the Client. Asbestos bulk sampling was performed by GEC in order to meet the current minimum sampling requirements of Ontario Regulation 278/05 - Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations (O. Reg. 278/05), as amended.

In Ontario, a material is defined as an ACM if the material has a minimum asbestos content of 0.5% by dry weight. ACMs are divided into two categories: friable and non-friable materials. A friable ACM is a material that can be crumbled, powdered, pulverized or reduced to dust by hand or moderate pressure. Friable materials can readily release fibres when disturbed. Common applications of friable ACMs are sprayed or trowelled surfacing materials (e.g. sprayed fireproofing and textured coatings) as well as mechanical and thermal insulations. Non-friable materials will generally release fibres only when cut, broken or have deteriorated to the point where the binding agents of the material begin to fail. Common non-friable ACMs include drywall joint compound, plaster, textile products (gaskets etc.) and asbestos cement (Transite). It must be noted that some materials, although non-friable intact, become friable upon manipulation (i.e. plaster, ceiling tile etc.).

Bulk samples of suspected ACMs collected by GEC during the site investigation were analyzed for asbestos content at Paracel Laboratories Ltd. (Paracel) in Ottawa, Ontario. The bulk asbestos samples were analyzed using a combination of dispersion staining and Polarised Light Microscopy (PLM). This analytical method complies with the United States Environmental Protection Agency (U.S. EPA) Method 600/R-93/116 dated July, 1993. Paracel is certified under the National Institute of Science and Technology's National Voluntary Laboratory Accreditation Program (NVLAP) to perform asbestos bulk sample analysis (NVLAP No. 200812-0).

The laboratory utilizes a "positive-stop" analysis methodology and stopped analysis for the particular set of samples once asbestos concentrations at or above 0.5% is detected. Therefore, samples taken in order to satisfy the requirements of O. Reg. 278/05, were not analyzed if the previous sample was identified as asbestos-containing. **Appendix 1** presents the current asbestos analytical results obtained for the purpose of this survey.

For the purpose of this survey, GEC collected paint chip samples of predominant paint finishes within the specified project areas and submitted the samples to Paracel Laboratories for analysis.

Paracel has received its Certificate of Laboratory Proficiency from the Canadian Association of Environmental Analytical Laboratories (CAEAL) and has achieved accreditation from the Standard Council of Canada.

Analysis of paint chip samples is performed using MOE E3470 (which utilizes EPA Method 6020) which describes the multi-elemental determination of analyses by ICP-OES in environmental samples. The method measures ions produced by a radio-frequency inductively coupled plasma. Analyte species originating in a liquid are nebulized and the resulting aerosol is transported by argon gas into the plasma torch. The ions produced by high temperatures are entrained in the plasma gas and introduced, by means of an interface, into a mass spectrometer. The ions produced in the plasma are sorted according to their mass-to-charge ratios and quantified with a channel electron multiplier. Interferences must be assessed and valid corrections applied, or the data flagged to indicate problems. Interference correction must include compensation for background ions contributed by the plasma gas, reagents, and constituents of the sample matrix. Prior to analysis, samples which require total values must be acid digested using appropriate sample preparation methods.

Inductively coupled plasma-optical emission spectrometry (ICP/OES) is applicable to the determination of sub-ug/L concentrations of a large number of elements in water samples and in waste extracts or digests. When dissolved constituents are required, samples must be filtered and acid-preserved prior to analysis. No digestion is required prior to analysis for dissolved elements in water samples. Acid digestion prior to filtration and analysis is required for groundwater, aqueous samples, industrial wastes, soils, sludges, sediments, and other solid wastes for which total (acid-leachable) elements are required. **Appendix 2** presents the lead analytical results obtained for the purpose of this survey.

3.0 SURVEY LIMITATIONS

This report reflects the observations of the accessed areas and analysis of materials sampled during the current survey. Additional designated substances and hazardous materials exist outside the surveyed areas but they are beyond the scope of this survey.

GEC cannot warrant against the discovery of additional ACMs or presence of other designated substances inside wall cavities, closed bulkheads and closed ceilings due to the non-destructive nature of this survey.

The site investigation was completed by Ms. Amy E. Dean (Environmental Technician) on November 17th, 2017. Observations expressed in this document apply only to conditions on this date and within the subject areas.

4.0 RESULTS

The results of the designated substances survey are discussed below.

4.1 Acrylonitrile

Acrylonitrile is used in production of synthetics and may be present in stable form in paints and adhesives. Over time, acrylonitrile will volatilize out of these materials but it is not expected that acrylonitrile concentrations will exceed the maximum allowable Time Weighted Average limit (TWA) of 2 ppm (parts per million) of air for occupants of the structure.

4.2 Arsenic

Arsenic, or arsenic-containing compounds, may be present in stable form in paints and adhesives. Provided these materials remain in good condition, it is not expected that arsenic concentrations will exceed the maximum allowable TWA of 0.01 mg/m³ of air for occupants of the subject area.

4.3 Asbestos

Table 2 provides a summary of the asbestos analytical results collected for the purpose of this survey. The analytical results are attached in **Appendix 1**.

TABLE 2 –BUILDING 405– ELECTRICAL COMMUNICATIONS PROJECT ASBESTOS ANALYTICAL RESULTS			
Sample Reference	Building Material Description	Location of Sample(s)	Result & Type
SA-01 (A/B/C)	Sprayed Fireproofing	Server Room 1220	ND
SA-01 (A/B/C)	Interior Wall Block Mortar	Locksmith Lab 1620	ND

- ND = No Asbestos Detected
- * Definition of an “Asbestos-containing material” as defined by the Ontario Ministry of Labour Regulation 278/05 is any material found to contain 0.5% or greater asbestos by dry weight.

Based on previous and current analytical data, no asbestos-containing materials were identified within the proposed project areas. However; based on the age of the building the potential exists for additional asbestos-containing materials to be present in concealed locations.

Flooring Finishes:

Flooring Finishes within the survey area consisted mainly of concrete. As concrete is not a suspect ACM, sampling was not conducted.

Based on the analytical data, no asbestos-containing flooring systems were identified within the surveyed areas. However, based on the age of the building, and previous reports, the potential exists for asbestos-containing ceiling materials to be present in concealed locations.

Wall Systems:

Wall systems within the surveyed areas consisted of block walls. Analytical results for the sampling of wall systems as they relate to this survey are summarized below:

- Three (3) samples SA-02(A/B/C) of the wall block mortar were collected and submitted. Based on the laboratory analysis, no asbestos was detected in any of the samples submitted.

Based on the analytical data, no asbestos-containing wall systems were identified within the surveyed areas. However, based on the age of the building, and previous reports, the potential exists for asbestos-containing ceiling materials to be present in concealed locations.

Ceiling Systems:

Ceilings systems within the survey area consisted mainly of concrete and acoustic ceiling tile (date stamped 1996). As concrete is not a suspect ACM, sampling was not conducted.

Based on the analytical data, no asbestos-containing ceiling systems were identified within the surveyed areas. However, based on the age of the building, and previous reports, the potential exists for asbestos-containing ceiling materials to be present in concealed locations.

Mechanical Insulations:

Insulation on mechanical systems within the surveyed area consisted of fibreglass, or mechanical systems were uninsulated. As fibreglass is not suspected to contain asbestos, no sampling was completed of this material.

Based on the on-site observations, no asbestos-containing mechanical insulation was identified within the surveyed areas. However, based on the age of the building, and previous reports, the potential exists for asbestos-containing mechanical insulations to be present in concealed locations.

Miscellaneous Materials:

- Three samples (SA-01A/B/C) of a sprayed fireproofing were collected from the project area and submitted for laboratory analysis. Based on the laboratory analysis, completed in accordance with sampling requirements outlined in O.Reg 278/05, no asbestos was identified in the samples analysed.

Based on the on-site observations, no asbestos-containing miscellaneous materials were identified within the surveyed areas. However, based on the age of the building, and previous reports, the potential exists for asbestos-containing miscellaneous materials to be present in concealed locations.

4.4 Benzene

Benzene is likely present in a stable form within roofing materials, paints and adhesives. Over time, the benzene component volatilizes out of these materials and is released into the ambient air. It is expected that only trace amounts of benzene presently exist in the building materials at the site. It is unlikely that benzene emissions from the building materials on site will exceed the maximum allowable TWAEV of 0.5ppm or occupants of the subject area.

4.5 Coke Oven Emissions

Coke oven emissions are the exhaust released during the burning process of coke (pure carbon). This process was not observed and is not expected to take place within this building; therefore, it is unlikely that coke oven emission concentrations will exceed the maximum allowable TWAEV of 0.15 mg/m³ for occupants for the subject area.

4.6 Ethylene Oxides

Ethylene oxides are used in production of many foams, adhesives and paints. Over time, ethylene oxide will volatilize out of these materials and may be present in trace amounts in the ambient air in the area. It is not expected that ethylene oxide levels will become hazardous to occupants of the subject area.

4.7 Isocyanates

Isocyanates are raw materials from which all polyurethane products are made. Over time, isocyanates may volatilize out of these materials but will only be present in trace amounts and are not expected to exceed the maximum allowable TWAEV of 0.005-0.02ppm (depending on type of isocyanate present) for occupants of the subject area.

4.8 Lead

In 1976, the Hazardous Products Act limited the amount of lead in interior paint to 0.5 % by weight (5,000 µg/g). Over the years, the amount of lead in paint has continued to decrease due to cooperative efforts of government and industry.

Based on site observations and current laboratory analysis, lead concentrations in painted finishes identified within the project areas were measured ranged from <20µg/g to 331µg/g.

TABLE 3 –BUILDING 405– LEAD ANALYTICAL RESULTS – NOVEMBER 2017			
Sample Reference	Building/Item/Location	Surface Colour	Results (µg/g Lead)
LS-01	Wall Paint	White	<20
LS-02	Wall Paint	Light Beige	<31

Paint surfaces were generally found to be in good condition with minor localized blistering or peeling observed.

Based on the age of the building and historical applications, lead is assumed to be present in solder on joints of copper piping, caulking in bell fittings associated with cast iron drainage pipe joints and used on electrical wiring/systems.

4.9 Mercury

Mercury vapour is present in fluorescent light tubes identified throughout the survey areas. Additionally, mercury may also be present within thermostats, switches and thermometers (where present).

Based on the age of the building and historical applications, mercury is also assumed to be present in painted surfaces; however, sampling of mercury in painted surfaces was not performed for the purpose of this survey.

4.10 Silica

Based on the age of the building and historical applications, silica is assumed to be present in gypsum (drywall), drywall joint compound, poured concrete, concrete block and cement mortar identified within the proposed renovation areas (where applicable).

The potential for the generation of airborne silica dust exists when manipulating any of the noted building materials.

4.11 Vinyl Chloride

Vinyl chloride may be present in paints and finishes. Over time, vinyl chloride will volatilize out of these materials but will only be present in trace amounts and is not expected to exceed the maximum allowable TWAEV of 1ppm for occupants of the subject area.

5.0 RECOMMENDATIONS

5.1 Asbestos

The following recommendations are made respecting Ontario Regulation 278/05:

General Recommendations:

- Suspect materials identified during renovation and/or demolition activities not discussed in this report herein should be treated as ACMs unless proven otherwise through material specific sampling and analysis in accordance with the requirements of Ontario Regulation 278/05.

- RCMP should update their existing ACM inventory upon completion of the project.
- That the roles and responsibility of “the owner” as stipulated in Section 8 of Ontario Regulation 278/05 be recognized and adhered to including, but not limited to, notification to occupiers and workers as well as training.

5.2 Lead

In the event that any work is conducted that has the potential to create airborne lead, every employer shall take all necessary measures and procedures by means of engineering controls, work practices and hygiene practices and facilities as outlined in the Ontario Ministry of Labour Guideline - Lead on Construction Projects dated April 2011.

Every employer shall also ensure that the time-weighted average exposure of a worker to airborne lead, except tetraethyl lead, shall not exceed 0.05 milligrams lead per cubic metre of air, and in the case of exposure to tetraethyl lead 0.10 milligrams lead per cubic metre of air as per O.Reg 490/09, as amended to 148/12.

The Occupational Health and Safety Branch of the Ontario Ministry of Labour have published Guideline: Lead on Construction Projects. This document classifies all lead disturbances as Type 1, Type 2a, Type 2b or Type 3 work, and assigns alternate levels of respiratory protection and work procedures for each type of task being performed.

Lead is confirmed and/or assumed to be present in the following materials:

- Caulking in cast iron drainage pipe joints (assumed);
- Solder on the joints of copper pipes (assumed); and
- Solder on electrical wiring / equipment etc. (assumed).

When piping or wiring is removed during demolition activities, copper and drainage piping or wiring can be cut a small distance (e.g., 5cm) from the joints to avoid disturbance of the solder and joint caulking suspected to contain lead.

The disposal of construction waste containing lead is controlled by Ontario Regulation 347/90 as amended to O. Reg. 302/14 – General Waste Management, under the Ontario Environmental Protection Act. Leachate tests for lead in construction waste must not exceed 5 mg/L in order to be disposed of at a local landfill without treatment.

5.3 Mercury

Mercury or mercury vapour within fluorescent light tubes and other equipment poses no risk to occupants provided the mercury containers remain intact.

Best management practice for disposal of mercury-containing light tubes is to participate in the manufacturer's recycling program or to release the material to an approved waste carrier for disposal and/or recycling.

Exposure to mercury in industrial establishments is regulated under O. Reg. 490/09, amended to O. Reg. 148/12. The TWA should not exceed 0.025 mg/m^3 for all forms except alkyl compounds. Alkyl compounds of mercury should not exceed 0.01 mg/m^3 .

All waste material including switches, thermostats and thermometers, must be handled and disposed of according to O. Reg. 347, amended to O. Reg. 302/14. Leachate tests for mercury in construction waste must not exceed 0.1 mg/L in order to be disposed of at a local landfill without treatment.

5.4 Silica

Silica dust can be generated by drilling, coring, blasting, grinding, crushing and sandblasting silica-containing materials.

Prior to any renovation or demolition, ensure that all necessary measures and procedures by means of engineering controls, work practices and hygiene practices and facilities are implemented as outlined in the Ontario Ministry of Labour Guideline - Silica on Construction Projects dated April 2011

Every employer shall also ensure that the TWAEV of a worker to silica is reduced to the lowest practical level and in any event shall not exceed 0.05 milligrams per cubic metre of air by volume for cristobalite and tridymite, and 0.10 milligrams silica per cubic metre of air by volume for quartz and tripoli.

- Segregate the work area from the rest of the building to reduce the risk of exposing building occupants to silica dust. Workers leaving the work area should pass through a designated clean room where excess dust can be brushed off clothes and facilities are available to wash dust off skin.

- The work surface should be wetted regularly to limit dust released during striking and abrasion.
- Everyone in the work area should be provided with a half-face respirator equipped with HEPA filters.
- Ensure that all necessary measures and procedures by means of engineering control, work and hygiene practices are implemented to ensure that the TWAEV of a worker to silica is reduced to the lowest practical level and in any event shall not exceed 0.05 mg/m³ of air for cristobalite and tridymite, and 0.10 mg/ m³ of air for quartz and tripoli.

6.0 CLOSURE

This report has been prepared for the sole benefit of the Client and their intended use. The report may not be relied upon by any other person or entity without the written consent of Greenough Environmental Consulting Inc. (GEC), and the Client.

GEC accepts no responsibility for any use that an outside party makes of this report and any reliance on decisions made based on it, are the responsibility of such parties.

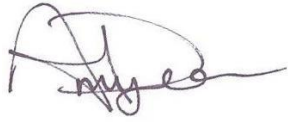
This report was not intended to provide direction or procedures for the handling of designated substances and hazardous materials. Only persons with documented, current training in the safe handling of the designated substances and hazardous materials should handle them. Persons handling any of designated substances and/or hazardous materials identified in this survey, or conducting work in the vicinity of these materials are advised to consult this survey and individuals with appropriate experience and training, prior to doing so.

The conclusions presented represent the best judgment of the assessor based on current environmental standards. Due to the nature of the investigation and the limited data available, the assessor cannot warrant against undiscovered environmental liabilities.

We trust that the report meets your current requirements. Should you have any questions or concerns regarding the above, please do not hesitate to contact the undersigned.

Yours Truly,

GREENOUGH ENVIRONMENTAL CONSULTING INC



Amy Dean
Environmental Technician



Derek R. Stashick, B.Ed, WRT, CMI, C-NRPP
Project Manager

APPENDIX 1

ASBESTOS ANALYTICAL – NOVEMBER 2017

Certificate of Analysis

Greenough Environmental Consulting Inc.

29 Capital Drive
Ottawa, ON K2C0E7
Attn: Amy Dean

Client PO:
Project: 30271
Custody: 26347

Report Date: 23-Nov-2017
Order Date: 17-Nov-2017

Order #: 1746522

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1746522-01	SA-01A
1746522-02	SA-01B
1746522-03	SA-01C
1746522-04	SA-02A
1746522-05	SA-02B
1746522-06	SA-02C

Approved By:



Emma Diaz
Senior Analyst

Certificate of Analysis
 Client: **Greenough Environmental Consulting Inc.**
 Client PO:

Report Date: 23-Nov-2017
 Order Date: 17-Nov-2017
 Project Description: **30271**

Asbestos, PLM Visual Estimation **MDL - 0.5%**

Paracel I.D.	Sample Date	Layers Analyzed	Colour	Description	Asbestos Detected:	Material Identification	% Content
1746522-01	17-Nov-17	sample homogenized	Grey	Firespray	No	Client ID: SA-01A	
						MMVF	70
						Non-Fibers	30
1746522-02	17-Nov-17	sample homogenized	Grey	Firespray	No	Client ID: SA-01B	
						MMVF	70
						Non-Fibers	30
1746522-03	17-Nov-17	sample homogenized	Grey	Firespray	No	Client ID: SA-01C	
						MMVF	70
						Non-Fibers	30
1746522-04	17-Nov-17	sample homogenized	Grey	Block Mortar	No	Client ID: SA-02A	
						Non-Fibers	100
1746522-05	17-Nov-17	sample homogenized	Grey	Block Mortar	No	Client ID: SA-02B	
						Non-Fibers	100
1746522-06	17-Nov-17	sample homogenized	Grey	Block Mortar	No	Client ID: SA-02C	
						Non-Fibers	100

* MMVF: Man Made Vitreous Fibers: Fiberglass, Mineral Wool, Rockwool, Glasswool

Analysis Summary Table

Analysis	Method Reference/Description	Lab Location	NVLAP Lab Code *	Analysis Date
Asbestos, PLM Visual Estimation	by EPA 600/R-93/116	2 - Ottawa West Lab	200812-0	22-Nov-17

* Reference to the NVLAP term does not permit the user of this report to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Work Order Revisions / Comments

None

APPENDIX 2

LEAD ANALYTICAL – NOVEMBER 2017

Certificate of Analysis

Greenough Environmental Consulting Inc.

29 Capital Drive
Ottawa, ON K2C0E7
Attn: Amy Dean

Client PO:
Project: 30271
Custody: 40368

Report Date: 23-Nov-2017
Order Date: 17-Nov-2017

Order #: 1746517

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Parcel ID	Client ID
1746517-01	LS-01 White
1746517-02	LS-02 Beige

Approved By:



Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis
Client: **Greenough Environmental Consulting Inc.**
Client PO:

Report Date: 23-Nov-2017
Order Date: 17-Nov-2017
Project Description: **30271**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-OES	based on MOE E3470, ICP-OES	23-Nov-17	23-Nov-17

Sample and QC Qualifiers Notes

1- GEN01 :Elevated Reporting Limits due to limited sample volume.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Certificate of Analysis
 Client: Greenough Environmental Consulting Inc.
 Client PO:

Report Date: 23-Nov-2017
 Order Date: 17-Nov-2017
 Project Description: 30271

Sample Results

Lead				Matrix: Paint
				Sample Date: 17-Nov-17
Paracel ID	Client ID	Units	MDL	Result
1746517-01	LS-01 White	ug/g	20	<20
1746517-02	LS-02 Beige	ug/g	20	<31 [1]

Laboratory Internal QA/QC

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Matrix Blank									
Lead	ND	20	ug/g						
Matrix Duplicate									
Lead	1190	20	ug/g	1170			1.6	30	
Matrix Spike									
Lead	810		ug/L	584	90.4	70-130			