



Government of Canada | Gouvernement du Canada

DEPARTMENT OF NATIONAL DEFENCE

REAL PROPERTY OPERATIONS UNIT (ONTARIO)
DETACHMENT (BORDEN)

SPECIFICATION

THIS DOCUMENT CONTAINS A SECURITY REQUIREMENT / CE
DOCUMENT CONTIENT DES EXIGENCES RELATIVES À LA SÉCURITÉ

REPLACE ROOF TOP HVAC UNITS
31 HANGAR ROAD, BORDEN, ON
(BUILDING #A-253)

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L-B147-8883/3-402	Mechanical Roof Plan Proposed MUA/ERV	2020/05/06
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L-B147-8883/3-505	Existing A-253 Single Line Diagram	2020/05/06

Part 1 General

1.1 SECTION INCLUDES

- .1 Title and description of Work.
- .2 Work sequence.
- .3 Contractor use of premises.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general construction of A-253, located at 31 Hangar Street, CFB Borden, ON.
- .2 Work comprises architectural, electrical, and mechanical upgrades and alterations including but not limited to:
 - .1 Remove all fans, separate all ducts, and repair roof as indicated.
 - .2 Reinstall all fans, reconnect all ducts, reinstall and replace any damaged HVAC insulation.
 - .3 Removal and replacement of existing make-up air (MUA 1, 2, & 3), exhaust fans (EF/ERV 1, 2, & 3), and existing glycol loop.
 - .4 Removal and replacement of roof in area indicated as 'scope of work.'
 - .5 Removal and replacement of existing electrical connections.
 - .6 Replacement of MUA/ERV controls inside A-253.

1.3 LOCATION OF THE SITE

- .1 CFB Borden is located on County Road 90, 23 kms west of Barrie, Ontario.

1.4 SITE ACCESS

- .1 Upon entering the Base, the Contractor has voluntarily consented to a search of his vehicle and its contents while on any part of CFB Borden and said military establishments, by the Base Commander or person designated by him.
- .2 The purpose of any search conducted is to ensure the security of CFB Borden and said military establishments, and/or material or classified information belonging to the Canadian Armed Forces.

1.5 CONTRACTOR TRAFFIC ROUTE

- .1 All contract related commercial motor vehicles must use the south entrance (known as the South Gate or Alliston Gate) to enter and exit CFB Borden. Furthermore, these vehicles must use Ortona Road and then the shortest distance between Ortona Road and the intended destination to navigate around the Base. This requirement extends to all subcontractors and delivery vehicles.

- .2 Commercial motor vehicles are defined as any heavy equipment, tractor trailers, cement trucks, dump trucks, cranes, any vehicle towing a trailer, and delivery type trucks larger than cube vans.
- .3 Exemptions: Roadways leading to CFB Borden can be impeded due to construction, maintenance, weather or seasonal / maximum weight restriction bans. It is also understood that some suppliers or delivery vehicles will service the Base as part of a larger area or regional route thus cannot be expected to absorb additional time or costs. Should such conditions exist, CFB Borden, for said occurrences or in accordance with provincial advisories, Road Restrictions and Seasonal Road Bans will allow commercial vehicle traffic to enter or exit via the north entrance (known as the North Gate or Angus Gate). A written request for exemption must be submitted to the DCC Representative for approval.
- .4 Enforcement of commercial motor vehicle traffic and routes once inside CFB Borden falls to the Military Police who hold the same authorities as civilian police as well as enhanced search & seizure powers related to all military or civilian activities on Department of National Defence property.

1.6 OWNER OCCUPANCY

- .1 Owner will occupy premises during entire construction period for execution of normal operations.
- .2 Co-ordinate with DCC Representative in scheduling operations to minimize conflict and to facilitate Owner usage.
- .3 As part of the coordination between occupant and the contractor, the contractor shall prepare and submit a Fire Safety Plan. The plan shall be based on the DND Template to be provided by DCC. The plan will further define the phases of the work, the timing of the phases, communication planning with occupants and also will include drawings depicting emergency exit plans for each phase of the work.
- .4 Refer to Section 01 70 03 - Safety Requirements for further details.

1.7 CONTRACTOR USE OF PREMISES

- .1 Contractor shall limit use of premises for Work, to allow;
 - .1 Owner occupancy.
- .2 Coordinate use of premises under direction of DCC Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.8 CONTRACTOR'S WORKING HOURS

- .1 Contractor's regular working hours are Monday to Friday from 0700 to 1600 hrs.
- .2 If work is to occur during unoccupied hours, the contractor is permitted to work during the following times:

- .1 Weekdays: Monday to Friday from 0800 to 1600 hrs.
- .2 Weekends: 0800 to 1600 hrs.
- .3 To ensure that Commissionaire services are provided when work is being completed during unoccupied hours, contractor shall make a written request for approval to DCC Representative at least 96 hours in advance.

1.9 WORK SEQUENCE

- .1 Construct work in stages to accommodate Owner's continued use of premise during construction. Unless noted otherwise, occupants will completely vacate one section of the building at a time for the allotted period indicated below in 'Required Stages'.
- .2 Separate and secure each construction area to allow for the rest of the building to remain occupied and fully operational by usage of barriers and signage. Ensure safe access to washrooms.
- .3 Occupant will unlock and lock the building each day unless otherwise arranged with DCC Representative.
- .4 Moving in of materials (MUA's and EF/ERV's) shall be done during unoccupied hours.
- .5 Contractor to provide lockable tower stair to roof – access to roof through A-253 is not permissible.

.6 Required stages:

.1 STAGE 1

- .1 Six (6) weeks allotted for demolish and construction.
- .2 Area of Work: Roof-top MAU-1, ERV-1, and roof area as indicated.

Note:

- .3 Allow five (5) working days for occupant to vacate Stage 2 serviced by MUA-1 and ERV-1. Five (5) working days shall be on top of the 6 weeks allotted for construction.
- .4 Contractors enter work site from lockable stairs.
- .5 For electrical work inside the building:
 - .1 The contractor shall liaise with DCC Representative; one (1) month prior for commissionaire. A minimum of three (3) weeks is necessary to cancel the Commissionaire services.

.2 STAGE 2

- .1 Six (6) weeks allotted for demolish and construction.
- .2 Area of Work: Roof-top MAU-2, ERV-2, and roof area as indicated.

Note:

- .1 Allow five (5) working days for occupant to vacate Stage 3 serviced by MUA-2 and ERV-2. Five (5) working days shall be on top of the 6 weeks allotted for construction.
- .2 Contractors enter work site from lockable stairs.
- .3 For electrical work inside the building:

- .1 The contractor shall liaise with DCC Representative; one (1) month prior for commissionaire. A minimum of three (3) weeks is necessary to cancel the Commissionaire services.

.3 STAGE 3

- .1 Six (6) weeks allotted for demolish and construction.
- .2 Area of Work: Roof-top MAU-3, ERV-3, and roof area as indicated.

Note:

- .1 Allow Five (5) working days for occupant to vacate Stage 4 serviced by MUA-3 and ERV-3. Five (5) working days shall be on top of the 6 weeks allotted for construction.
- .2 Contractors enter work site from lockable stairs.
- .3 For electrical work inside the building:
 - .1 The contractor shall liaise with DCC Representative; one (1) month prior for commissionaire. A minimum of three (3) weeks is necessary to cancel the Commissionaire services.

- .4 In each stage area listed the Contractor is required to:
 - .1 Complete all mechanical, electrical, structural, and architectural work during allocated time frame.
 - .2 Replace and patch all HVAC insulation that is removed for roof repair.
 - .3 Seal all penetrations as shown on Architectural drawings.
 - .4 In presence of DCC Rep and DND PM conduct smoke test and commissioning of all existing and proposed fans.
 - .5 In the presence of DCC Rep and DND PM conduct ESA rough in and final electrical inspections.
- .5 The contractor is to include in the Tender Price for costs associated with this sequencing.
- .6 Always maintain fire access/control. Contractor to request commissionaire one (1) month prior if fire access/control is shut down during building unoccupied hours. A minimum of three (3) weeks is necessary to cancel commissionaire service.
- .7 Construct work in stages listed above to accommodate Owner's continued use of premises.
- .8 General Contractor is to maintain same roofing contractor through-out the project.

1.10 REFERENCES AND CODES

- .1 It is the policy of the Department of National Defence to design buildings, on Federal lands, in compliance with the most current Suite of Canadian Electrical Code (CEC), National Plumbing Code of Canada (NPC), National Energy Code of Canada for Buildings (NEC), National Fire Code of Canada (NFC) and DND Standards (CFFM FMD's and CETOs) including all amendments up to tender closing date.
- .2 The design of the facility shall comply with all applicable Acts, Regulations, Bylaws, policies and standards associated with the Infrastructure and Environment for the project. In the event of a conflict, the most stringent of the applicable standard shall apply, unless directed otherwise by DND.

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

1.11 HAZARDOUS MATERIAL DISCOVERY

- .1 Asbestos: Demolition of spray or trowel-applied asbestos can be hazardous to health. Should material resembling spray or trowel-applied asbestos be encountered in course of demolition work, immediately stop work and notify DCC Representative.
- .2 Hazardous materials inventory report is available for inspection from the DCC Representative.
- .3 If suspected Designated Substances are encountered during the course of the contract, make area safe and contact the DCC Representative immediately on how to proceed.

1.12 BUILDING SMOKING ENVIRONMENT

- .1 Smoking is prohibited in all work places within DND buildings.
- .2 Although smoking is not permitted in hazardous areas, care must still be exercised in the use of smoking materials in non-restricted areas.

1.13 RELICS AND ANTIQUITIES

- .1 Protect relics, antiquities, items of historical or scientific interest such as cornerstones and contents, commemorative plaques, inscribed tablets, and similar objects found during course of work.
- .2 Give immediate notice to DCC and await DCC Representatives written instructions before proceeding with work in this area.
- .3 Relics, antiquities and items of historical or scientific interest remain her Majesty's property.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- .1 Particular requirements for inspection and testing to be carried out by testing laboratory are specified under various sections. Contractor and DCC Representative will each engage their own testing & inspection company for the purpose of this contract.

1.2 APPOINTMENT AND PAYMENT

- .1 DCC Representative will appoint and pay for independent inspection/testing agency, equipment, facilities, and labour to provide Quality Assurance (QA) testing, except follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Testing, adjustment and balancing of conveying systems, mechanical and electrical equipment and systems.
 - .3 Mill tests and certificates of compliance.
 - .4 Tests specified to be carried out by Contractor under the supervision of DCC Representative.
 - .5 Additional tests specified in the following paragraph.
- .2 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by DCC Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 The contractor to furnish and pay for independent inspection/testing agency, equipment, facilities, and labour to provide Quality Control (QC) testing in accordance with the contractor's quality control plan.
- .2 Provide labour, equipment and facilities to:
 - .1 Provide access to Work to be inspected and tested.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
- .3 Notify DCC Representative sufficiently in advance of testing & inspection operations (48hrs minimum).
- .4 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .5 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed.

END OF SECTION

Part 1 General

1.1 PROJECT MEETINGS

- .1 DCC Representative will arrange project meetings and assume responsibility for setting times and recording and distributing minutes.'

1.2 ON-SITE DOCUMENTS

- .1 Maintain at job site, one copy each of the following:
 - .1 Contract drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed shop drawings.
 - .5 Change orders.
 - .6 Other modifications to Contract.
 - .7 Field test reports.
 - .8 Copy of approved Work schedule.
 - .9 Manufacturers' installation and application instructions.

1.3 SCHEDULES

- .1 Contractor to submit a construction progress schedule to DCC Representative within 10 working days of the Contract award and at least 10 working days prior to the submission of the first progress claim. The construction progress schedule must show anticipated progress stages and final completion of the work within the time periods required by the Contract documents.
- .2 During progress of Work revise and resubmit as directed by DCC Representative.

1.4 CLOSEOUT PROCEDURES

- .1 Notify DCC Representative when Work is considered ready for Substantial Performance.
- .2 Accompany DCC Representative on preliminary inspection to determine items listed for completion or correction.
- .3 Comply with DCC Representative's instructions for correction of items of Work listed in executed certificate of Substantial Performance and for access to Owner-occupied areas.
- .4 Notify DCC Representative of instructions for completion of items of Work determined in DCC Representative's final inspection.

1.5 COST BREAKDOWN

- .1 Contractor to submit a detailed cost breakdown to DCC Representative at least ten (10) working days prior to the submission of the first progress claim. After approval by DCC Representative the cost breakdown will be used as basis for progress payment.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Shop drawings and product data.
- .2 Samples.

1.2 ADMINISTRATIVE

- .1 Submit to DCC Representative, submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .2 Work affected by submittal shall not proceed 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 DCC 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 shall be considered rejected.
- .6 Notify DCC 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 coordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by DCC Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by DCC Representative's review.
- .10 Keep one reviewed copy of each submission on site.

1.3 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 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 coordinated, regardless of Section under which

adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

- .3 Allow 10 working days for DCC Representative's review of each submission.
- .4 Adjustments made on shop drawings by Reviewer are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to DCC Representative prior to proceeding with Work.
- .5 Make changes in shop drawings as DCC Representative may require, consistent with Contract Documents. When resubmitting, notify DCC Representative in writing of any revisions other than those requested.
- .6 Accompany submissions with transmittal letter, in duplicate, 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.
- .7 Submissions shall include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
- .8 After DCC Representative's review, distribute copies.

- .9 Submit minimum of 3 prints or 1 electronic copy of shop drawings for each requirement requested in specification Sections and as DCC Representative may reasonably request with the understanding the DCC Representative will retain 2 copies of the reviewed submission.
- .10 Submit minimum of 3 copies or 1 electronic copy of product data sheets or brochures for requirements requested in specification Sections and as requested by DCC Representative where shop drawings will not be prepared due to standardized manufacture of product, with the understanding the DCC Representative will retain 2 copies of the reviewed submission.
- .11 Delete information not applicable to project.
- .12 Supplement standard information to provide details applicable to project.
- .13 If upon review by DCC 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.
- .14 The review of shop drawings by the DCC Representative is for sole purpose of ascertaining conformance with general concept. This review shall not mean that the DCC 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 all requirements of construction and Contract Documents. 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 all sub-trades.

1.4 SAMPLES

- .1 Submit for review samples in as requested in respective specification Sections. Label samples with origin and intended use.
- .2 Notify DCC Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .3 Where colour, pattern or texture is criterion, submit full range of samples.
- .4 Adjustments made on samples by DCC Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to DCC Representative prior to proceeding with Work.
- .5 Make changes in samples which DCC Representative may require, consistent with Contract Documents.
- .6 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

- .1 Erect mock-ups in accordance with 01 45 00 - Quality Control.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 **Precedence** - Division 1 sections take precedence over technical specifications in other Divisions of this project manual.

1.2 REFERENCES

- .1 Definitions:
 - .1 Contract Security Program (CSP) - A division of Public Services and Procurement Canada (PSPC), which developed the Contract Security Manual and helps industry to participate in Government of Canada and foreign government contracts. CSP provides security screening services needed for contractors before their employees can work with Protected and Classified information and assets.
 - .2 Company Security Officer (CSO) - The CSO is the organization's official point of contact with the CSP. The CSO is responsible for monitoring the organization's security profile, addressing security issues, and is accountable to the CSP and to the organization's designated Key Senior Official on all industrial security matters.
 - .3 Contractor CSO - The employee of the Contractor's company who is the CSO.
 - .4 Contract Security Manual (CSM) - The CSM is a ready and simple reference which tells Company Security Officers what they must know about Canadian government security standards and procedures and how to ensure that their organization meets these security requirements.
 - .5 Positive Control - Measures which guarantee that persons without appropriate clearance will not be left unattended to access the Department of National Defence/Canadian Armed Forces (DND/CAF) information, assets, resources, or locations.
 - .6 Request for Visit (RFV) - A form to be filled out by an individual who requires access to sensitive DND property, personnel, information, assets and resources because they must be security screened at the appropriate level before commencement of their duties.
 - .7 Restricted - Refers to a situation where authorized persons only, are allowed access to an area or information.
 - .8 Security Implementation Plan - A detailed document which outlines the company's strategy and process to meet contract security requirements.
 - .9 Security Requirements Check List (SRCL) - The SRCL is a Treasury Board Secretariat (TBS) form used to define the security requirements for a contract. The SRCL represents an evaluation of security threats and risks that may arise through the contracting process.
 - .10 Sensitive - Records that are sensitive contain information that can cause different degrees of injury to an individual, a company, or the country if the information were disclosed in an unauthorized manner.
- .2 Reference Sites:

- .1 Defence Construction Canada (DCC)
 - .1 <https://www.dcc-cdc.gc.ca/industry/security-requirements>
- .2 PSPC Contract Security Manual
 - .1 <https://www.tpsgc-pwgsc.gc.ca/esc-src/msc-csm/index-eng.html>

1.3 GENERAL

- .1 Security requirements must form part of the contract between DCC and industry when defined by a SRCL.
- .2 These security requirements apply but are not limited to:
 - .1 construction and material objects;
 - .2 contractual arrangements;
 - .3 professional service contracts;
 - .4 facility maintenance contracts; and
 - .5 environmental and UXO contracts.
- .3 A SRCL is a form that is used to define the security requirements associated with each contract. The SRCL ensures that the appropriate security clauses are identified so they may be incorporated into the contract, thereby legally binding the parties to meet the contract's security requirements. **The SRCL must accompany all contract documents including subcontracts that contain security requirements.**
- .4 If multiple levels of screening are required, a Security Classification Guide may have been provided along with the SRCL as a contractual document. This document will provide further information related to security requirements when dealing with multiple levels of clearances within the contract.

1.4 PRIVATE SECTOR ORGANIZATION SCREENING AND CLEARANCES

- .1 Companies who will need access to or who will retain controlled goods, protected or classified property, information, assets or resources must be cleared as follows:
 - .1 Companies must be cleared to safeguard the highest level of information and asset to be retained/accessed, meaning:
 - .1 Designated Organization Screening (DOS) is required for contracts involving access to information at the protected level and/or secure worksites (Reliability status);
 - .2 Facility Security Clearance (FSC) is required for contracts involving access to information at the protected and/or classified levels and/or secure worksites (Secret status);
 - .3 Document Safeguarding Capability (DSC) is required to work on protected and/or classified information at their own worksite; and
 - .4 Companies who will electronically process protected or classified information must have IT media clearance and processing capability commensurate with the security classification level of the information to be processed and must be cleared to the level commensurate with the information or asset to be accessed.

1.5 PERSONNEL SECURITY SCREENING

- .1 Individuals requiring access to information and/or site must have their personnel security screening completed prior to submitting an RFV. As a part of the screening process, it is now a requirement for individuals to undergo a law enforcement inquiry through the RCMP, for electronic finger printing. Please refer to PSPC website for more information.
- .2 Prior to Contract Award, personnel security screenings may not be initiated due to CSP requirements. Therefore, contractors must allow time in their schedules to seek personnel security screenings as required by the contract.
 - .1 Reliability status processing is anticipated to take seven (7) business days per employee after a request has been properly submitted to CSP; and
 - .2 Secret clearance processing is anticipated to take seventy-five (75) business days per employee after a request has been properly submitted to CSP.

1.6 VISIT CLEARANCE REQUESTS (VCR) APPROVAL

- .1 All individuals (including subcontractors) who will have access to sensitive DND or CAF property, personnel, information, assets, and resources, must be security screened at the appropriate level before the commencement of their duties in relation to the contract.
- .2 Access to Operations Zones: security screening is not required for certain personnel if positive control of those individuals is maintained throughout their visit. Positive control measures must be outlined in the Security Implementation Plan. Positive control can be used for the following personnel:
 - .1 Logistics activities – material drop-off, waste removal, snow removal;
 - .2 Transit through an operations zone (no work); and
 - .3 Authorities having jurisdiction.
- .3 The VCR process verifies that those who are permitted access onto DND property have the required clearance level as outlined within the SRCL for the contract.

1.7 POST AWARD PROCESS OVERVIEW

- .1 The Contractor's CSO is provided a blank RFV form by the DCC Representative in order to obtain an approved VCR.
- .2 All employees of the successful bidder who will be accessing restricted sites or sensitive information during the execution of the contract require a VCR. The Contractor's CSO must forward the completed form to the DCC Representative for processing.
 - .1 The CSO of each company completing an RFV form must submit a picklist from the Online Industrial Security Services (OLISS) portal instead of filling in the details of each visitor on the form. Only the employees of the company who require access to the restricted site or sensitive information for that contract shall be listed on the picklist.
 - .2 If the Contractor intends to use Union Hall members, the CSO will request the Union Hall to provide the CSO with a separate picklist for all members to be used on the contract. Only the individuals of the Union Hall who require access to the site for that contract shall be listed on the picklist.

- .3 The CSO of the company will input “SEE ATTACHED PICKLIST” when completing Particulars of Visitors.
- .3 It is the responsibility of the Prime Contractor to submit and receive an approved SRCL for each subcontract containing security requirements. This responsibility extends to all subcontracts held by subcontractors.
 - .1 Instructions on this process are in the CSM located at <https://www.tpsgc-pwgsc.gc.ca/esc-src/msc-csm/index-eng.html>
 - .2 Prior to Contract Award, subcontract SRCL security screenings may not be initiated due to CSP requirements. Therefore, contractors must allow time in their schedules for subcontract SRCL approvals as required by the contract.
 - .1 When a Private Sector Organization Screening (PSOS) is **not** required, contractors shall allow 45 business days (from the date on which a complete and correct subcontract SRCL is received by CSP) for approval of a subcontract SRCL by CSP.
 - .2 When a PSOS **is** required:
 - .1 For sub-contractors to be sponsored to the level of DOS, contractors shall allow for 50 business days (from the date on which a complete and correct PSOS is submitted to CSP) for approval of a subcontract SRCL by CSP; and
 - .2 For sub-contractors to be sponsored to the level of FSC (Secret), contractors shall allow 124 business days (from the date on which a complete and correct PSOS is submitted to CSP) for approval of a subcontract SRCL by CSP.
- .3 All security related pre-construction activities shall proceed immediately after award.
- .4 For subcontracts, the RFV shall not be submitted until after the subcontract SRCL has been approved and permission to award the contract is granted by CSP.
 - .1 Contractor to allow a minimum of 15 business days for VCR processing.
- .5 Personnel not meeting the required security clearances will not be allowed access to restricted sites or any sensitive information pertaining to the contract, except as permitted in 1.6.2.
- .6 Approved VCRs are valid for the duration of the contract **or** one year less one day, whichever is less. Extension to VCRs will need to be requested as required, again allowing a minimum of 15 business days for processing.

1.8 SUBMITTALS

- .1 Submit to the DCC Representative copies of the following documents, including updates issued:
 - .1 Security Implementation Plan
 - .2 Approved subcontract SRCLs
 - .3 Completed Request for Visit forms for all personnel working under the contract
 - .4 Incident reports within (1) working day

- .5 Submit other data, information and documentation upon request by the DCC Representative.

1.9 RESPONSIBILITY

- .1 It is the responsibility of the Contractor to have no security breaches while undertaking the work for this contract.

1.10 MEETINGS

- .1 Prior to commencement of work, the Contractor will attend a pre-commencement meeting conducted by the DCC Representative. Ensure, as minimum, attendance by Contractor's site superintendent.
 - .1 The DCC Representative will advise of time, date and location of the meeting and will be responsible for recording and distributing the minutes.
 - .2 If requested by the DCC Representative, the Contractor's CSO will be required to participate in the pre-commencement meeting.
- .2 Conduct site specific security meetings as required to ensure the management of security is in accordance with the contract.
 - .1 Record and post minutes of all meetings as allowed by the security requirements of the contract.

1.11 SECURITY IMPLEMENTATION PLAN

- .1 Contractors are required to have in place a contract specific Security Implementation Plan that addresses the security requirements outlined in the contract.
- .2 Provide one copy of the Security Implementation Plan to the DCC Representative prior to the commencement of work.
- .3 At a minimum, the plan shall contain details addressing:
 - .1 CSO name and contact information;
 - .2 Schedule for subcontract SRCLs and RFVs;
 - .3 Site Access and Control Monitoring including verification that all people entering secure areas on site have approved VCRs in accordance with contractual security requirements, or any planned positive control measures;
 - .4 Security Education (i.e. Restrictions on photographs); and
 - .5 Security Incident Reporting.
- .4 The DCC Representative will coordinate review of the Security Implementation Plan by the DND Project Security Authority to be completed within 10 business days of receipt following which the DCC Representative shall confirm DND's acceptance or rejection with comments.

1.12 INCIDENT REPORTING

- .1 Investigate and report any security incidents immediately to the DCC Representative.
 - .1 Immediately provide a copy of the incident/investigation reports to the DCC Representative.

- .2 Refer to Chapter 5 of the CSM <https://www.tpsgc-pwgsc.gc.ca/esc-src/msc-csm/index-eng.html> for more information.
- .2 For the purpose of this contract, immediately notify the DCC Representative of incidents that involve a security breach from the identified clauses on the SRCL or an interruption to adjacent and/or integral infrastructure operations with potential loss implications.
- .3 In the investigation and reporting of incidents, the Contractor is required to respond in a timely fashion (within 5 working days) to correct the action that was deemed to have caused the incident and advise in writing on the action taken to prevent a re-occurrence of the incident.

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 CONSTRUCTION FIRE SAFETY

- .1 The Contractor shall provide construction fire safety in accordance with the National Fire Code of Canada.

1.2 RELATED SECTIONS

- .1 Section 01 35 43 Environmental Procedures
- .2 Section 01 70 03 Safety Requirements
- .3 Section 02 81 01 Hazardous Materials

1.3 REFERENCES

- .1 Occupational Health and Safety Act (OHSA)
 - .1 Ontario Regulation 632/05- Confined Spaces
- .2 Government of Canada
 - .1 Canada Labour Code, Part II - Canada Occupational Health and Safety Regulations (COHSR), SOR/86-304, Part XI- Confined Spaces,
 - .2 National Fire Code of Canada (NFC),
 - .3 Canadian Forces Fire Marshall Directive FMD4003 Fire Protection and Life Safety Engineering Design

1.4 FIRE DEPARTMENT BRIEFING

- .1 DCC Representative will co-ordinate arrangements for Pre-Commencement Meeting following contract award. Contractors will be briefed on Fire Safety by the Base Fire Department before work starts.

1.5 REPORTING FIRES

- .1 The Contractor shall inform the DCC representative and Base Fire Department of all fire incidents at the construction site, regardless of size.
- .2 Know location of nearest fire alarm pull station and telephone, including emergency phone number.
- .3 Report immediately fire incidents to Base Fire Department as follows:
 - .1 Activate nearest fire alarm pull station.
 - .2 Telephone 911, Inform dispatcher of location at CFB Borden
- .4 Person activating fire alarm pull station will remain at the front entrance to direct Base Fire Department to scene of fire.

- .5 When reporting fire by telephone, give location of fire, name or number of building and be prepared to verify location.

1.6 FIRE SAFETY PLAN

- .1 Submit a fire safety plan for the construction site prior to commencement of construction work. The fire safety plan shall conform to the National Fire Code of Canada and Base Fire Department guidelines.
- .2 The fire safety plan shall be submitted to the DCC representative for review by Base Fire Department. Any comments by Base Fire Department shall be implemented by the Contractor.
- .3 The fire safety plan shall be limited to the area of construction only. Contractor is not responsible for amending fire safety plans in existing buildings.
- .4 Post the fire safety plan at the entrance to the construction site or near the construction site's health and safety board.
- .5 The fire safety plan shall conform to the National Fire Code of Canada, and shall contain, at minimum:
 - .1 Emergency procedures to be used in case of fire, including
 - .1 Sounding the fire alarm;
 - .2 Notifying the fire department;
 - .3 Instructing occupants on procedures to be followed when the fire alarm sounds;
 - .4 Evacuating occupants, including special provisions for persons requiring assistance; and
 - .5 Confining, controlling and extinguishing fires.
 - .2 The appointment and organization of designated supervisory staff to carry out fire safety duties.
 - .3 The training of responsibilities for supervisory staff and other occupants.
 - .4 Documents including diagrams, showing the type, location and operation of building fire emergency systems.
 - .5 The holding of fire drills (where applicable).
 - .6 The control of fire hazards in the building.
 - .7 The inspection and maintenance of building facilities provided for the safety of occupants.

1.7 FIRE WARNING SYSTEM

- .1 A fire warning shall be provided to notify construction personnel of a fire emergency in the construction area.
- .2 The system used shall be capable of being heard throughout the building.

1.8 INTERIOR AND EXTERIOR FIRE PROTECTION AND ALARM SYSTEMS

- .1 Fire protection and alarm system will not be:
 - .1 Obstructed.
 - .2 Shut-off.
 - .3 Left inactive at end of working day or shift without prior written authorization from the Base Fire Department.
- .2 Do not use Fire hydrants, standpipes or hose systems for other than fire-fighting purposes unless authorized by the Base Fire Department.

1.9 FIRE PROTECTION SYSTEM IMPAIRMENT

- .1 Notify the DCC Representative, by completing a Fire Alarm Impairment Permit, 48 hours (for coordination with Base Fire Department and RP Ops Det Fire alarm techs) prior to shutting down any active fire protection system, including water supply, fire suppression, fire detection and life safety systems.
- .2 Where a fire protection system that provides fire alarm monitoring is impaired in an existing building, a fire watch may be required at the discretion of the Base Fire Department.
- .3 Implement all fire protection system impairments in accordance with the National Fire Code of Canada and Base Fire Orders. Fire Orders will be provided at the Pre-Commencement Meeting.

1.10 FIRE EXTINGUISHERS

- .1 In addition to other requirements of this specification, supply fire extinguishers, as scaled by the Base Fire Department, necessary to protect work in progress and contractor's physical plant on site.
- .2 Fire extinguishers may be required in the following areas as directed by the Base Fire Department
 - .1 Adjacent to hot works;
 - .2 In areas where combustibles are stored;
 - .3 Near or on any internal combustion engines;
 - .4 Adjacent to areas where flammable liquids or gases are stored or handled;
 - .5 Adjacent to temporary oil fired or gas fired equipment; and
 - .6 Adjacent to bitumen heating equipment.
- .3 Extinguishers shall be sized as 4-A: 40-B: C (20 lbs) unless otherwise directed by the Base Fire Department.
- .4 Extinguishers shall be of the dry chemical type unless otherwise required by the hazard being protected.
- .5 The Contractor may assume the quantity of extinguishers based on a maximum travel distance between extinguishers of 75 feet.

1.11 INSTALLATION OR REPAIR OF ROOFS

- .1 Notify the DCC Representative of location of asphalt kettles and dates that kettles will be in use. Ensure personnel use and take precautions as follows:
 - .1 Use kettles equipped with thermometers or gauges in good working order.
 - .2 Locate kettles in safe place outside of building or, if approved by the DCC Representative, on non-combustible roof. Locate to avoid danger of igniting combustible material below.
 - .3 Maintain continuous supervision while kettles are in operation and provide metal covers for kettles to smother flames in case of fire. Provide fire extinguishers as required in 1.8.
 - .4 Prior to start of work; demonstrate container capacities to the DCC Representative.
 - .5 Use only glass fibre roofing mops.
 - .6 Do not leave used roofing mops unattended on roof. Store mops away from building and combustible materials.
 - .7 Storage of roofing materials shall be no closer than 3.0 m from structures.

1.12 ACCESS FOR FIRE FIGHTING

- .1 Access for firefighting shall be provided in accordance with the National Fire Code of Canada.
- .2 Advise the DCC Representative of work that would impede fire apparatus response. This includes violation of minimum horizontal and overhead clearance, as prescribed by the Base Fire Department, erecting of barricades and digging of trenches.
- .3 Minimum horizontal clearance: clear width of not less than 5m, or as defined by the Base Fire Department.
- .4 Minimum vertical clearance: overhead height of not less than 6m, or as defined by the Base Fire Department.

1.13 SMOKING PRECAUTIONS

- .1 Smoking is prohibited in all buildings. Observe posted smoking restrictions near existing buildings.

1.14 RUBBISH AND WASTE MATERIALS

- .1 Keep rubbish and waste materials at minimum quantities.
- .2 Burning of rubbish is prohibited.
- .3 Remove rubbish from work site at end of work day or shift or as directed.
- .4 Storage:
 - .1 Storage of oily waste shall be in approved receptacles to ensure maximum cleanliness and safety.
 - .2 Deposit greasy or oily rags and materials subject to spontaneous combustion in

- .3 approved receptacles and remove specified.

1.15 FLAMMABLE AND COMBUSTIBLE LIQUIDS

- .1 Handle, store and use of flammable and combustible liquids in accordance with the National Fire Code of Canada.
- .2 Keep flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing Underwriters' Laboratory of Canada or Factory Mutual seal of approval. Obtain written authorization from DCC Representative for storage of quantities of flammable and combustible liquids exceeding 45 litres.
- .3 Do not transfer flammable or combustible liquids inside buildings or on jetties.
- .4 Do not transfer flammable or combustible liquids in vicinity of open flames or any type of heat-producing devices.
- .5 Do not use flammable liquids having flash point below 38 degrees C such as naphtha or gasoline as solvents or cleaning agents.
- .6 Store flammable and combustible waste liquids, for disposal, in approved containers located in safe ventilated area. Keep quantities to a minimum and notify DCC Representative when disposal is required.
- .7 Use secondary containment vessels for all transfer of flammable or combustible materials.
- .8 Report all spills to DCC Representative.

1.16 HOT WORKS

- .1 The Contractor shall implement a hot works program in accordance with the National Fire Code of Canada and NFPA 51 Standard for Fire Prevention during Welding, Cutting and Other Hot Work.
- .2 The Contractor shall obtain from the Base Fire Department a "Hot Work" permit for all hot works in the construction area. Frequency of renewal for hot works permits is at the discretion of the Base Fire Department.
- .3 When Work is carried out in dangerous or hazardous areas involving use of heat, provide fire watchers equipped with sufficient fire extinguishers. Determination of dangerous or hazardous areas along with level of protection necessary for Fire Watch is at discretion of the Base Fire Department.
- .4 Provide fire watch service for work on scale as defined in the Fire Department Briefing. Fire watchers shall be trained in the use of fire extinguishing equipment.
- .5 Area of hot works
 - .1 Hot works shall be carried out in an area free of combustible and flammable content.

- .2 Where 1.16.5.1 is not possible,
 - .1 All flammable and combustible materials within 15m of the hot works shall be protected in accordance with the National Fire Code of Canada;
 - .2 A fire watch shall be provided during the hot work and for a period of not less than 60 minutes unless otherwise directed by the Base Fire Department;
 - .3 A final inspection of the hot work area shall be conducted not less than 4 hours after the completion of hot works unless otherwise directed by the Base Fire Department.
- .3 Where there is a possibility of sparks leaking onto combustible materials in areas adjacent to the areas where the hot work is carried out.
 - .1 Openings in walls, floors or ceilings shall be covered or closed to prevent the passage of sparks to such adjacent areas, or
 - .2 Sentence 1.16.5.2 shall apply for those areas.
- .6 Protection of flammable and combustible materials
 - .1 Any combustible or flammable material, dust or residue shall be:
 - .1 Removed from the area where hot works is carried out; or
 - .2 Protected from ignition by non-combustible materials.
- .7 Fire extinguisher
 - .1 A fire extinguisher shall be provided within 3 m of all hot works. Minimum size shall be 20lbs ABC unless otherwise directed by Base Fire Department.

1.17 CONFINED SPACE

- .1 The Contractor shall implement a confined space program in accordance with the latest versions of COHSR or OSHA, whichever is more stringent.
- .2 The Base Fire Department monitors all confined space occurrences and must be notified prior to entrance and after exit.

1.18 HAZARDOUS SUBSTANCES

- .1 Work entailing use of toxic or hazardous materials, chemicals and/or explosives, or otherwise creating hazard to life, safety or health, shall be in accordance with National Fire Code of Canada.
- .2 Provide ventilation where flammable liquids, such as lacquers or urethanes are used. Eliminate all sources of ignition. Inform the Base Fire Department prior to and at completion of such works.

1.19 PARTIAL OCCUPANCY

- .1 Implement partial occupancy procedures as defined in the drawings and specifications. Partial occupancy is where construction occurs adjacent to work areas occupied by Departmental or Canadian Forces personnel. This includes:
 - .1 Phased renovation or recapitalization of an existing building.

- .2 Where partial occupancy occurs, Contractor shall implement requirements as found in the drawings and specifications. This may include construction of a rated fire separation between occupied and construction areas as required by the National Fire Code.
- .3 Except where a building is provided with a fire alarm system or similar equipment, a watch, with tours at intervals of not more than one hour, shall be provided when a portion of the building is occupied while construction operations are taking place.

1.20 QUESTIONS AND/OR CLARIFICATION

- .1 All questions or requests for clarification on Fire Safety in addition to above requirements shall be directed to the DCC Representative.
- .2 DCC is responsible to obtain clarifications from the Base Fire Department. The Contractor is not to liaise directly with the Base Fire Department for notification, authorization, other than Hot Work Permits, or any requests unless the situation constitutes an immediate emergency.

1.21 FIRE INSPECTION

- .1 All site inspections by the Base Fire Department shall be coordinated through the DCC Representative.
- .2 Allow the Base Fire Department unrestricted access to work site.
- .3 Co-operate with the Base Fire Department during routine fire safety inspection of work site.
- .4 Immediately remedy unsafe fire situations observed by the Base Fire Department.

END OF SECTION

Part 1 General

1.1 REFERENCES

FEDERAL

- .1 Applicable Base/Wing Environmental Administrative Instructions (AI) or Base Standing Orders (BSOs) will be provided to the Contractor after award.
 - .1 Directorate Contaminated Sites (DCS) Contaminated Sites Instruction (CSI.004.001)- Imported Fill. 15 June 2020.
 - .2 DCS CSI (CSI.004.001) - Soil Management. V. 2.0, 20 Jan 2021.
- .2 Canadian Council of Ministers of the Environment (CCME). *Canadian Environmental Quality Guidelines, Canadian Water Quality Guidelines for the Protection of Aquatic Life, Total Particulate Matter*, 2002.
- .3 Canadian Council of Ministers of the Environment. (CCME). *Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products*. PN 1326. 2003.
- .4 *Canadian Environmental Protection Act 1999*. Statutes of Canada 1999 Chapter 33.
 - .1 Federal Halocarbon Regulations, 2022. SOR/2022-110.
 - .2 PCB Regulations. SOR/2008-273.
 - .3 Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations. SOR/2008-197.
- .5 *Canada Labour Code- Canadian Occupational Health and Safety Regulations* (SOR/86-304). 2019.
- .6 *Canada Occupational Health and Safety Regulations* (SOR/86-304). Canada Labour Code.
- .7 *Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems* (the Environment and Climate Change Canada “Refrigeration Code of Practice”). April 2015, Errata 2021.
- .8 *Code of Practice for the Environmental Sound Management of End-of-Life Lamps Containing Mercury*. Environment and Climate Change Canada. 2017.
- .9 *Fisheries Act*. Revised Statutes of Canada 1985, Chapter F-14.
- .10 *Migratory Birds Convention Act, 1994*.
- .11 *Navigation Protection Act*. Revised Statutes of Canada 1985, Chapter N-22.
- .12 *Species at Risk Act*, 2003. Chapter 25-29, no.3.
- .13 *Transportation of Dangerous Goods Act* and pursuant regulations.

PROVINCIAL

- .14 *Ontario Water Resources Act*. Revised Statutes of Ontario 1990, Chapter O.40.
- .15 *Technical Standards and Safety Act, 2000* and pursuant regulations, codes, and standards. Statutes of Ontario 2000, Chapter 16.
- .16 *Environmental Protection Act*. Revised Statutes of Ontario 1990, Chapter E.19.
 - .1 Ontario Regulation 102/94. *Waste Audits and Waste Reduction Work Plans*.
 - .2 Ontario Regulation 103/94. *Industrial, Commercial, and Institutional Source Separation Programs*.
 - .3 Ontario Regulation 153/04. *Records of Site Condition*. Part XV.1 of the Act.
 - .4 Ontario Regulation 347. *General—Waste Management*. Revised Regulations of Ontario 1990
 - .5 Ontario Regulation 362. *Waste Management – PCB's*.
 - .6 Ontario Regulation 406/19. *On-site and Excess Soils*.
 - .7 Ontario Regulation 407/19. *Records of Site Condition*. Part XV.1 of the Act.
 - .8 Ontario Regulation 903. *Wells*.
- .17 *Occupational Health and Safety Act*. Revised Statutes of Ontario 1990, Chapter O.1.
 - .1 Ontario Regulation 490/09. *Designated Substances*.
 - .2 Ontario Regulation 278/05. *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*.
- .18 Ontario Ministry of Labour. 2011. *Lead on Construction Projects*.
- .19 Ontario Ministry of Labour 2011. *Silica on Construction Projects*.
- .20 Ontario Provincial Standard Specifications. Ontario Ministry of Transportation.
 - .1 OPSS 182. General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks.
 - .2 OPSS 518. Construction Specification for Control of Water from Dewatering Operations.
 - .3 OPSS 801. Construction Specification for the Protection of Trees.
 - .4 OPSS 805. Construction Specification for Temporary Erosion and Sediment Control Measures.

1.2 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prior to commencing construction activities submit an Environmental Protection Plan to include the following:
 - .1 Spill Response Plan.
 - .2 Hazardous Materials Abatement and Management Plan.
 - .3 Waste Management and Disposal Plan.
 - .4 Waste Reduction and Source Separation Work Plan.
- .3 Record of Abatement and as-built drawings identifying abatement completed.
- .4 Submit other data, information, and documentation upon request by the DCC Representative and as stipulated elsewhere in this section.

1.3 ADMINISTRATIVE

- .1 Comply with all federal, provincial, and municipal regulatory requirements and guidelines for environmental protection and natural resource conservation, including those, noted above.
- .2 The Work site is subject to inspection by the Base Environment Officer, or designate, and the DCC Representative, without prior notice.
- .3 Failure to comply with environmental requirements may result in a stop work order or assessment of damages commensurate with repair of damage.
- .4 The Contractor will be unable to request extra funding to meet environmental requirements that are within the contract.
- .5 It is the Contractor's responsibility to be aware of environmental requirements and the best management practices and pollution control measures necessary to meet them.
- .6 It is the Contractor's responsibility to obtain and abide by permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.
- .7 Blasting is not permitted on DND property.
- .8 Fires and burning of rubbish are not permitted on DND property.

1.4 VEHICLE REFUELLING

- .1 Refueling of vehicles or machinery is to be conducted above a secondary containment barrier.
- .2 Refueling and maintenance of vehicles and equipment will not be done within 30 m of a surface water drainage feature.

- .3 All onsite vehicles and equipment are to use POL drip mats while stationary for 4 hours or more or when not in use.

1.5 SPILL PREVENTION AND RESONSE PLAN

- .1 A spill or release is an accidental discharge of a pollutant (solid, liquid or gas) into the environment. After a spill or release, always ensure human health and safety is protected above all else.
- .2 Submit to the DCC Representative a project-specific Spill Prevention and Response (SPR) Plan prior to work on-site.
 - .1 The SPR shall include environmental response measures necessary to prevent and to mitigate a pollutant release on National Defence property.
 - .2 The SPR is to include roles and responsibilities, contact information, spill notification procedure, emergency spill response measures, project and site-specific clean up measures for spills, waste disposal, restoration activities, and reporting requirements.
 - .3 Identify storage locations of materials or wastes that may require emergency spill response. Identify spill control kit inventory and location(s).
 - .4 SPR shall identify equipment fueling location, methodology and control measures. Refueling operations shall be conducted within a secondary containment area. Refuel equipment no closer than 30 meters from water bodies.
 - .5 The SPR is to include measures to escalate the response in the event of an emergency that exceeds on-site control capabilities.
- .3 The SPR is to be modified and updated, as necessary. On-going assessments shall be performed during the progress of work identifying and documenting new or potential spill hazards and measures not previously known and identified.
- .4 Prior to starting work, provide to the DCC Representative an inventory of hazardous material to be brought to the site, including volume or mass, and Safety Data Sheets (SDS).
- .5 A Pollution Incident Report shall be completed by the Contractor for all spill or release incidents.

Emergency Response:

- .1 With respect to liquid spills, provide enough on-site equipment to control for one hour a liquid spill of 110% of any material brought on to—or handled at—the site.
 - .1 Requirement applies to sub-Contractors as well as the General Contractor.
- .2 The on-site spill control kit required to include absorbent pads, absorbent granular, nitrile gloves, garbage bags and/or pails with lids, and shovels, and applicable to the chemical used. A spill control kit shall be located wherever significant quantities of materials or wastes that may require emergency spill response are used or stored.
- .3 In the event of a spill, invoke Contractor's SPR Plan and make immediate notifications as per Contractor Environmental Hazard & Spill Response Guide, provided by the DCC Representative.
- .4 In the event of a spill into the natural environment, do everything practicable to prevent, eliminate, and ameliorate adverse effects, and to restore the natural environment.
- .5 Emergency response planning is to include measures to escalate the response in the event of an emergency that exceeds on-site equipment capabilities.
- .6 Display an information placard on all such material and equipment containing liquid products that will be located overnight or longer on DND property.
 - .1 Information placards to include Contractor's name and address, contact person, emergency telephone numbers, and liquid contents.
 - .2 Post the information placard either on the exterior of the container, or on the dashboard of the vehicle, where applicable.

1.6 HALOCARBON MANAGEMENT

- .1 Halocarbons are ozone-depleting substances that are used as refrigerants, solvents and for fire suppression.
- .2 Comply with the:
 - .1 Federal Halocarbon Regulations (FHR), 2022. SOR/2022-110.
 - .2 *Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems* (the Environment and Climate Change Canada "Refrigeration Code of Practice"). April 2015.
- .3 Installation, servicing, operation must be completed by a certified person as defined in the FHR 2022.
 - .1 Provide copies of all technicians' certificates to the DCC Representative.
- .4 For the purpose of this contract, the Responsible Person as defined in the FHR 2022 shall be the Contractor.
- .5 The following are the only halocarbons that are acceptable as refrigerants (non-halocarbon refrigerants are also acceptable):
 - .1 HFC 448A

- .6 Document **all** work—installation, maintenance, decommissioning, leak testing on refrigeration and air conditioning systems using ANNEX A3-7: REFRIGERATION AND AIR CONDITIONING SERVICE LOG. Mount white copy of form on equipment, supply Yellow & Pink copies to DCC Representative and retain Orange copy for records. Obtain forms from DCC Representative.
- .7 Immediately report all releases of halocarbons to the DCC Representative.
 - .1 Complete ANNEX B7-1: Halocarbon/Halon Release Report and provide to DCC Representative within 24 hours.
- .8 Leak-test all halocarbon-containing equipment within 24 hours of arrival at the Base, in accordance with the FHR 2022 and the *Refrigeration Code of Practice*.
- .9 Leak-test all nitrogen-charged or “empty” equipment within 24 hours of arrival at the Base, in accordance with the FHR 2022 and the *Refrigeration Code of Practice*.
- .10 Leak-test halocarbon-containing equipment during Commissioning in accordance with the FHR 2022 and the *Refrigeration Code of Practice*.
- .11 After installation, leak-test factory-charged halocarbon-containing equipment in accordance with the FHR 2022 and the *Refrigeration Code of Practice*.
- .12 Comply with the following timelines for service activity log completions,
 - .1 Factory charged units containing more than 10 kg of halocarbon shall be leak tested within 2 (two) working days of delivery to site.
 - .2 Commissioning of units requires forms to be submitted to DCC Representative within 48 hours of service.
 - .3 Leak Test with “no leaks,” submit forms to DCC Representative within 48 hours of service.
 - .4 Leak Test with “leak detected,” submit forms to DCC Representative within 24 hours of service.
 - .5 Leak repaired and isolation or emptying of system, submit forms to DCC Representative within 5 days of service.
 - .6 Release of halocarbons >10 kg and <100 kg, submit forms to DCC Representative within 24 hours of service.
 - .7 Release or potential release of halocarbons > 100 kg, submit forms to DCC Representative immediately.
 - .8 Decommissioning of units requires forms to be submitted to DCC Representative within 48 hours of service.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Submit a Waste Management and Disposal (WMD) Plan to the DCC Representative before construction work begins at the site.
- .2 The WMD Plan is to encompass:
 - .1 Regular waste.
 - .2 Construction waste.
 - .3 Hazardous materials used in the course of the work.

- .4 Hazardous materials and designated substance waste.
- .3 The Plan is to comply with legislation, best practices, and with the requirements of the specifications.
- .4 Provide evidence in the WMD Plan that all proposed temporary storage procedures, transport methods, and disposal sites are licensed where applicable.
 - .1 Include copies of licenses.
- .5 The WMD Plan is to include handling, storage, transportation, disposal, and emergency response. Specific minimum requirements to be addressed are listed below.

Handling:

- .6 Ensure that staff are properly trained and equipped, in accordance with regulatory requirements.
- .7 Minimize handling and exposure to hazardous materials. Use control measures such as PPE and best practice procedures to address potential risks.
- .8 All waste products will be placed in suitable containers and labeled clearly.
- .9 Waste products are to be segregated by commodity and placed in separate containers based on class.
- .10 Similar waste products are not to be mixed together without prior approval from the DCC Representative.

Storage:

- .1 Identify location(s) on site where wastes and hazardous materials wastes will be stored.
- .2 Store all petroleum, oil, lubricants, and other hazardous materials within secondary containment, or in an appropriate metal clad storage building with containment.
- .3 Store incompatible materials separated to prevent reaction.
- .4 Access to hazardous waste storage areas must be controlled through appropriate physical barriers and limited to authorized personnel.
- .5 Site is to be kept neat and orderly at all times.

Transportation:

- .1 Transportation of hazardous material must be in accordance with the *Transportation of Dangerous Goods Act*, by a licensed hauler, and in approved containers.
- .2 Hazardous Materials Waste shall not be released from a work site to a carrier that is not registered as a carrier for the specific Hazardous Materials Waste, nor shall it be released for delivery to a consignee that is not registered as a receiver for the specific Hazardous Materials Waste.

Disposal:

- .1 Identify the proposed waste receiver facilities and the anticipated waste shipment frequency for all wastes.
- .2 Contractor is required to have painted waste sampled and analyzed for toxicity characteristic leaching procedure (TCLP) metals analysis in accordance with O. Reg. 347.
 - .1 Sample(s) are to be taken by a Qualified Person (QP) (as defined in O. Reg. 153).
 - .2 Results are to be provided to DCC Representative for review prior to disposal off-site.
- .3 Disposal of leachate toxic lead-based paint as hazardous materials must comply with legislation on transport and disposal.
- .4 Dispose of all materials that are removed as asbestos-containing materials as asbestos waste.

Transport and Disposal of Hazardous Waste and Designated Substances:

- .1 Provide DCC Representative written notification of intent to transport of hazardous materials or designated substances off site, including but not limited to hazardous and liquid industrial waste (i.e. oils, solvents, waste fuels, used spill clean-up materials) or designated substance waste (i.e. asbestos, leachate toxic lead paint, mercury vapour in fluorescent light tubes).
- .2 For shipments that require a waste generator number pursuant to O. Reg. 347, the Base waste generator number is required prior to removal offsite and will be provided by the DCC Representative.
- .3 Submit the following to the DCC Representative for review 5 days prior to transport:
 - .1 Description and approximate quantity of waste material, including substrate if applicable.
 - .2 Waste carriers' business name, address, contact information, and Ministry of Environment, Conservation and Parks (MECP) Certificate of Approval(s) listing the hazardous materials approved for transport.
 - .3 Contractor proposed date and time for hazardous waste material shipment.

- .4 Hazardous waste receivers name, address, contact information, and MECP Certificate of Approval(s) listing the hazardous materials approved for their receiving site.
- .5 Correspondence from the approved hazardous waste receiver, indicating agreement and intent to accept the specified hazardous materials waste on specified date.
- .6 Contractor will complete a "Certificate of Content for Waste Disposal" provided in this specification.
- .4 Coordinate with the DCC Representative so that the Base Hazardous Materials Officer or designate is present at the time of shipment to review, sign and document hazardous waste transport from the Base.
- .5 Submit the following to the DCC Representative for review within 48 hours following transport from the Base:
 - .1 Landfill weigh scale receipt/ticket for the disposal of waste.

Disposal of Mechanical Flushing Liquids:

- .1 Mechanical flushing liquids and mechanical liquids include any mechanical systems (piping, units, etc.) such as HVAC, glycol and includes residual liquid in current systems, cleaning with chemical inhibitors or cleaners, and flushing of new piping.
- .2 Mechanical flushing liquids are to be assumed for bidding purposes to be hazardous waste and shall be transported and disposed of at a licensed facility in accordance with O. Reg. 347, and as described in this specification for Shipment and Disposal of Hazardous Waste and Designated Substances.
- .3 In the event the contractor wants to discharge to a sanitary sewer the contractor must undertake the following items:
 - .1 Provide DCC Representative written notification of intent to discharge mechanical flushing liquids to sanitary sewer.
 - .2 Submit a sample of the liquid for laboratory analysis of all parameters in THE CORPORATION OF THE TOWNSHIP OF ESSA Sewer Bylaw including pH to a licensed laboratory.
 - .3 Submit a report to DCC Representative confirming that all materials proposed to be disposed to sewers comply with all legislative requirements, including THE CORPORATION OF THE TOWNSHIP OF ESSA Sewer Use Bylaw.
 - .4 Coordinate with the DCC Representative to involve the Hazardous Materials Officer to authorize results from testing and sanitary discharge. Allow a minimum of 48 hours for review and authorization.
 - .5 Mechanical flushing liquids and mechanical liquids that are not authorized to be discharged to sanitary sewer shall be transported and disposed of at a licensed facility in accordance with O. Reg. 347, and as described in this specification for Shipment and Disposal of Hazardous Waste and Designated Substances.

Special Wastes:

.1 Smoke Detectors

- .1 Undamaged and intact commercial Canadian Standards Association (CSA) and Underwriters Laboratories (UL) approved smoke detectors containing less than 185 kilo-Becquerel's of Americium-241 may be disposed of using local waste collection systems.
- .2 Photoelectric smoke detectors are not subject to this special procedure.
- .3 Ionization chamber smoke detectors (ICSDs) contain radioactive sources and are subject to this special procedure.
- .4 If surplus ICSDs are not to be re-used, remove the ICSDs from walls, ceilings, etc., without breakage, and dispose of ICSDs at an approved landfill.

.2 Polychlorinated Biphenyls (PCBs):

- .1 Before beginning work, submit written procedures to DCC Representative for review. Do not begin work on PCB ballasts material until DCC has reviewed the written procedures.
- .2 Fluorescent light ballasts considered to contain polychlorinated biphenyls (PCBs) are to be packaged and disposed of at a PCB storage facility off Base.
- .3 Label containers with black and white serialized, "ATTENTION PCB" labels, in accordance with Environment and Climate Change Canada Manual for Spills of Hazardous Materials.
- .6 Do not bury rubbish or waste materials on DND Property.
- .7 Do not dispose of waste into any waterways, storm or sanitary sewers, drainage system, or onto land.
- .8 Divert unused asphalt material from landfill to be reused offsite or recycled.
- .9 All solid and liquid hazardous waste material generated by work are to be taken off Base and disposed of in a lawful manner and at appropriately accredited facilities.
- .10 All expenses incurred for the handling, storage, analysis, transport, and disposal/recycling of all wastes will be incurred by the Contractor.

1.8 WASTE REDUCTION AND SOURCE SEPRATION WORK PLAN

- .1 In accordance with Ontario Regulation 103/94 “*Industrial, Commercial, and Institutional Source Separation Programs*”, before work begins at the site, implement a “Source Separation Program” covering the waste that will be generated in the construction project. Include in the program not less than: brick and Portland cement concrete; cardboard (corrugated); drywall (unpainted); steel; wood (not including painted or treated wood or laminated wood).

1.9 SITE CLEARING AND PLANT PROTECTION

- .1 Protect trees and plants on site and adjacent properties as indicated.
- .2 Trees to be protected must have secure enclosures surrounding trees located a minimum of 1.5 metres from the trunk. Comply with standards in OPSS 801 “*Construction Specification for the Protection of Trees*”.
- .3 Protect roots of designated trees to dripline to prevent disturbance or damage. Avoid unnecessary traffic, dumping and storage of materials over root zones.
- .4 Root pruning may be required when working in close proximity to a tree’s drip line. Clean saw cuts are required for all root pruning.
 - .1 Contractor must identify to the DCC Representative prior to excavations where the limit of root cut will be for potentially impacted trees.
 - .2 If it is determined root pruning is required, work shall be carried out in the presence of the DCC Representative.
 - .3 Once the limit of the root cut has been defined, the Contractor shall not under any circumstances cut the tree roots a second time without the prior approval of the DCC Representative.
- .5 Do not use tree protection areas for storage, stockpiling or any other purpose. Do not dump or flush any contaminants in areas of tree feeder roots.
- .6 Obtain DCC Representative’s approval where it is necessary to encroach onto protected area, prior to proceeding.
- .7 Do not attach rigging cables to trees.
- .8 Woody vegetation less than 10 cm Diameter at Breast Height (DBH) are to be mulched or chipped and distributed onsite with material not to exceed piles of 0.5 metres in height above ground level.
- .9 Trees removed that are greater than 10 cm DBH must be cut into 1.5 m lengths and be disposed of in the nearby forest on DND property to serve as habitat. Cut tree trunk material is not to exceed piles of 0.5 metres in height above ground level.
- .10 Trees labeled in blue paint or numbered are not to be cut down or removed. If encountered, the Contractor is to stop work and notify the DCC Representative immediately.

1.10 WILDLIFE PROTECTION

- .1 Nesting structures in trees for birds of prey are to remain intact without harm to the tree or the nest.
 - .1 If these features are encountered the Contractor is to stop work and notify the DCC Representative immediately for direction on how to proceed.
 - .2 Depending on the nest and bird species, setbacks for disturbance zones maybe defined.
- .2 The Contractor will comply with the *Migratory Birds Convention Act*, 1994.
- .3 Prior to work commencing, conduct ground surveys to ensure that wildlife are not nesting/denning on or immediately adjacent to the project site.
 - .1 Where found, immediately notify the DCC Representative.
 - .2 Maintain a minimum setback distance of 3 m from wildlife burrows/dens and maintain markers indicating wildlife burrows/dens.

1.11 POLLUTION PREVENTION - WATER

- .1 Protection of Storm Drains
 - .1 Protect storm drains within work site and within roadway that borders work site (which may be outside of work site) against entry by sediment, debris, oil, or chemicals prior to any work on-site and maintain until completion of work.
 - .2 Discharge of sediment-laden water to storm sewer is not permitted.
 - .3 Catch basins and catch basin manholes within work site and within roadway that borders work site (which may be outside of work site) to have a double layer of geotextile placed under lids to prevent sedimentation of storm sewer system. The geotextile shall be maintained until the completion of work.
 - .4 Ditch inlets to be protected by flow check dam immediately upstream of ditch inlet until all areas draining into the ditch inlet have been permanently stabilized.
- .2 Protection of Drinking Water
 - .1 In the event of a water main break, leak or disruption, Contractor is to stop work and notify the DCC Representative immediately.
 - .2 Water mains are to be disinfected with a 12% solution of sodium hypochlorite specific for drinking water supplies.
 - .3 Coordinate with DCC Representative to have the Department of National Defence's water authority; Water, Fuel and Environment (WFE) witness the connection, disinfection and flushing procedures as well as collect residual chlorine and bacteria samples.
 - .4 Repeat disinfection procedure of water main as required in order to achieve acceptable test results.

.3 Protection of Groundwater Monitoring Wells

- .1 Protect any and all existing groundwater monitoring wells at the site.
- .2 The Contractor is responsible to repair any damage to existing monitoring wells. Work to be completed in compliance with Ontario Regulation 903.
- .3 The DCC Representative will, upon request, show the Contractor the location of all known monitoring wells.

.4 Protection of Waterbodies

- .1 Do not operate construction equipment in waterways.
- .2 Do not use waterway beds for borrow material.
- .3 Do not dump excavated fill, waste material or debris in waterways.
- .4 Chlorinated drinking water is considered a deleterious substance by Environment and Climate Change Canada (ECCC).
- .5 Contractor is to ensure that hydrant discharge does not enter or is likely to enter fish habitat by direct or indirect discharge with measurable levels of free reactive chlorine (CCME).
- .6 Discharging to land is permitted subject to the use of matting to prevent loss of soil or vegetation ensuring that items above are complied with.
- .7 Comply with requirements of OPSS 182 "General Specification for Environmental Protection for Construction in Waterbodies and on Waterbody Banks". A written strategy is required by paragraph 182.04 to be submitted to the DCC Representative before commencing work on site. Disregard references to OPSF 182-1.

1.12 POLLUTION PREVENTION - LAND

- .1 Take all measures necessary to prevent dust and mud tracking on adjacent roads and streets.
 - .1 Use mechanical sweepers as often as necessary to keep adjacent roads and streets clean of dust and mud that is deposited from this project.
- .2 Spray water to minimize the release of dust from paved areas or exposed soils.
 - .1 Chemical dust suppressants to be used only as approved by the DCC Representative.
- .3 Maintain temporary erosion and pollution control features installed under this Contract, and those in place pre-dating the Contract.
- .4 If materials are to be transported between sites, prevent any loss of material during transit.
- .5 Cover or wet down dry materials or rubbish to prevent blowing dust and debris.
 - .1 Cover or otherwise contain loose materials that have potential to release airborne particulates during their transport, installation, or removal.

- .2 Stabilize soil and other material storage piles against wind erosion.
- .3 Minimize vehicle traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material.
- .4 Avoid excavation, or other construction activity with potential to release airborne particulates, during windy and prolonged dry periods.
- .5 Restore disturbed areas as soon as possible to minimize the duration of soil exposure.
- .6 Lawn care pesticides are prohibited.
- .7 Secure covers on waste bins and dumpsters at the end of each working day so as to prevent unauthorized use.
- .8 Secure covers on waste bins and dumpsters so as to shed rain.

1.13 POLLUTION PREVENTION - AIR

- .1 Prevent material from sandblasting, saw-cutting, and other operations from contaminating air beyond application area, by providing temporary enclosures.
- .2 Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers.
- .3 Comply with operating specifications for heavy equipment and machinery.
- .4 Minimize the operation and idling of vehicles and avoid operating and idling vehicles and gas-powered equipment during smog advisories.
- .5 Control emissions from equipment and plant to conform with federal, provincial, and municipal requirements.
- .6 Products and Materials:
 - .1 Use products and materials that are as free as possible of noxious or toxic volatile emissions or emissions of irritating or toxic particles, so that the interior air of the completed building is as pollution-free as possible. For example, products emitting benzene, mercury, lead, or other known toxic compounds are not acceptable.
 - .2 Where odourless products are not available, choose products where possible so that odours are minimized. Set ventilation levels during the construction period sufficiently high to encourage the off-gassing of materials to their minimum levels prior to occupancy of the building, where possible.
 - .3 Choose products for installation within the air-handling and distribution systems to minimize the introduction of pollutants into the fresh air supply to the building.
 - .4 Remove oily rags and other combustible debris from Site daily. Take every precaution necessary to prevent spontaneous combustion.

1.14 ARCHAEOLOGY

- .1 Refer to General Condition GC 6.3
- .2 Artifacts can include broken housewares, garbage, bits of uniforms, ships or boats, timber, ammunition, building materials, building foundations, cut stone, stone drains, animal bones, human bones, coins or tokens, ash pits, fire pits, encampments, Aboriginal materials, pottery, etc.
- .3 During excavations, watch for the following: patterns; off-colour soils (either light or dark); any sorts of the artifacts noted above.
- .4 Excavations must coincide with the archaeology field period, from April until November.
- .5 Upon discovery of artifacts, stop work in that area and notify the DCC Representative.
- .6 An archaeologist licensed in Ontario will monitor all excavation work or disturbance of the existing ground.
 - .1 Coordinate through the DCC Representative for monitoring of excavations by the archaeologist.
 - .2 A minimum 48 hours notice is required for any excavation in which archaeological monitoring has been stipulated.
- .7 Expect interruptions of excavation work by the archaeologist of up to 2 hours per day. Interruptions for longer periods will be negotiated between the General Contractor and the DCC Representative, in accordance with the General Conditions of the contract.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures.

1.3 REFERENCES TO REGULATORY REQUIREMENTS

- .1 Perform Work in accordance with National Building Code of Canada (NBC) 2015 including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
 - .1 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.4 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions and municipal by-laws.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
 - .1 Regulatory requirements and fees in force on date of Bid submission, and
 - .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

Part 2 Products

2.1 NOT USED

- .1 Not Used.

2.2 EASEMENTS AND NOTICES

- .1 Owner will obtain permanent easements and rights of servitude that may be required for performance of Work.
- .2 Contractor shall give notices required by regulatory requirements.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 91 00 - Commissioning

1.2 DEFINITIONS

- .1 **Quality Control (QC):** QC refers to the actual monitoring of specific project results to determine if they comply with relevant quality standards. There are a number of deliverables associated with the QC sub-system, most of these are generally already used on typical construction projects. The deliverables include, shop drawing reviews, on-site inspections and tests and related reports, site meeting minutes etc.
- .2 **Quality Assurance (QA):** QA refers to the documented intent outlining the activities that are implemented in the QCP to provide confidence that the project will satisfy the relevant quality standards and specifications.
- .3 **Quality Control Plan:** The Quality Control Plan (QCP) consists of the organizational structure and the inherent responsibilities, procedures, processes and resources needed to implement quality control management of the building process. In addition, and for the purpose of this project, "Commissioning" will be considered an integral element of the quality management system.
 - .1 The Contractor shall establish and maintain a documented QCP to ensure that the specified quality standards for the project are achieved, in compliance with the terms and conditions of the contract.
 - .2 Under the terms of the Contract, the Contractor is responsible for the delivery of a facility that meets the standards of quality demanded by the specification as it applies to the materials, workmanship, and completed results. The purpose of the QCP is to assist in the fulfillment of this obligation and to provide to the DCC Representative a means to confirm the specified level of quality will be achieved.

1.3 INSPECTION

- .1 The Contractor must allow the DCC Representative access to Work site. 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 DCC 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 DCC Representative may order any part of Work to be examined if Work is suspected to be not in accordance with Contract Documents. If, upon examination such work is found not in accordance with Contract Documents, correct such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, DCC Representative shall pay cost of examination and replacement.

1.4 INDEPENDENT INSPECTION AGENCIES

- .1 The contractor to furnish and pay for independent inspection/testing agency, equipment, facilities, and labour to provide Quality Control (QC) testing in accordance with the contractor's quality control plan.
- .2 DCC Representative will appoint and pay for independent inspection/testing agency, equipment, facilities, and labour to provide Quality Assurance (QA) testing.
- .3 Provide equipment required for executing inspection and testing by appointed agencies.
- .4 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .5 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 DCC Representative at no cost to DCC Representative. Pay costs for retesting and re-inspection.

1.5 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.

1.6 PROCEDURES

- .1 Notify appropriate agency and DCC Representative in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.7 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 DCC 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 DCC Representative it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner may deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by DCC Representative.

1.8 REPORTS

- .1 Submit electronic pdf format inspection and test reports to DCC Representative.
- .2 Provide copies to Subcontractor of work being inspected or tested or manufacturer or fabricator of material being inspected or tested.

1.9 CONTRACTOR RESPONSIBILITIES

- .1 Contractor is responsible for the execution of the Construction Quality Plan. Contractor is to pay all costs for the execution of the Construction Quality Plan. Contractor shall designate an experienced site representative for carrying out the Construction Quality Plan.

1.10 TESTS AND MIX DESIGNS

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

1.11 MILL TESTS

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

1.12 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to Section 01 78 00 - Closeout Submittals for definitive requirements.

Part 2 (Not Used)

Part 3 (Not Used)

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Temporary utilities.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.4 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.

1.5 WATER SUPPLY

- .1 DCC Representative will provide continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 DCC Representative will pay for utility charges at prevailing rates, based on General Conditions of Contract.

1.6 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be flameless (vent free) type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10 degrees Celsius in areas where construction is in progress.
- .5 Ventilating:

- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Ventilate temporary sanitary facilities.
- .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Permanent heating system of building, may not be used when available, unless there are savings to the contract price and DCC Representative's written permission is obtained stating conditions of use, provisions relating to guarantees on equipment and operation and maintenance of system. Be responsible for damage to heating system if use is permitted.
- .7 On completion of Work for which permanent heating system is used, replace filters.
- .8 Ensure Date of Substantial Performance and Warranties for heating system do not start until entire system is in as near original condition as possible and is certified by DCC Representative.
- .9 Pay costs for maintaining temporary heat, when using permanent heating system. DCC Representative will pay utility charges when temporary heat source is the existing building equipment.
- .10 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .11 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.7 TEMPORARY POWER AND LIGHT

- .1 DCC Representative will pay for temporary power during construction for temporary lighting and operating of power tools, to a maximum supply of 230 volts 30 amps.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Temporary power for electric cranes and other equipment requiring in excess of above is responsibility of Contractor based on General Conditions of Contract.
- .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.

- .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of DCC Representative provided that guarantees are not affected.

- .1 Repair damage to electrical system caused by use under this Contract.

- .2 Replace lamps which have been used for more than 3 months.

1.8 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary fax, data, and telephone hookup, lines and equipment necessary for own use and use of DCC Representative.

1.9 FIRE PROTECTION

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

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Construction aids.
- .2 Office and sheds.
- .3 Parking.
- .4 Project identification.

1.2 INSTALLATION AND REMOVAL

- .1 Provide construction facilities in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.3 SCAFFOLDING

- .1 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms and temporary stairs.

1.4 HOISTING

- .1 Provide, operate and maintain hoists and cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for use thereof.
- .2 Hoists and cranes shall be operated by qualified operator.

1.5 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 a weight or force that will endanger the Work.

1.6 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.
- .3 Build and maintain temporary roads where indicated or directed by DCC Representative and provide snow removal during period of Work.
- .4 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.7 OFFICES

- .1 If required by DCC Representative, provide office heated to 22 °C, lighted 750 lx and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.
- .2 Provide a clearly marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors may provide their own offices as necessary. Direct location of these offices.

1.8 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in a clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in a manner to cause least interference with work activities.

1.9 SANITARY FACILITIES

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

1.10 CONSTRUCTION SIGNAGE

- .1 Direct requests for approval to erect a Contractor signboard to DCC Representative.
- .2 Signs and notices for safety and instruction shall be in both official languages.
- .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 DCC Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Barriers.
- .2 Environmental Controls.
- .3 Traffic Controls.
- .4 Fire Routes.

1.2 INSTALLATION AND REMOVAL

- .1 Provide temporary controls in order to execute Work expeditiously.
- .2 Remove from site all such work after use.

1.3 HOARDING

- .1 Erect temporary site enclosure using Standard Leasable Temporary chain link fencing 2m x 3m (6'x10') sections. Provide one lockable truck gate. Maintain fence in good repair.
- .2 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.4 GUARD RAILS AND BARRICADES

- .1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.
- .2 Contractor to provide lockable tower stair to roof – access to roof through A-253 is not permissible.
- .3 Provide as required by governing authorities.

1.5 WEATHER ENCLOSURES

- .1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs.
- .2 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.
- .3 Design enclosures to withstand wind pressure and snow loading.

1.6 DUST TIGHT SCREENS

- .1 Provide dust tight screens or partitions to localize dust generating activities, and for protection of workers, finished areas of Work and public.
- .2 Maintain and relocate protection until such work is complete.

1.7 ACCESS TO SITE

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

1.8 PUBLIC TRAFFIC FLOW

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

1.9 FIRE ROUTES

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

1.10 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

- .1 Protect surrounding private and public property from damage during performance of Work.
- .2 Be responsible for damage incurred.

1.11 PROTECTION OF BUILDING FINISHES

- .1 Provide protection for finished and partially finished building finishes and equipment during performance of Work.
- .2 Provide necessary screens, covers, and hoardings.
- .3 Confirm with DCC Representative, locations and installation schedule 5 days prior to installation.
- .4 Be responsible for damage incurred due to lack of or improper protection.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Product quality, availability, storage, handling, protection, and transportation.
- .2 Manufacturer's instructions.
- .3 Quality of Work, coordination and fastenings.
- .4 Existing facilities.

1.2 QUALITY

- .1 Products, materials, equipment and articles (referred to as products throughout specifications) incorporated in Work shall be new, not damaged or defective, and of best quality (compatible with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .3 Should any dispute arise as to quality or fitness of products, decision rests strictly with DCC Representative based upon requirements of Contract Documents.
- .4 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .5 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

- .1 Review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify DCC Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify DCC Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, DCC Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.4 STORAGE, HANDLING AND PROTECTION

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

- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- .6 Store sheet materials and lumber on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of DCC Representative.
- .9 Touch-up damaged factory finished surfaces to DCC Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by DCC Representative. Contractor shall be responsible for the unloading, handling and storage of such products.

1.6 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 DCC Representative in writing, of conflicts between specifications and manufacturer's instructions, so that DCC Representative may establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes DCC Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 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 DCC 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. DCC Representative reserves the 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 DCC Representative, whose decision is final.

1.8 CO-ORDINATION

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

1.9 CONCEALMENT

- .1 In finished areas, conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation, inform DCC Representative if there is interference. Install as directed by DCC Representative.

1.10 REMEDIAL WORK

- .1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Coordinate 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.

1.11 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform DCC Representative of conflicting installation. Install as directed.

1.12 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.

1.13 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.

1.14 PROTECTION OF WORK IN PROGRESS

- .1 Adequately protect Work completed or in progress. Work damaged or defaced due to failure in providing such protection is to be removed and replaced, or repaired, as directed by DCC Representative, at no increase in Contract Price or Contract Time.
- .2 Prevent overloading of any part of building. Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated without written approval of DCC Representative.

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

END OF SECTION

Part 1 General

1.1 SUBMITTALS

- .1 Submit to DCC Representative copies of the following documents, including updates issued:
 - .1 Site-specific Health and Safety Plan prior to commencement of work on the work site.
 - .2 Fire Safety Plan.
 - .3 Reports or directions issued by authorities having jurisdiction, immediately upon issuance from that authority.
 - .4 Accident or Incident Reports, within 24 hrs of occurrence.
- .2 Submit other data, information and documentation upon request by the DCC Representative as stipulated elsewhere in this section.

1.2 COMPLIANCE REQUIREMENTS

- .1 Comply with the latest edition of the Ontario Occupational Health and Safety Act, and the Regulations made pursuant to the Act.
- .2 As a minimum, comply with the Canada Labour Code Part II Part 125(1)(l) and 125(1)(w), and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
- .3 A copy of the Canada Labour Code Part II may be obtained by contacting:
 - .1 A condensed version can be viewed on-line at <http://laws.justice.gc.ca/en/index.html>
- .4 Observe and enforce construction safety measures required by:
 - .1 National Building Code of Canada (latest edition).
 - .2 Workplace Safety and Insurance Board of Ontario (WSIB).
- .5 In event of conflict between any provisions of above authorities the most stringent provision shall apply. Should a dispute arise in determining the most stringent requirement, the DCC Representative shall advise on the course of action to be followed. In the case of direct conflict between the federal and provincial/territorial regulatory Health and Safety instruments noted above in paragraphs 1.2.1 and 1.2.2, the Canada Labour Code shall be the default regulatory instrument.
- .6 Provide and maintain Workplace Safety and Insurance Board of Ontario (WSIB) coverage for all employees for the duration of the contract. Prior to commencement of the work, at the time of Interim Completion and prior to final payment, provide to the DCC Representative a certificate of Clearance from the Workplace Safety and Insurance Board of Ontario (WSIB) indicating that the Contractor's account is in good standing.

1.3 RESPONSIBILITY

- .1 In accordance with the Canada Labour Code Part II, the obligations and responsibilities for safety reside with the Department of National Defence. The DCC Representative on behalf of the Department of National Defence will monitor safety on the Work Site in accordance with the Canada Labour Code Part II and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code.
- .2 Carry out work placing emphasis on health and safety of the public, building employees, site personnel and protection of the environment.
- .3 The Contractor is responsible to enforce compliance by its employees and sub-contractors accessing the Work Site with safety requirements of Contract Documents, and all applicable federal, provincial, local statutes, regulations, and ordinances.
- .4 The Contractor is responsible to manage safety of the work site to ensure that any persons, including but not limited to, building employees and the general public circulating adjacent to the work operations are protected against harm due to the extent that they may be affected by conduct of the work.
- .5 Contractors are required under the Canada Labour Code Part II to conduct site specific occupational health and safety meetings. For the purpose of this contract, the Contractor is responsible to establish and conduct site specific occupational health and safety meetings on a weekly basis.
- .6 The Contractor is responsible to record and post minutes of all site specific occupational health and safety meetings in plain view on the work site. Make copies available to DCC Representative upon request.
- .7 The Contractor is responsible to designate a competent person or persons to be present on site at all times during the work as the site health and safety representative. The designated person(s) shall be required to conduct regularly scheduled safety inspections of the work site as follows:
 - .1 Informal inspections on a minimum bi-weekly basis noting deficiencies and remedial actions taken in a log book or diary. Make the log book and/or diary available for the DCC Representative's viewing as requested.
 - .2 Formal inspections on a minimum weekly basis and is to provide a written report to the DCC Representative for each formal inspection, document deficiencies, remedial action needed and assign responsibility for rectification to the appropriate party.
- .8 The Contractor is responsible to ensure Contractor employees and sub-contractors accessing the work site are in possession of and wear appropriate personnel protective equipment (PPE).
- .9 Should an unforeseen or peculiar safety related hazard or condition become evident during performance of work, the Contractor is responsible to immediately take measures to rectify the situation and prevent damage or harm and to advise the DCC Representative verbally and in writing of the hazard or condition.
- .10 Daily or weekly field level hazard assessment shall be completed by the Contractor and communicated to all employees and occupant representative with the intent to identify known and potential hazards associated with current and future work tasks. The

Contractor shall establish and implement control measures for known and potential hazards that have been identified.

1.4 SITE CONTROL AND ACCESS

- .1 The Contractor shall be responsible after consultation with the DCC Representative to control all work site access points and work site activities.
- .2 Delineation and isolation of the work site from adjacent and surrounding areas is not possible as the facility and infrastructure must remain fully operational and fully occupied and utilized by the Department of National Defence throughout the duration of the work of this contract. Refer to section 01 11 00 Summary of Work for further details on control of work site, working with occupants in the building and Fire Safety Plan submission requirements.
- .3 On behalf of the Department of National Defence, Defence Construction Canada will be performing a safety monitoring function as required by the Canada Labour Code in order to verify that the Contractor is fulfilling all of the required responsibilities and duties as identified above. This monitoring function will be performed throughout the duration of the contract.
- .4 Erect signage at access points and at other strategic locations around the work site clearly identifying the work site area(s) as being “off-limits” to non-authorized persons. Signage must be professionally made with well understood graphic symbols and is not to be used as advertising but for the specific use as related to site safety and key contact information.

1.5 FILING OF NOTICE

- .1 File Notice of Project and any other required Notices with the Provincial/Territorial Authorities prior to commencement of the work. Provide the DCC Representative with a copy of the filed Notice(s) prior to commencement of the work.

1.6 PERMITS

- .1 Obtain permits, licenses and compliance certificates at appropriate times and frequencies as required by the authorities having jurisdiction.
- .2 Post all permits, licenses and compliance certificates on work site and provide copies to the DCC Representative.
- .3 Acquire a Hot Work Permit from Base Fire Hall prior to commencing any cutting, welding, hot roofing or similar work.
- .4 Request a digging permit from DCC Representative and complete contractor’s portion of permit. Return to DCC Representative for DND signatures, allow 5 working days for DND signatures. Permit must be completed and Authorized by DND prior to commencing any excavation work.
- .5 Acquire a Road Closure Permit from DND prior to commencing any Road Closures or similar work.
- .6 Acquire a Fire Alarm Impairment Permit from DND prior to commencing any work which will affect the Fire alarm system.

1.7 PROJECT/SITE CONDITIONS

- .1 The following are the known hazardous substances and/or hazardous conditions at the work site which shall be considered as health or environmental hazards and shall be properly managed should they be encountered as part of the work:
 - .1 Silica, Asbestos, Lead, Mercury, and Mould
 - .2 Due to the function of this building (welding school), hazardous materials are used in the daily work of the building occupant. Prior to starting work, the Contractor shall meet with the building occupant to become familiar with these materials.
 - .3 Reports identifying the known hazardous substances are available for viewing from the DCC Representative.
 - .4 Contractors are required to be aware of the known hazardous substances and/or hazardous conditions and are to include in their tender price all work associated in working with, in and around the hazards.
- .2 Obtain from the DCC Representative, a copy of the MSDS data sheets of the existing hazardous materials stored on site or being used by facility personnel in the course of their operations.
- .3 The above lists shall not be construed as being complete and inclusive of all safety and health hazards encountered as a result of Contractor's operations during the course of work. Include above items into the hazard assessment program specified herein.

1.8 MEETINGS

- .1 Prior to commencement of work attend a pre-commencement meeting conducted by the DCC Representative. Ensure minimum attendance by the Contractor's site superintendent. The DCC Representative will arrange to have the Contractor's site superintendent and designated site health and safety representative briefed on the specific content of the Base Health and Safety Program where it requires more stringent requirements than stipulated in the Canada Labour Code Part II and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code. DCC Representative will advise of time, date and location of the meeting and will be responsible for recording and distributing the minutes.
- .2 The Contractor is responsible to conduct safety meetings as required by paragraph 1.3 above.

1.9 HEALTH AND SAFETY PROGRAM

- .1 The Canada Labour Code Part II and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code provides the Contractor with the overall program of health and safety for operations on the Base. For the purpose of this contract, the Contractor shall perform a hazard assessment of the work site in order to acknowledge, assess and address the hazardous substances and/or hazardous conditions known and identified in paragraph 1.7, and to develop a written site-specific Health and Safety Plan as related to these known hazards. The Contractor shall be required to write the site-specific Health and Safety Plan for review by the DCC Representative, on behalf of the Department of National Defence. The site-specific Health and Safety Plan shall include provisions for an on-going hazard assessments performed during the progress of work identifying and documenting new or potential health risks and safety hazards not previously known and identified.

- .2 The format of the site-specific Health and Safety Plan shall at a minimum for the purpose of this contract contain the following three (3) parts:
- .1 Part 1: Detailed description of the project and a list of individual health risks and safety hazards identified by the contractor's detailed site specific hazard assessment(s).
 - .1 List of critical construction activities to be communicated with the DCC Representative which could affect facility, infrastructure, and occupant operations, or pose a risk to the health and safety of the occupants, Contractor employees and to the general public.
 - .2 Part 2: List of specific measures to control or mitigate each hazard and risk identified in part one of the Plan. Describe the Engineering controls, personnel protective equipment, safe work practices and any other applicable means to be implemented and followed when performing work related to each identified hazard or risk. Part 2 of the Plan must also include:
 - .1 In the management of safety responsibility, provide the name of the competent employee(s) assigned as site safety representative(s) who is (are) to be present on site at all times during work.
 - .2 A written statement, where applicable, that the Contractor has been made aware of known hazards and hazardous substances referred to under paragraph 1.7, and that the Contractor will inform all Contractor employees, sub-contractor employees and any persons affected or potentially affected by the work of this contract of the known hazards.
 - .3 A written statement confirming that Contractor employees, sub-contractors and other authorized persons accessing the work site are trained and have been fully instructed in:
 - .1 Safe operation of tools and equipment.
 - .2 Proper wearing and use of personnel protective equipment (PPE) as applicable to the purpose and activities to be conducted on site.
 - .3 Safe work practices and procedures to be followed during the performance of their given work tasks or function on the work site.
 - .4 Work site conditions and minimum site safety rules provided through safety orientation sessions.
 - .4 A copy of the Contractor's health and safety policy and disciplinary policy that will be followed to enforce compliance by Contractor employees and sub-contractors with safety requirements of contract documents, applicable regulations and the Contractor's site-specific Health and Safety Plan.
 - .3 Part 3: Emergency Measures and Communications Procedures as follows:
 - .1 Emergency Measures: On-site operating procedures, evacuation measures and emergency response to be implemented in the occurrence of an accident or incident. Procedures to be specific and relevant to identified hazards. Measures to complement and be integrated with the Facility Emergency Response Plan(s) in place at site.
 - .2 Confirmation of the location of nearest fire alarm activation box and telephone.
 - .3 A map depicting the location of the nearest emergency medical facility.

- .4 The location of emergency equipment and supplies including but not limited to first aid kits, emergency eye wash stations, spill kits/equipment and fire extinguishers. Including confirmation that equipment and supplies have been verified/certified for use.
- .5 The names of all persons assigned responsibility by the Contractor as a first aid attendant at the project.
- .6 An inventory listing the common name of all controlled products (WHMIS Products) that the Contractor knows or intends to bring to the project site. List to be updated as necessary as project proceeds.
- .7 A copy of the Contractor's accident/incident investigation policy and incident and accident report form(s) to be used by the Contractor to document any incident or accident that might occur during the course of project work
- .8 Communication procedures:
 - .1 List of names and telephone numbers of designated official(s), to be contacted should an incident or emergency situation occur, including the following:
 - .1 Contractor and all sub-contractors.
 - .2 Federal and Provincial departments and local emergency resources organizations, as applicable to the hazards identified and type of accident or incident which might occur, in accordance with applicable laws and regulations.
 - .2 Procedures implemented at site to communicate and share information between Contractor employees, sub-contractors, and the Contractor on work site activities, and in particular those which might endanger employees and facility occupants and infrastructure users.
 - .3 The procedure to be followed by contract personnel to initiate emergency response by fire, police and medical personnel.
 - .4 Post a copy, including all updates, of the Health and Safety Plan in a common visible location at work site.
- .3 Provide one copy of the site-specific Health and Safety Plan to the DCC Representative prior to commencement of work on the work site. The copy provided to the DCC Representative is for the purpose of review against both Canada Labour Code Part II and the Canada Occupational Safety and Health Regulations made under Part II of the Canada Labour Code and the contract requirements related to the known hazardous substances and/or hazardous conditions.
- .4 Provide and maintain one copy of the site-specific Health and Safety Plan at the work site, in a location that is easily accessible by all Contractor employees, sub-contractor employees and any persons affected or potentially affected by the work of this contract.

1.10 MINIMUM SITE SAFETY RULES

- .1 Notwithstanding the requirement to abide by federal and provincial health and safety regulations, the following safety rules shall be considered minimum requirements at the work site and obeyed by all persons accessing the work site:
 - .1 Wear PPE appropriate to the function and task while on the work site.

- .2 Immediately report unsafe activities, conditions, near miss accidents, injuries and damages.
- .3 Maintain the work site in a tidy condition.
- .4 Obey warning signs and safety tags.

1.11 ACCIDENT REPORTING

- .1 Investigate and report incidents and accidents as required by Canada Labour Code Part II and Ontario Occupational Safety and Health Act, and the Regulations made pursuant to the Act.
- .2 For the purpose of this contract immediately investigate and provide a report to the DCC Representative on incidents and accidents that involve:
 - .1 A resulting injury that may or may not require medical aid but involves lost time at work by the injured person(s).
 - .2 Exposure to toxic chemicals or substances.
 - .3 Property damage.
 - .4 Interruption to adjacent and/or integral infrastructure operations with potential loss implications.

1.12 RECORDS ON SITE

- .1 Maintain on site a copy of the safety documentation as specified in this section and any other safety related reports and documents issued to or received from the authorities having jurisdiction.
- .2 Upon request, make copies available to the DCC Representative.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Survey services to establish and confirm inverts for Work.
- .2 Recording of subsurface conditions found.

1.2 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify DCC Representative of findings.
- .2 Where Work involves breaking into or connecting to existing services, carry out work at times directed by authorities having jurisdiction, with minimum of disturbance to building occupants, pedestrian and vehicular traffic.
- .3 Where unknown services are encountered, immediately advise DCC Representative and confirm findings in writing.

1.3 LOCATION OF EQUIPMENT AND FIXTURES

- .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.
- .2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.
- .3 Inform DCC Representative of impending installation and obtain approval for actual location.
- .4 Submit field drawings to indicate relative position of various services and equipment when required by DCC Representative.

1.4 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 Record locations of maintained, re-routed and abandoned service lines.

1.5 SUBMITTALS

- .1 Submit name and address of Surveyor to DCC Representative.
- .2 On request of DCC Representative, submit documentation to verify accuracy of field Engineering work.

1.6 SUBSURFACE CONDITIONS

- .1 Promptly notify DCC Representative in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should DCC Representative determine that conditions do differ materially, instructions will be issued for changes in Work.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Requirements and limitations for cutting and patching the Work.

1.2 SUBMITTALS

- .1 Submit written request and obtain DCC Representative's approval in advance of cutting or alteration which affects:
 - .1 Structural integrity of any element of Project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of any operational element.
 - .4 Visual qualities of sight-exposed elements.

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 may 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 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .8 Restore work with new products in accordance with requirements of Contract Documents.

- .9 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .10 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with "ULC approved" firestopping material, full thickness of the construction element.
- .11 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.
- .12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Progressive cleaning.
- .2 Final cleaning.

1.2 PROGRESSIVE CLEANING

- .1 Maintain Work site in tidy condition, free from accumulation of waste products and debris.
- .2 Clear snow and ice from access to building, bank/pile snow in designated areas only.
- .3 Remove waste materials from site at regularly scheduled times or dispose of as directed by DCC Representative.
- .4 Provide on-site containers for collection of waste materials and debris. Site plan must be submitted to DCC Representative prior to placement of containers.
- .5 Do not burn waste materials on site.
- .6 Provide and use clearly marked separate bins for recycling.
- .7 The work site must be left clean and tidy upon completion, to the satisfaction of the DCC Representative.
- .8 The base landfill site is not available to be used for this project. The contractor is responsible to make necessary arrangements with a licensed off-site landfill/recycle facility.
- .9 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
- .10 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .11 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .12 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .13 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.3 FINAL CLEANING

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

- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review, remove surplus products, tools, construction machinery and equipment.
- .4 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
- .5 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fittings, walls, and floors.
- .6 Clean lighting reflectors, lenses, and other lighting surfaces.
- .7 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .8 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .9 Inspect finishes, fittings and equipment and ensure specified workmanship and operation.
- .10 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .11 Remove dirt and other disfiguration from exterior surfaces.
- .12 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .13 Sweep and wash clean paved areas.
- .14 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
- .15 Clean roofs, downspouts, and drainage systems.
- .16 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .17 Remove snow and ice from access to building.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for management of construction waste and disposal, which forms the Contractor's commitment to reduce and divert waste materials from landfill and includes the following:
 - .1 Preparation of a Draft Construction Waste Management Plan that will be used to track the success of the Construction Waste Management Plan against actual waste diversion from landfill.
 - .2 Preparation of a Construction Waste Management Plan that provides guidance on a logical progression of tasks and procedures to be followed in a pollution prevention program to reduce or eliminate the generation of waste, the loss of natural resources, and process emissions through source reduction, reuse, recycling, and reclamation.
 - .3 Preparation of monthly progress reports indicating cumulative totals representing progress towards achieving diversion and reduction goals of waste materials away from landfill and identifying any special programs, landfill options or alternatives to landfill used during construction.
 - .4 Preparation of a Construction Waste Management Report containing detailed information indicating total waste produced by the project, types of waste material and quantity of each material, and total waste diverted and diversion rates indicated as a percentage of the total waste produced.
- .2 Owner has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors be employed by the Contractor.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM E1609 01, Standard Guide for Development and Implementation of a Pollution Prevention Program
- .2 Recycling Certification Institute (RCI):
 - .1 RCI Certification Construction and Demolition Materials Recycling
- .3 Environmental Protection Act. Revised Statutes of Ontario 1990, Chapter E. 19, Ontario Regulations 102/94.
- .4 Waste Audits and Waste Reduction Work Plans, Ontario Regulation 347
- .5 General – Waste Management. Revised Regulations of Ontario 1990

1.3 DEFINITIONS

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction operations.
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
- .4 Non-hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non-toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.
- .17 Construction Waste Management Plan: A project related plan for the collection, transportation, and disposal of the waste generated at the construction site; the purpose of the plan is to ultimately reduce the amount of material being landfilled.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate waste management requirements with all Divisions of the Work for the project, and ensure that requirements of the Construction Waste Management Plan are followed.
- .2 Preconstruction Meeting: Arrange a pre-construction meeting in accordance with Section 01 31 19- Project Meetings before starting any Work of the Contract attended by the project manager, DCC Representative, and Contractors to discuss the Construction Waste

Management Plan and to develop mutual understanding of the requirements for a consistent policy towards waste reduction and recycling.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide required information in accordance with Section 01 33 00- Submittal Procedures.
- .2 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Draft Construction Waste Management Plan (Draft CWM Plan): Submit to DCC Representative a preliminary analysis of anticipated site generated waste by listing a minimum of five (5) construction or demolition waste streams that have potential to generate the most volume of material indicating methods that will be used to divert construction waste from landfill and source reduction strategies; DCC Representative will provide commentary before development of Contractor's Construction Waste Management Plan.
 - .2 Construction Waste Management Plan (CWM Plan): Submit a CWM Plan for this project prior to any waste removal from site and that includes the following information:
 - .1 Material Streams: Analysis of the proposed jobsite waste being generated, including material types and quantities forming a part of identified material streams in the Draft CWM Plan Proposed Material Conservation Audit; materials removed from site destined for alternative daily cover at landfill sites and land clearing debris cannot be considered as contributing to waste diversion and will be included as a component of the total waste generated for the site.
 - .2 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.
 - .3 Alternative Waste Disposal: Prepare a listing of each material proposed to be salvaged, reused, recycled or composted during the course of the project, and the proposed local market for each material.
 - .4 Landfill Materials: Identify materials that cannot be recycled, reused or composted and provide explanation or justification; energy will be considered as a viable alternative diversion strategy for these materials where facilities exist.
 - .5 Landfill Options: The name of the landfill where trash will be disposed of; landfill materials will form a part of the total waste generated by the project.
 - .6 Materials Handling Procedures: A description of the means by which any recycled waste materials will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with requirements for acceptance by designated facilities.
 - .7 Transportation: A description of the means of transportation of the recyclable materials, whether materials will be site separated and self hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site, and destination of materials.

1.6 PROJECT CLOSEOUT SUBMISSIONS

- .1 Record Documentation: Submit as constructed information in accordance with Section 01 78 00- Closeout Submittals as follows:
 - .1 Construction Waste Management Report (CWM Report): Submit a CWM Report for this project in a format acceptable to submittal requirements and that includes the following information:
 - .1 Accounting: Submit information indicating total waste produced by the project.
 - .2 Composition: Submit information indicating types of waste material and quantity of each material.
 - .3 Diversion Rate: Submit information indicating total waste diverted from landfill as a percentage of the total waste produced by the project.
 - .4 Transportation Documentation: Submit copies of transportation documents or shipping manifests indicating weights of materials, and other evidence of disposal indicating final location of waste diverted from landfill and waste sent to landfill.
 - .5 Alternative Daily Cover (ADC): Submit quantities of material that were used as ADC at landfill sites, and that form a part of the total waste generated by the project.
 - .6 Multiple Waste Hauling: Compile all information into a single CWM Report where multiple waste hauling and diversion strategies were used for the project.
 - .7 Photographs: Submit photographs of waste diversion facilities documenting location and signage describing usage of waste separation containers.

1.7 QUALITY ASSURANCE

- .1 Resources for Development of Construction Waste Management Report (CWM Report): The following sources may be useful in developing the Draft Construction Waste Management Plan:
 - .1 Recycling Haulers and Markets: Investigate local haulers and markets for recyclable materials, and incorporate into CWM Plan.
 - .2 Waste-to-Energy Systems: Investigate local waste-to-energy incentives where systems for diverting materials from landfill for reuse or recycling are not available.
- .2 Certifications: Provide proof of the following during the course of the Work:
 - .1 Compliance Certification: Provide proof that recycling center is third party verified and is listed as a Certified Facility through the registration and certification requirements of the Recycling Certification Institute.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Storage Requirements: Implement a recycling/reuse program that includes separate collection of waste materials as appropriate to the project waste and the available recycling and reuse programs in the project area.

- .2 Handling Requirements: Clean materials that are contaminated before placing in collection containers and ensure that waste destined for landfill does not get mixed in with recycled materials:
 - .1 Deliver materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - .2 Arrange for collection by or delivery to the appropriate recycling or reuse facility.
- .3 Hazardous Waste and Hazardous Materials: Handle in accordance with applicable regulations.
- .4 All waste products to be placed in suitable containers and labeled clearly.
- .5 Waste products to be segregated by commodity, and placed in separate containers based on class.
- .6 Store all petroleum, oil, lubricants, and other hazardous materials within secondary containment, or in an appropriate metal clad storage building with containment.
- .7 Identify the proposed waste receiver facilities and the anticipated waste shipment frequency for all waste.

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 (CWM PLAN) IMPLEMENTATION

- .1 Manager: Contractor is responsible for designating an on-site party or parties responsible for instructing workers and overseeing and documenting results of the CWM Plan for the project.
- .2 Distribution: Distribute copies of the CWM Plan to the job site foreman, each Subcontractor, the Owner, the DCC Representative and other site personnel as required to maintain CWM Plan.
- .3 Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, composting and return methods being used for the project to Subcontractor's at appropriate stages of the project.
- .4 Separation Facilities: Lay out and label a specific area to facilitate separation of materials for potential recycling, salvage, reuse, composting and return:
 - .1 Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid contamination of materials.
 - .2 Hazardous wastes shall be separated, stored, and disposed of in accordance with local regulations.
- .5 Progressive Documentation: Submit a monthly summary of waste generated by the project to ensure that waste diversion goals are on track with project requirements:

- .1 Submission of waste summary can coincide with application for progress payment, or similar milestone event as agreed upon between the Contractor and DCC Representative.
- .2 Monthly waste summary shall contain the following information:
 - .1 The amount in tonnes or m³ and location of material landfilled,
 - .2 The amount in tonnes or m³ and location of materials diverted from landfill, and
 - .3 Indication of progress based on total waste generated by the project with materials diverted from landfill as a percentage.

3.2 SUBCONTRACTOR'S RESPONSIBILITY

- .1 Subcontractors shall cooperate fully with the Contractor to implement the CWM Plan.

3.3 SAMPLE CONSTRUCTION WASTE MANAGEMENT FORMS

- .1 Sample waste tracking form below can be used by the Contractor to establish their own forms for recording management of construction waste:

SAMPLE WASTE MANAGEMENT FORM

Material Stream	Diverted Waste by Report Date				
	Oct	Nov	Dec	Jan	Total (m ³)
Material Streams Contributing to Credit	4.5	1.25	2.5	10	18.25
Metal	1.25	2.5	5.5	7	16.25
Gypsum Board	2.5	2.5	4	5	14.00
Brick/Concrete	10.5	2.5	5.5	8.75	27.25
Asphalt Shingles	10	0	0	0	10.00
Total Diverted Waste	135	0	0	0	135.00
Material Streams not Contributing to Credit	10	10.75	7.5	15	43.25

Material Stream	Diverted Waste by Report Date				
	Oct	Nov	Dec	Jan	Total (m ³)
Screen Fines (ADC)	5	1.25	0	2.5	
150 mm Minus (ADC)	1.25	1.25	5	5.5	
Total Landfill/ADC Waste	65				
Total Waste	200				
Percent Diverted %	67.5				

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 As-built, samples, and specifications.
- .2 Equipment and systems.
- .3 Product data, materials and finishes, and related information.
- .4 Operation and maintenance data.
- .5 Spare parts, special tools and maintenance materials.
- .6 Warranties and bonds.

1.2 SUBMISSION

- .1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .2 At least 2 weeks prior to scheduled commissioning activities, submit 2 copies of the DRAFT Operating and Maintenance Manuals, for DCC Representatives review and use during the commissioning activities. After the completion of the commissioning activities, the DCC Representative will return to the Contractor 1 DRAFT copy, with review comments, for revision. Submit 1 copy of the revised Operating and Maintenance for approval prior to the production of FINAL copies. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after the issuance of the Interim Certificate of Completion, submit:
 - .1 Two (2) hard copies of the FINAL Operating and Maintenance Manuals.
 - .2 One (1) electronic copy (CD/DVD only) of the FINAL Operating and Maintenance Manual in PDF format. Files on CD/DVD shall be organized in same manner as the hard copies, and must follow the same formatting and sequence as specified in article 1.3 and 1.4 of this section.
- .3 Building will not be deemed ready for use, and the Final Certificate of Completion will not be granted, unless the Operating and Maintenance Manuals and the "As-built" Record Documents have been submitted and reviewed and accepted by the DCC Representative.
- .4 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .5 If requested, furnish evidence as to type, source and quality of products provided.
- .6 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .7 Pay costs of transportation.

1.3 FORMAT

- .1 Organize data in the form of an instructional manual.
- .2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.
- .3 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: Identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.
- .5 Arrange content by Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: Manufacturer's printed data or typewritten data.
- .8 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.4 CONTENTS - EACH VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission; names,
 - .2 Addresses, and telephone numbers of and Contractor with name of responsible parties;
 - .3 Schedule of products and systems, indexed to content of volume.
- .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- .3 Product Data: mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: Refer to Section 01 79 00 - Demonstration and Training.

1.5 AS-BUILTS AND SAMPLES

- .1 In addition to requirements in General Conditions, maintain at the site for DCC Representative one record copy of:

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed shop drawings, product data, and samples.
- .6 Field test records.
- .7 Inspection certificates.
- .8 Manufacturer's certificates.
- .2 Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by DCC Representative.

1.6 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of opaque drawings, provided by DCC Representative.
- .2 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
- .3 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract Drawings.
 - .5 References to related shop drawings and modifications.
- .4 Submit following drawings:
 - .1 Record changes in red. Mark on one set of prints and at completion of project prior to final inspection, produce electronic "as-built" records on disk using AutoCad 2011 Suite. Annotate "AS-BUILT RECORD" in each drawing title block.
 - .2 Electronic "as-built" drawings shall be in accordance with all DND drawing standards. Copy of drawing standards can be downloaded at http://cafnet.dcc-cdc.gc.ca/CAD_BIM_GIS/access-eng.htm.
 - .3 All changes shall be shown on a separate drawing layer named "as-built".

- .4 At least 2 weeks prior to scheduled commissioning activities, submit one copy of the DRAFT "As-built" Project Record Documents for DCC Representatives review and use during the commissioning activities. After the completion of the commissioning activities, the DCC Representative will return to the Contractor the DRAFT copy, with review comments, for revision. Prior to the Issuance of the Final Certificate of Completion, and within 10 working days after the issuance of the Interim Certificate of Completion, submit 2 copies of the FINAL "As-built" Project Record Documents and disk of "as-built" record drawings.
- .5 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 EQUIPMENT AND SYSTEMS

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with Engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's coordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 00 - Commissioning.
- .15 Additional requirements: As specified in individual specification sections.

1.8 MATERIALS AND FINISHES

- .1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations. Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and Weather-exposed Products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .4 Additional Requirements: as specified in individual specifications sections.

1.9 SPARE PARTS

- .1 Provide spare parts, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Spare parts as identified in individual sections are to be delivered to the DCC Representative prior to the Contractor's submission for Interim Certificate of Completion.
- .4 Receive and catalogue all items. Submit inventory listing to DCC Representative. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.10 MAINTENANCE MATERIALS

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Maintenance materials are to be delivered to the DCC Representative prior to the Contractor's submission for Interim Certificate of Completion.
- .4 Receive and catalogue all items. Submit inventory listing to DCC Representative. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.11 SPECIAL TOOLS

- .1 Provide special tools, in quantities specified in individual specification section.
- .2 Provide items with tags identifying their associated function and equipment.
- .3 Special tools are to be delivered to the DCC Representative prior to the Contractor's submission for Interim Certificate of Completion.
- .4 Receive and catalogue all items. Submit inventory listing to DCC Representative. Include approved listings in Maintenance Manual.

1.12 STORAGE, HANDLING AND PROTECTION

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and to satisfaction of DCC Representative.

1.13 WARRANTIES AND GUARANTEES

- .1 Separate each warranty or guarantee with index tab sheets keyed to Table of Contents listing.
- .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.
- .3 Obtain warranties and guarantees, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
- .4 Except for items put into use with DCC Representative's permission, leave date of beginning of time of warranty until the Date of Substantial Performance is determined.
- .5 Verify that documents are in proper form, contain full information, and are notarized.
- .6 Co-execute submittals when required.
- .7 Retain warranties and guarantees until time specified for submittal.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Procedures for demonstration and instruction of equipment and systems to Owner's personnel.

1.2 DESCRIPTION

- .1 Demonstrate operation and maintenance of equipment and systems to Owner's personnel two weeks prior to date of final inspection.
- .2 Owner will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.3 QUALITY CONTROL

- .1 When specified in individual Sections, require manufacturer to provide authorized representative to demonstrate operation of equipment and systems, instruct Owner's personnel, and provide written report that demonstration and instructions have been completed.

1.4 SUBMITTALS

- .1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for DCC Representative's approval.
- .2 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.
- .3 Give time and date of each demonstration, with list of persons present.

1.5 CONDITIONS FOR DEMONSTRATIONS

- .1 Equipment has been inspected and put into operation.
- .2 Testing, adjusting, and balancing has been performed in accordance with Section 01 91 00 - Commissioning and equipment and systems are fully operational.
- .3 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.6 PREPARATION

- .1 Verify that conditions for demonstration and instructions comply with requirements.
- .2 Verify that designated personnel are present.

1.7 DEMONSTRATION AND INSTRUCTIONS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled times, at the designated location.

- .2 Instruct personnel in all phases of operation and maintenance using operation and maintenance manuals as the basis of instruction.
- .3 Review contents of manual in detail to explain all aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

1.8 MECHANICAL SYSTEMS TRAINING

- .1 Turnover Seminar:
 - .1 Organize and conduct a seminar to instruct the Owner and his representatives in the operation and general preventative maintenance of equipment and systems provided at the completion of the project.
 - .2 Provide services of qualified personnel, including each sub-trade, each major equipment supplier and design DCC Representative to attend seminar and instruct on his equipment or system. Seminar shall be chaired and conducted by the Contractor's Commissioning agent.
 - .3 At seminar, submit final copies of record drawings and operating and maintenance manuals to Owner.
- .2 Systems Seminar:
 - .1 Allow a minimum of four (4) days to conduct the systems training seminar addressing the following topics:
 - .1 Air Systems:
 - .1 Review operation of systems and equipment:
 - .1 Air systems
 - .2 Make-up air units
 - .3 All exhaust systems
 - .2 Review equipment maintenance
 - .3 Air system site tour (air handling units/ventilation/ fans/make up air unit)
 - .1 Demonstrate start/stop
 - .2 Components
 - .3 Maintenance

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 General requirements for Commissioning facilities and facility systems.

1.2 QUALITY ASSURANCE

- .1 Provide all related Commissioning and testing services.
- .2 Comply with applicable procedures and standards.
- .3 Perform services to support quality management and verifying contract performance.

1.3 REFERENCES

- .1 CSA Z320 – Building Commissioning Standard
- .2 ASHRAE Guideline 0-2013 – The Commissioning Process
- .3 ASHRAE Standard 202-2013 – Commissioning Process for Building and Systems

1.4 METHODOLOGY

- .1 Verification of performance of building systems and components will be performed by means of a Commissioning process.
- .2 Commissioning plan & testing activities shall be performed by the Contractor and witnessed by the Commissioning Agent.
- .3 Commissioning Agent for this facility will be the DCC Representative.

1.5 COMMISSIONING OBJECTIVES

- .1 To bring mechanical, electrical & building architectural systems and components from a state of static completion to a state of dynamic operation.
- .2 To verify conformance to contract requirements.
- .3 To confirm installations, meet requirements of performance specification & design intent of contract drawings and specifications.
- .4 To provide all testing documentation and records.
- .5 To ensure completed facility meets user stated requirements.
- .6 To provide a documented operator training program.
- .7 To verify accuracy of project record drawings and operating & maintenance manuals.

1.6 CONTRACTORS - COMMISSIONING PLAN

- .1 Provide a commissioning plan consisting of:
 - .1 Details regarding roles and responsibilities during all phases of Commissioning.
 - .2 Documentation defining design assumptions and performance standards of proposed systems.
 - .3 Description of mechanical, electrical and building architectural systems, intended operation and performance details.
 - .4 Static testing and verification procedures.
 - .5 Functional performance verification procedures.
 - .6 Contractors and manufacturers start-up reports.
 - .7 Check sheet documentation for recording testing procedures and recording test results prepared by the Contractor for mechanical, electrical and building architectural systems and components.
 - .8 Test procedures and documentation for seasonal or deferred commissioning.
 - .9 Training plan for building operators.
 - .10 Final commissioning report.

1.7 COMMISSIONING AGENT'S - RESPONSIBILITIES

- .1 For ensuring that commissioning activities are carried out in accordance with the Contractors Commissioning plan.
- .2 Commissioning Agent will:
 - .1 Chair and arrange commissioning meetings.
 - .2 Witness all equipment start-up and collect all manufacturer's start-up reports.
 - .3 Witness testing and balancing measurements and procedures.
 - .4 Witness all tests and initial all test documents at time of test.
 - .5 Co-sign off, as witness, all systems verification and test forms.
 - .6 Coordinate building operators training.
 - .7 Arrange for provision of additional training where required.
 - .8 Turn over completed Interim and Final Commissioning reports to the DND Representative.

1.8 CONTRACTORS - SUBMITTALS

- .1 Prior to start of Work, submit name of Contractor personnel proposed to perform services to organize, coordinate, and schedule the applicable personnel to complete the Commissioning process.
- .2 Submit documentation to confirm Contractor personnel compliance to perform services.
- .3 Contractor shall prepare & submit a completed Commissioning Plan and Commissioning Schedule for review by the Commissioning Agent eight (8) weeks after award.
- .4 Submit an updated Commissioning Schedule as directed by the Commissioning Agent.

- .5 Prior to the Issuance of the Final Certificate of Completion, and within ten (10) working days after the issuance of the Interim Certificate of Completion, submit three (3) copies of the Interim Commissioning report in D-ring binders, complete with index tabs.
- .6 Submit reports of Commissioning activities that are deferred or seasonal after completion and witnessing by the Commissioning Agent.

1.9 PROCEDURES - GENERAL

- .1 Comply with referenced standards and the contract documents.
- .2 Notify DCC Representative fourteen (14) days prior to beginning Commissioning activities.
- .3 Accurately record data for each step on check sheets prepared by the Contractor.
- .4 Report to Commissioning Agent / DCC Representative any deficiencies or defects found during start-up and the solution to resolve.

1.10 CONTRACTORS - RESPONSIBILITIES

- .1 Prepare each system for testing and functional performance verification.
- .2 Cooperate fully with the Commissioning Agent in the execution of the Contractors Commissioning plan. At completion of Commissioning, provide a written statement affirming that building systems are operating properly in accordance with requirements of performance specification and design intent of contract drawings and specifications.
- .3 Provide personnel, equipment, instruments & operate systems as required to perform and record Commissioning activities as directed by the Commissioning Agent.

1.11 CONTRACTORS - PREPARATION

- .1 Contractors' personnel and equipment are on-site to complete the scheduled activities.
- .2 All testing procedures & data recording check sheets are updated and on-site.
- .3 Contractors & Manufacturers Start-up reports are updated and on-site.
- .4 Updated Shop Drawings are on-site.
- .5 Equipment Installation, Operation & Maintenance Manuals are on-site.

1.12 BUILDING SYSTEMS TO BE COMMISSIONED

- .1 The Contractor shall provide Commissioning services for all mechanical, electrical & building architectural systems and components.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section includes descriptions for demolishing, salvaging, recycling and removing site work items identified for removal in whole or in part, and for backfilling trenches and excavations resulting from site demolition activities.

1.2 PRICE AND PAYMENT PROCEDURES

- .1 Measurement Procedures: Coordinate with Section 01 74 19- Construction Waste Management and Disposal, and as follows:
 - .1 Measure removal of waste from site in tonnes.

1.3 REFERENCE STANDARDS

- .1 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012
 - .2 Canadian Environmental Protection Act (CEPA), 2012
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Materials Information Review Act, 1985
- .2 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S660-08, Standard for Nonmetallic Underground Piping for Flammable and Combustible Liquids
 - .2 ULC/ORD-C58.15-1992, Overfill Protection Devices for Flammable Liquid Storage Tanks
 - .3 ULC/ORD-C58.19-1992, Spill Containment Devices for Underground Flammable Liquid Storage Tanks
- .3 United States Environmental Protection Agency (EPA)
 - .1 EPA CFR 86.098-10, Emission standards for 1998 and later model year Otto-cycle heavy-duty engines and vehicles
 - .2 EPA CFR 86.098-11, Emission standards for 1998 and later model year diesel heavy-duty engines and vehicles
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices

1.4 DEFINITIONS

- .1 Selective Demolition: Sequencing demolition activities to allow separation and sorting of selected site materials.

- .2 Hazardous Substances: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: asbestos PCB's, CFC's, HCFC's poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well-being or environment if handled improperly.
- .3 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19- Construction Waste Management and Disposal and as follows:
 - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
- .4 Waste Management Coordinator (WMC): contractor's representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .5 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.
- .6 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Management and Disposal.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate with DCC Representative for the material ownership including the following:
 - .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain DCC Representative's property, demolished materials shall become Contractor's property and shall be removed from Project site.
 - .2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to DCC Representative that may be encountered during demolition remain DCC Representative's property:
 - .1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to DCC Representative.
 - .2 Coordinate with DCC Representative, who will establish special procedures for removal and salvage operations.
- .2 Pre-Demolition Meetings.
 - .1 Convene pre-installation meeting 1 week before beginning on-site installation, with DCC Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Verify existing site conditions adjacent to demolition work
 - .3 Coordinate with other construction sub trades
 - .4 Examine existing site conditions adjacent to demolition work, prior to start of Work

- .5 Waste reporting requirements
- .2 Hold project meetings every month.
- .3 Ensure project manager, subcontractor representatives, key personnel, WMC, and site supervisor attend.
- .4 WMC will provide written report on status of waste diversion activity at each meeting.
- .5 DCC Representative will provide written notification of change of meeting schedule established upon contract award 24 hours prior to scheduled meeting.
- .3 Scheduling:
 - .1 Employ necessary means to meet project time lines without compromising specified minimum rates of material diversion.
 - .2 In event of unforeseen delay notify DCC Representative in writing.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Shop Drawings: Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada as follows:
 - .1 Submit for review and approval selective site demolition drawings, diagrams or details showing sequence of selective site demolition.
 - .2 Submit in accordance with Section 01 74 19 - Construction Waste Management and Disposal and Section 01 33 00 - Submittal Procedures.
 - .3 WMC is responsible for fulfilment of reporting requirements.
 - .2 Construction Waste Management Plan (CWM Plan): Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:
 - .3 Proposed Dust Control Measures: Submit statement or drawing that indicates measures proposed for use, proposed locations, and proposed time frame for their operation.
 - .4 Inventory: Submit a list of items that have been removed and salvaged after selective site demolition is complete
 - .1 Pre demolition videotape and photographs: Submit photographs and videotape indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective site demolition operations.
- .2 Informational Submittals: Provide the following submittals when requested by the DCC Representative:
 - .1 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of Consultant and DCC Representative, for work of similar complexity and extent.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: ensure Work is performed in compliance with applicable Provincial/Territorial regulations, CEAA, CEPA, and TDGA.
- .2 Comply with hauling and disposal regulations of Authority Having Jurisdiction.

1.8 SITE CONDITIONS

- .1 Environmental protection:
 - .1 Ensure Work is done in accordance with Section 01 35 43 - Environmental Procedures.
 - .2 Ensure Work does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
 - .3 Fires and burning of waste or materials is not permitted on site.
 - .4 Burying of rubbish waste materials is not permitted.
 - .5 Disposal of waste of volatile materials including but not limited to, mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers, is not permitted.
 - .6 Ensure proper disposal procedures are maintained throughout the project.
- .2 Pumping of water containing suspended materials into watercourses, storm or sanitary sewers or onto adjacent properties, is not permitted.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with authorities having jurisdiction as directed by DCC Representative.
- .4 Protect trees, plants and foliage on site and adjacent properties where indicated.
- .5 Prevent extraneous materials from contaminating air beyond application area, by providing temporary enclosures during demolition work.
- .6 Cover or wet down dry materials and waste to prevent blowing dust and debris. Control dust on all temporary roads.
- .7 Conduct selective site demolition so Owner's operations will not be disrupted:
 - .1 Provide not less than 120 hours' notice to Owner and DCC Representative of activities that will affect operations.
 - .2 Maintain access to existing walkways, exits, and other adjacent occupied or used facilities:
 - .1 Closing or obstructing walkways, exits, or other occupied or used facilities without written permission from DCC Representative is not permitted.
- .8 DCC Representative assumes no responsibility for Selective Site elements being demolished:
 - .1 Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - .2 Before selective site demolition, remove, protect and store salvaged items as directed by DCC Representative:

- .1 Salvage items as identified by DCC Representative.
- .2 Deliver to DCC Representative as directed.

1.9 EXISTING CONDITIONS

- .1 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify DCC Representative.
- .2 If material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify DCC Representative immediately. Proceed only after receipt of written instructions have been received from DCC Representative.

Part 2 Products

2.1 EQUIPMENT

- .1 Equipment and Heavy Machinery:
 - .1 On-road vehicles to: CEPA-SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations.
 - .2 Machinery running only while in use, except where extreme temperatures prohibit shutting machinery down.

Part 3 Execution

3.1 EXAMINATION

- .1 Survey existing conditions and correlate with requirements indicated to determine extent of selective site demolition required.
- .2 DCC Representative does not guaranty that existing conditions are the same as those indicated in Project Record Documents.
- .3 Inventory and record the condition of items being removed and salvaged.
- .4 When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to DCC Representative.
- .5 Engage a professional engineer to perform an engineering survey of condition of adjacent buildings to determine whether removing any site element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective site demolition operations.
- .6 Verify that hazardous materials have been remediated before proceeding with site demolition operations.

3.2 REMOVAL AND DEMOLITION OPERATIONS

- .1 Remove items as indicated.
- .2 Disruption of items designated to remain in place is not permitted.

3.3 REMOVAL FROM SITE

- .1 Transport material designated for alternate disposal using approved facilities listed in CWM Plan and in accordance with applicable regulations:
 - .1 Written authorization from DCC Representative is required to deviate from facilities listed in CWM Plan.
- .2 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal Facilities: approved and listed in Waste Reduction Workplan.
 - .2 Written authorization from DCC Representative is required to deviate from disposal facilities listed in Waste Reduction Workplan.

3.4 RESTORATION

- .1 Restore areas and existing works outside areas of demolition to match condition of adjacent, undisturbed areas.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove debris, trim surfaces and leave work site clean, upon completion of Work
 - .3 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.
- .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 SUMMARY

- .1 This Section includes the following:
 - .1 Demolition and removal of selected portions of exterior building components or structural elements.
 - .2 Demolition of mechanical and electrical equipment.
 - .3 Demolition and removal of selected site elements.
 - .4 Repair procedures for selective demolition operations.
- .2 This section does not include the following:
 - .1 Removal of hazardous materials or asbestos abatement.
 - .2 Demolition of interior building components and finishes.
- .3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.2 RELATED REQUIREMENTS

- .1 Section 23 05 05- Selective Demolition for Heating, Ventialting, and Air Conditioning (HVAC)
- .2 Section 26 05 05- Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A10.8 2011, Safety Requirements for Scaffolding
- .2 CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures
- .3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012
 - .2 Canadian Environmental Protection Act (CEPA), 2012
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Materials Information Review Act, 1985

- .5 National Fire Protection Association (NFPA)
 - .1 NFPA 241 13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.
- .2 Remove and Salvage: Detach items from existing construction and deliver them to DCC Representative.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.
- .5 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all elements in planes as drawn, maintaining their relationships with all other building elements.
- .2 Coordination: Coordinate with DCC Representative for the material ownership as follows:
 - .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain DCC Representative's property, demolished materials shall become Contractor's property and shall be removed from Project site.
 - .2 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to DCC Representative that may be encountered during selective demolition remain DCC Representative's property:
 - .1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to DCC Representative.
 - .2 Coordinate with DCC Representative's historical adviser, who will establish special procedures for removal and salvage.
- .3 Pre Demolition Meeting: Conduct a pre demolition meeting at Project site in accordance with requirements listed in Section 01 31 19 - Project Meetings to confirm extent of salvaged and demolished materials; and to review Contractor's demolition plan prepared by a professional engineer.

1.6 ACTION AND INFORMATION SUBMITTALS

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
 - .1 Demolition Plan: Submit a plan of demolition area indicating extent of temporary facilities and supports, methods of removal and demolition prepared by a professional engineer in accordance with requirements of Authority Having Jurisdiction, and as follows:
 - .1 Proposed Dust Control Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. DCC Representative reserves the right to make modifications where proposed methods interfere with the Owner's ongoing operation
 - .2 Inventory: Submit a list of items that have been removed and salvaged after selective demolition is complete.
 - .3 Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - .4 Pre demolition Videotape and Photographs: Submit photographs and videotape indicating existing conditions of adjoining construction and site improvements prior to starting Work. Include finish surfaces that may be misconstrued as damage caused by selective demolition operations.
- .2 Informational Submittals: Provide the following submittals when requested by the DCC Representative:
 - .1 Qualification Data: Submit information for companies and personnel indicating their capabilities and experience to perform work of this Section including; but not limited to, lists of completed projects with project names and addresses, names and addresses of architects and owners, for work of similar complexity and extent.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Comply with governing environmental notification requirements and regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction and in accordance with the following:
 - .1 Government of Canada, Labour Program: Workplace Safety.
- .2 Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project:
 - .1 Conform to the provincial Occupational Health and Safety Act and Regulations.
 - .2 Conform to federal Workers' Compensation Board Regulations.
 - .3 Conform to the local municipal bylaws and regulations governing this type of work.

1.8 SITE CONDITIONS

- .1 Owner will occupy portions of building immediately adjacent to selective demolition area:

- .1 Conduct selective demolition so that Owner's operations will not be disrupted.
 - .2 Provide not less than 72 hour's notice to DCC Representative of activities that will affect Owner's operations.
- .2 Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities and as follows:
 - .1 Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- .3 DCC Representative assumes no responsibility for condition of areas to be selectively demolished:
 - .1 Conditions existing at time of Pre Bid Site Review will be maintained by DCC Representative as far as practical.
- .4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify DCC Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - .1 Refer to Section 01 41 00- Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous materials will be as defined in the Hazardous Materials Act.
 - .3 Hazardous materials will be removed by DCC Representative before start of the Work.
 - .4 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify DCC Representative. Hazardous materials will be removed by DCC Representative under a separate contract or as a change to the Work.
- .5 Hazardous Materials: Hazardous materials are present in building to be selectively demolished. A report on the presence of hazardous materials is attached as an information document to this Section for review and use:
 - .1 Examine report to become aware of locations where hazardous materials are present.
 - .2 Coordinate with Section 02 81 00- Hazardous Materials.
 - .3 Do not disturb hazardous materials or items suspected of containing hazardous materials.
- .6 Storage or sale of removed items or materials on site will not be permitted.
- .7 Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
- .8 Maintain fire protection facilities in service during selective demolition operations.

Part 2 Products

2.1 MATERIALS

- .1 Temporary Support Structures: Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the

project using a qualified professional engineer registered or licensed in province of the Work.

- .2 Repair Materials: Use repair materials identical to existing materials:
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - .2 Use materials whose installed performance equal or surpasses that of existing materials.
 - .3 Comply with material and installation requirements specified in individual technical specification Sections.
 - .4 Retain original installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition, if possible. Engage another recognized experienced and specialized firm where it is not possible to retain original installer:
 - .1 Processed concrete finishes.
 - .2 Preformed metal panels.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that utilities have been disconnected and capped.
- .2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- .3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- .4 Notify the DCC Representative where existing mechanical, electrical, or structural elements conflict with intended function or design:
 - .1 Investigate and measure the nature and extent of conflict and submit a written report to DCC Representative.
 - .2 DCC Representative will issue additional instructions or revise drawings as required to correct conflict.
- .5 Engage a professional engineer to survey condition of building when removing elements that may result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- .6 Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- .1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.
- .2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.

- .1 Arrange to shut off affected utilities with utility companies.
- .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
- .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- .4 Cut off pipe or conduit to a minimum of 25 mm below slab, and remove concrete mound.
- .3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.
- .4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- .1 Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- .2 Conduct selective demolition and debris removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
 - .1 Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from DCC Representative and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - .2 Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - .3 Protect existing site improvements, appurtenances, and landscaping to remain.
 - .4 Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- .3 Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain in accordance with Section 01 56 00- Temporary Barriers, and as follows:
 - .1 Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - .2 Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
- .4 Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities in accordance with Section 01 52 00- Construction Facilities.
 - .1 Provide temporary weather tight enclosure for building exterior.
 - .2 Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures.

- .3 Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
- .5 Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished:
 - .1 Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

- .1 Dust Control: Provide water mist, temporary enclosures or other suitable methods reviewed and accepted by the DCC Representative to limit spread of dust and dirt. Comply with governing environmental protection regulations, and as limited below:
 - .1 Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 - .2 Wet mop floors to eliminate tracking of dirt, wipe down walls and doors of demolition enclosure. Vacuum carpeted areas.
- .2 Remove and transport debris to prevent spillage on adjacent surfaces and areas.
- .3 Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- .4 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

- .1 Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - .1 Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - .2 Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - .3 Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - .4 Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame cutting operations. Maintain fire watch and portable fire suppression devices during flame cutting operations.
 - .5 Maintain adequate ventilation when using cutting torches.
 - .6 Remove decayed, vermin infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

- .7 Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- .8 Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- .9 Dispose of demolished items and materials promptly.
- .10 Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- .2 Comply with DCC Representative's requirements for using and protecting stairs, walkways, loading docks, building entries, and other building facilities during selective demolition operations.
- .3 Existing Items to Remain:
 - .1 Protect construction indicated to remain against damage and soiling during selective demolition
 - .2 Items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete
- .4 Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to Section Applicable Division 7 Section for new roofing requirements.

3.6 CLOSEOUT ACTIVITIES

- .1 Patching and Repairs: Promptly repair damage to adjacent construction caused by selective demolition operations and as follows:
 - .1 Patch to produce surfaces suitable for new materials where repairs to existing surfaces are required,
- .2 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) and as follows:
 - .1 Promptly dispose of demolished materials.
 - .2 Do not allow demolished materials to accumulate onsite.
 - .3 Do not burn demolished materials.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes the following:
 - .1 Demolition and removal of selected portions of interior building components and finishes.
 - .2 Repair procedures for selective demolition operations.
- .2 This section does not include the following:
 - .1 Removal of hazardous materials or asbestos abatement.
 - .2 Demolition of exterior building components or structural elements.
 - .3 Mechanical or electrical equipment, except as required to make minor modifications to allow the work to be completed.
- .3 Drawings contain details that suggest directions for solving some of the major demolition and removal requirements for this project; Contractor is required to develop these details further by submitting a demolition plan prepared by a professional engineer employed by the Contractor.

1.2 RELATED REQUIREMENTS

- .1 Section 26 05 05- Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A10.8 2011, Safety Requirements for Scaffolding
- .2 ASTM International (ASTM)
 - .1 ASTM C475/C475M-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board
- .3 CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 2012
 - .2 Canadian Environmental Protection Act (CEPA), 2012
 - .1 SOR/2003-2, On-Road Vehicle and Engine Emission Regulations
 - .2 SOR/2006-268, Regulations Amending the On-Road Vehicle and Engine Emission Regulations
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34
 - .4 Motor Vehicle Safety Act (MVSA), 1995
 - .5 Hazardous Materials Information Review Act, 1985

- .5 National Fire Protection Association (NFPA)
 - .1 NFPA 241 13, Standard for Safeguarding Construction, Alteration, and Demolition Operations

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of them off site, unless indicated to be removed and salvaged or removed and reinstalled.
- .2 Remove and Salvage: Detach items from existing construction and deliver them to DCC Representative ready for reuse.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed, removed and salvaged, or removed and reinstalled.
- .5 Waste Management Coordinator (WMC): Contractor representative responsible for supervising waste management activities as well as coordinating related, required submittal and reporting requirements.
- .6 Draft Construction Waste Management Plan (Draft CWM Plan): Detailed inventory of materials in building indicating estimated quantities of reuse, recycling and landfill, prepared in accordance with Section 01 74 19- Waste Management and Disposal and as follows:
 - .1 Involves quantifying by volume/weight amounts of materials and wastes generated during construction, demolition, deconstruction, or renovation project.
- .7 Construction Waste Management Plan (CWM Plan): Written plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.
- .8 Construction Waste Management Report (CWM Report): Written report identifying actual materials that formed CWM Plan for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.
- .9 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate with DCC Representative for the material ownership as follows:
 - .1 Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.
 - .2 Coordinate selective demolition work so that work of this Section adheres to aesthetic criteria established by the Drawings and specified dimensions with all

- elements in planes as drawn, maintaining their relationships with all other building elements.
- .3 Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property:
 - .1 Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.
 - .2 Coordinate with DCC Representative, who will establish special procedures for removal and salvage.
- .2 Pre Demolition Meeting: Convene pre-installation meeting 1 week prior to beginning on-site installation, with Contractor, DCC Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Confirm extent of salvaged and demolished materials
 - .2 Review Contractor's demolition plan
 - .1 Verify existing site conditions adjacent to demolition work
 - .2 Coordination with other construction sub trades
- .3 Hold project meetings every 3 week.
- .4 Ensure project manager, key personnel, DCC rep., WMC, site supervisor attend.
- .5 WMC must provide written report on status of waste diversion activity at each meeting.
- .6 DCC Representative will provide written notification of change to meeting schedule established upon contract award 48 hours prior to scheduled meeting.

1.6 ACTION AND INFORMATION SUBMITTALS

- .1 Action Submittals: Provide the following submittals before starting any work of this Section:
- .2 Regulatory Requirements: Perform work as follows; use most restrictive requirements where differences occur between the municipal, provincial and federal jurisdictions:
 - .1 Provincial and Federal Requirements: Perform work in accordance with governing environmental notification requirements and regulations of the Authority Having Jurisdiction.
 - .2 Municipal Requirements: Perform hauling and disposal operations in accordance with regulations of Authority Having Jurisdiction.

1.7 SITE CONDITIONS

- .1 Owner will occupy portions of building immediately adjacent to selective demolition area:
 - .1 Conduct selective demolition so that Owner's operations will not be disrupted.
 - .2 Provide not less than 72 hours' notice to Owner, DCC Representative of activities that will affect Owner's operations.
- .2 Maintain access to existing means of egress, walkways, corridors, exits, and other adjacent occupied or used facilities:

- .1 Do not close or obstruct means of egress, walkways, corridors, exits, or other occupied or used facilities without written acceptance from authorities having jurisdiction.
- .3 Departmental Representative, Owner assumes no responsibility for condition of areas to be selectively demolished:
 - .1 Conditions existing at time of Pre Bid Site Review will be maintained by DCC Representative as far as practical.
- .4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify DCC Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - .1 Refer to Section 01 41 00- Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous materials will be as defined in the Hazardous Materials Act.
 - .3 Hazardous materials will be removed by DCC Representative before start of the Work.
 - .4 If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify DCC Representative. Hazardous materials will be removed by DCC Representative under a separate contract or as a change to the Work.

Part 2 Products

2.1 TEMPORARY SUPPORT STRUCTURES

- .1 Design temporary support structures required for demolition work and underpinning and other foundation supports necessary for the project using a qualified professional engineer registered or licensed in province of the Work.

2.2 DESCRIPTION

- .1 This section of the Work includes, but is not necessarily limited to, the following:
 - .1 Demolition, removal completely from site, and disposal of all identified components, materials, equipment and debris
 - .2 Selective demolition to allow new walls, bulkheads, ceilings and other materials to meet existing construction as indicated
 - .3 All material from demolition shall be removed from site immediately with no salvage, selling, sorting or burning permitted on site
 - .4 Retain items indicated on drawings for re use in new construction

2.3 DEBRIS

- .1 Make all arrangements for transport and disposal of all demolished materials from the site.

2.4 EQUIPMENT

- .1 Provide all equipment required for safe and proper demolition of the building interiors indicated.

2.5 REPAIR MATERIALS

- .1 Use repair materials identical to existing materials:
 - .1 If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - .2 Use a material whose installed performance equals or surpasses that of existing material.
 - .3 Comply with material and installation requirements specified in individual Specification Sections.
- .2 Floor Patching and Levelling Compounds: Cement based, trowelable, self levelling compounds compatible with specified floor finishes; gypsum based products are not acceptable for work of this Section.
- .3 Concrete Unit Masonry: Lightweight concrete masonry units, and mortar, cut and trimmed to fit existing opening to be filled. Provide standard hollow core units, square end units and bond beam units as indicated on drawings.
- .4 Prefinished Sheet Steel: Prefinished sheet steel, colour to match existing radiation cabinets, bent and profiled to match existing radiation cabinets.
- .5 Gypsum Board Patching Compounds: Joint compound to ASTM C475/C475M, bedding and finishing types thinned to provide skim coat consistency to patch and prepare existing gypsum board walls ready for new finishes in accordance with Section 09 21 16- Gypsum Board Assemblies.
- .6 Hoarding and Dust Screens: Refer to Section 01 56 00- Temporary Barriers and Enclosures for stud framing and gypsum board sheathing materials.

Part 3 Execution

3.1 EXAMINATION

- .1 Verify that utilities have been disconnected and capped.
- .2 Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- .3 Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- .4 Notify the DCC Representative where existing mechanical, electrical, or structural elements conflict with intended function or design:
 - .1 Investigate and measure the nature and extent of conflict and submit a written report to DCC Representative.

- .2 DCC Representative will issue additional instructions or revise drawings as required to correct conflict.
- .5 Perform surveys as the work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- .1 Coordinate existing services indicated to remain and protect them against damage during selective demolition operations.
- .2 Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - .1 Arrange to shut off affected utilities with utility companies.
 - .2 If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - .3 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- .3 Coordinate with Mechanical and Electrical Divisions for shutting off, disconnecting, removing, and sealing or capping utilities.
- .4 Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- .1 Identify and mark all equipment and materials identified to be retained by DCC Representative or to be re used in subsequent construction. Separate and store items to be retained in an area away from area of demolition and protect from accidental disposal.
- .2 Post warning signs on electrical lines and equipment that must remain energized to serve other areas during period of demolition.
- .3 Confirm that all electrical and telephone service lines entering buildings are not disconnected.
- .4 Do not disrupt active or energized utilities crossing the demolition site.
- .5 Provide and maintain barricades, warning signs, protection for workmen and the public during the full extent of the Work. Read drawings carefully to ascertain extent of protection required.
- .6 Mark all materials required to be re used, store in a safe place until ready for re installation.
- .7 Adjust all junction boxes, receptacles and switch boxes flush with new wall construction where additional layers to existing construction are indicated.
- .8 Remove permanent marker lines used or found on exposed surfaces and at surfaces indicated for subsequent finish materials. Mechanically remove permanent marker lines and associated substrates where permanent marker lines occur and patch surface. Sealing or priming over permanent marker lines is not acceptable.

3.4 SELECTIVE DEMOLITION

- .1 Demolish and dismantle work in a neat and orderly manner and in strict accordance with all regulations.
- .2 At end of each day's work, leave Work in safe condition so that no part is in danger of toppling or falling.
- .3 Demolish in a manner to minimize dusting and to prevent migration of dust.
- .4 Selling or burning of materials on the site is not permitted.
- .5 Fill all openings in concrete block walls with concrete masonry units, coursing to match existing, prepare ready to receive new finishes to match existing.
 - .1 Provide bond beams in new openings cut into existing concrete masonry unit walls.
 - .2 Provide finished end masonry units to patch and repair for new jamb sections in existing concrete masonry unit walls.
- .6 Fill all openings in gypsum board walls with gypsum board and steel framing to match existing, skim coat to make wall smooth and even.
 - .1 Recycle materials in accordance with Section 01 74 19- Waste Management and Disposal.
- .7 Demolish completely all ceiling panels and grid as indicated.
- .8 Patch and repair all walls, floor and ceilings damaged during demolition with material matching adjacent walls, prepare ready for new finishes.
- .9 Patch and repair all radiation cabinets, mechanical equipment and electrical fixtures damaged or exposed during demolition to match adjacent finished surfaces.

3.5 PATCHING AND REPAIRING

- .1 Floors and Walls:
 - .1 Where walls or partitions that are demolished extend from one finished area into another, patch and repair floor and wall surfaces in the new space.
 - .2 Provide a level and smooth surface having uniform finish colour, texture, and appearance.
 - .3 Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform colour and appearance.
 - .4 Patch with durable seams that are as invisible as possible.
 - .5 Provide materials and comply with installation requirements specified in other Sections of these Specifications.
 - .6 Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
 - .7 Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

- .2 Ceilings: patch, repair, or re hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.6 PROTECTION

- .1 Prevent debris from blocking drainage inlets and systems and ground draining, and protect material and electrical systems and services that must remain in operation.
- .2 Arrange demolition and shoring work so that interference with the use of adjoining areas by the DCC Representative and users is minimized.
- .3 Maintain safe access to and egress from occupied areas adjoining.
- .4 Provide and maintain fire prevention equipment and alarms accessible during demolition.

3.7 CLEANING

- .1 Waste Management: Separate waste materials for recycling, reuse in accordance with Section 01 74 19 - Waste Management and Disposal, and as follows:
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.
 - .2 Divert excess materials from landfill to site approved DCC Representative.
 - .3 Promptly as the Work progresses, and on completion, clean up and remove from the site all rubbish and surplus material. Remove rubbish resulting from demolition work daily.
 - .4 Maintain access to exits clean and free of obstruction during removal of debris.
 - .5 Keep surrounding and adjoining roads, lanes, sidewalks, municipal rights of way clean and free of dirt, soil or debris that may be a hazard to vehicles or persons.
 - .6 Transport material designated for alternate disposal using approved facilities listed in CWM Plan and in accordance with applicable regulations.
 - .1 Written authorization from DCC Representative is required to deviate from facilities, haulers, or receiving organizations listed in CWM Plan.
 - .7 Dispose of materials not designated for alternate disposal in accordance with applicable regulations.
 - .1 Disposal facilities must be those approved of and listed in CWM Plan.
 - .2 Written authorization from DCC Representative is required to deviate from disposal facilities listed in CWM Plan.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Environmental Protection Act, 1999 .
 - .1 Export and Import of Hazardous Waste Regulations (SOR/2002-300).
- .2 Health Canada/Workplace Hazardous Materials Information System 2015 (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 National Fire Code of Canada (latest version)
- .4 Transportation of Dangerous Goods Act (TDG Act)(latest version)
- .5 Transportation of Dangerous Goods Regulations (T-19.01-SOR/2003-400).

1.2 DEFINITIONS

- .1 Dangerous Goods: product, substance, or organism that is specifically listed or meets hazard criteria established in Transportation of Dangerous Goods Regulations.
- .2 Hazardous Material: product, substance, or organism that is used for its original purpose; and that is either dangerous goods or a material that may cause adverse impact to environment or adversely affect health of persons, animals, or plant life when released into the environment.
- .3 Hazardous Waste: any hazardous material that is no longer used for its original purpose and that is intended for recycling, treatment or disposal.
- .4 Workplace Hazardous Materials Information System (WHMIS): Canada-wide system designed to give employers and workers information about hazardous materials used in workplace. Under WHMIS, information on hazardous materials is provided on container labels, Material Safety Data Sheets (MSDS), and worker education programs. WHMIS is put into effect by combination of federal and provincial laws.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit to DCC Representative current Material Safety Data Sheet (MSDS) for each hazardous material required prior to bringing hazardous material on site.
 - .2 Submit hazardous materials management plan to DCC Representative that identifies hazardous materials, their use, their location, personal protective equipment requirements, and disposal arrangements.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Co-ordinate storage of hazardous materials with DCC Representative and abide by internal requirements for labelling and storage of materials and wastes.
- .2 Store and handle hazardous materials and wastes in accordance with applicable federal and provincial laws, regulations, codes, and guidelines.
- .3 Store and handle flammable and combustible materials in accordance with current National Fire Code of Canada requirements.
- .4 Keep no more than 45 litres of flammable and combustible liquids such as gasoline, kerosene and naphtha for ready use.
 - .1 Store flammable and combustible liquids in approved safety cans bearing the Underwriters' Laboratory of Canada or Factory Mutual seal of approval.
 - .2 Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes requires the written approval of the DCC Representative.
- .5 Transfer of flammable and combustible liquids is prohibited within buildings.
- .6 Do not transfer of flammable and combustible liquids in vicinity of open flames or heat-producing devices.
- .7 Do not use flammable liquids having flash point below 38 degrees C, such as naphtha or gasoline as solvents or cleaning agents.
- .8 Store flammable and combustible waste liquids for disposal in approved containers located in safe, ventilated area. Keep quantities to minimum.
- .9 Observe smoking regulations, smoking is prohibited in areas where hazardous materials are stored, used, or handled.
- .10 Storage requirements for quantities of hazardous materials and wastes in excess of 5 kg for solids, and 5 litres for liquids:
 - .1 Store hazardous materials and wastes in closed and sealed containers.
 - .2 Label containers of hazardous materials and wastes in accordance with WHMIS.
 - .3 Store hazardous materials and wastes in containers compatible with that material or waste.
 - .4 Segregate incompatible materials and wastes.
 - .5 Ensure that different hazardous materials or hazardous wastes are not mixed.
 - .6 Store hazardous materials and wastes in secure storage area with controlled access.
 - .7 Maintain clear egress from storage area.
 - .8 Store hazardous materials and wastes in location that will prevent them from spilling into environment.
 - .9 Have appropriate emergency spill response equipment available near storage area, including personal protective equipment.
 - .10 Maintain inventory of hazardous materials and wastes, including product name, quantity, and date when storage began.

- .11 Ensure personnel have been trained in accordance with Workplace Hazardous Materials Information System 2015 (WHMIS 2015) requirements.
- .12 Report spills or accidents immediately to DCC Representative. Submit a written spill report to DCC Representative within 24 hours of incident.

1.5 TRANSPORTATION

- .1 Transport hazardous materials and wastes in accordance with federal Transportation of Dangerous Goods Act, Transportation of Dangerous Goods Regulations, and applicable provincial regulations.
- .2 If exporting hazardous waste to another country, ensure compliance with federal Export and Import of Hazardous Waste Regulations.
- .3 If hazardous waste is generated on site:
 - .1 Co-ordinate transportation and disposal with DCC Representative.
 - .2 Ensure compliance with applicable federal, provincial and municipal laws and regulations for generators of hazardous waste.
 - .3 Use licensed carrier authorized by provincial authorities to accept subject material.
 - .4 Prior to shipping material obtain written notice from intended hazardous waste treatment or disposal facility that it will accept material and that it is licensed to accept this material.
 - .5 Label containers with legible, visible safety marks as prescribed by federal and provincial regulations.
 - .6 Ensure that trained personnel handle, offer for transport, or transport dangerous goods.
 - .7 Provide photocopy of shipping documents and waste manifests to DCC Representative.
 - .8 Track receipt of completed manifest from consignee after shipping dangerous goods. Provide a photocopy of completed manifest to DCC Representative.
 - .9 Report discharge, emission, or escape of hazardous materials immediately to DCC Representative and appropriate provincial authority. Take reasonable measures to control release.

Part 2 Products

2.1 MATERIALS

- .1 Only bring on site quantity of hazardous materials required to perform work.
- .2 Maintain MSDS in proximity to where materials are being used. Communicate this location to personnel who may have contact with hazardous materials.

Part 3 Execution

3.1 DISPOSAL

- .1 Dispose of hazardous waste materials in accordance with applicable federal and provincial acts, regulations, and guidelines.
- .2 Recycle hazardous wastes for which there is approved, cost effective recycling process available.
- .3 Send hazardous wastes to authorized hazardous waste disposal or treatment facilities.
- .4 Burning, diluting, or mixing hazardous wastes for purpose of disposal is prohibited.
- .5 Disposal of hazardous materials in waterways, storm or sanitary sewers, or in municipal solid waste landfills is prohibited.
- .6 Dispose of hazardous wastes in timely fashion in accordance with applicable provincial regulations.
- .7 Minimize generation of hazardous waste to maximum extent practicable. Take necessary precautions to avoid mixing clean and contaminated wastes.
- .8 Identify and evaluate recycling and reclamation options as alternatives to land disposal, such as:
 - .1 Hazardous wastes recycled in manner constituting disposal.
 - .2 Hazardous waste burned for energy recovery.
 - .3 Lead-acid battery recycling.
 - .4 Hazardous wastes with economically recoverable precious metals.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 52 00 Modified Bituminous Membrane Roofing.

1.2 REFERENCES

- .1 CSA International
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-O141-05, Softwood Lumber.
 - .3 CSA O151-09, Canadian Softwood Plywood.
- .2 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2000.

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 rough carpentry work and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 QUALITY ASSURANCE

- .1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood identification: by grade mark in accordance with applicable CSA standards.

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, in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wood from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
 - .1 CAN/CSA-O141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 FSC certified.
- .2 Canadian Softwood Plywood (CSP) : to CSA O151, standard construction
- .3 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 S2S is acceptable.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.

2.2 ACCESSORIES

- .1 Fasteners: to CAN/CSA-G164.
- .2 Nails, spikes and staples: to CSA B111.
- .3 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.
- .4 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for rough carpentry installation in accordance with manufacturer's written instructions.
 - .1 Inform DCC Representative of unacceptable conditions immediately upon discovery.
 - .2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from DCC Representative.

3.2 INSTALLATION

- .1 Comply with requirements of NBC, supplemented by the following paragraphs.
- .2 Install furring and blocking as required.
- .3 Align and plumb faces of furring and blocking to tolerance of 1:600.

- .4 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .5 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.
- .6 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .7 Countersink bolts where necessary to provide clearance for other work.

3.3 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 REQUIREMENTS

- .1 Section 06 08 99 Rough Carpentry for Minor Works.
- .2 Section 07 62 00 Sheet Metal Flashing and Trim

1.2 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 37-GP-9Ma-83, Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing.
 - .2 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
 - .3 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.
- .2 Canadian Roofing Contractors Association (CRCA)
 - .1 CRCA Roofing Specifications Manual-1997.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA A123.21-04, Standard Test Method for the Dynamic Wind Uplift Resistance of Mechanically Attached Membrane-Roofing Systems
 - .2 CSA-A123.3-05, Asphalt Saturated Organic Roofing Felt.
 - .3 CSA-A123.4-04, Asphalt for Constructing Built-Up Roof Coverings and Waterproofing Systems.
 - .4 CSA O151-04, Canadian Softwood Plywood.
- .4 Factory Mutual (FM Global)
 - .1 FM Approvals - Roofing Products.
- .5 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 Underwriters Laboratories' of Canada (ULC)
 - .1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.3 WORK INCLUDED

- .1 Remove roof mounted equipment and attachments for disposal as indicated and as directed by DCC Representative. Remove other roof mounted equipment items to permit re-roofing, protect removed items for reinstallation.

- .2 Remove and dispose of existing two-ply modified bituminous roofing system including flashings, bitumen felts and insulation to concrete deck, in area as indicated on drawings.
- .3 Remove and dispose of metal fascia and flashings. Remove fascia board and cants. Remove deteriorated wood blocking as directed by DCC Representative.
- .4 Remove roof drains, as indicated.
- .5 On roof, supply and install new:
 - .1 Wood blocking, cants and fascia board.
 - .2 Vapour barrier.
 - .3 75m Rigid roof insulation.
 - .4 12.7mm fiberboard overlay.
 - .5 Two-ply modified bituminous roofing membrane.
 - .6 Membrane flashings.
 - .7 Prefinished metal fascia and flashings.
 - .8 Vent pipe stack flashing.
 - .9 Roof retrofit drains.
 - .10 Gas line supports.
 - .11 Electrical service roof penetration flashings.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and DCC 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.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide two copies of WHMIS MSDS and indicate VOC content for:
 - .1 Primers.
 - .2 Asphalt.
 - .3 Sealers.
 - .4 Filter fabric.
- .3 Provide shop drawings:
 - .1 Indicate flashing details.

- .4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .5 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.
- .6 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control

1.6 FIRE PROTECTION

- .1 Fire Extinguishers:
 - .1 Maintain one stored pressure rechargeable type with hose and shut-off nozzle,
 - .2 ULC labelled for A, B and C class protection.
 - .3 Size 9kg on roof per torch applicator, within 6 m of torch applicator.
- .2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Storage and Handling Requirements:
 - .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
 - .2 Provide and maintain dry, off-ground weatherproof storage.
 - .3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
 - .4 Remove only in quantities required for same day use.
 - .5 Place plywood runways over completed Work to enable movement of material and other traffic.
 - .6 Store sealants at +5 degrees C minimum.
 - .7 Store insulation protected from daylight and weather and deleterious materials.

1.8 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C to manufacturers' recommendations for mop application.
 - .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
- .2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.9 WARRANTY

- .1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to 60 months.

Part 2 Products

2.1 PERFORMANCE CRITERIA

- .1 Compatibility between components of roofing system is essential. Provide written declaration to DCC Representative stating that materials and components, as assembled in system, meet this requirement.

2.2 DECK PRIMER

- .1 Asphalt primer: to CGSB 37-GP-9Ma.

2.3 VAPOR RETARDER

- .1 Two-ply bituminous membrane consisting of:
 - .1 No. 15 asphalt saturated organic roofing felts to CSA A123.3.

2.4 MEMBRANE

- .1 Base sheet: to CGSB 37-GP-56M glass fibres to ASTM D 6163
 - .1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated sheet, glass reinforcement, having nominal weight of 180 g/m².
 - .2 Type 2, fully adhered.
 - .3 Class C - plain surfaced.
 - .4 Grade 1- standard service
 - .5 Top and bottom surfaces:
 - .1 Sanded/polyethylene.
 - .6 Base sheet membrane properties: to CGSB 37-GP-56M
 - .1 Strain energy (longitudinal/transversal): 9.0/7.0 kN/m.
 - .2 Breaking strength (longitudinal/transversal): 17.0/18.0 N/5 cm.
 - .3 Ultimate elongation (longitudinal/transversal): 60/70%.
 - .4 Tear resistance: 85 N.
 - .5 Cold bending at -30 degrees C : no cracking.
 - .6 Softening point: \leq 110 degrees C.
 - .7 Static puncture resistance: > 400 .
 - .8 Dimensional Stability: -0.3 / 0.3 %.
 - .7 ULC certification: Class A
- .2 Cap sheet membrane: to CGSB 37-GP-56M glass fibres to ASTM D 6163
 - .1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer, prefabricated sheet, glass reinforcement, having nominal weight of 250 g/m².
 - .2 Type 1 fully adhered.
 - .3 Class A-granule surfaced.

- .1 Refer to Section 06 08 99 – Rough Carpentry for Minor Works.

2.11 CANT STRIPS

- .1 Cut from pressure-treated wood material, to measure 140 mm on slope.

2.12 FASTENERS

- .1 Insulation to deck: coated insulation fasteners and galvanized plates must meet FM Approval for wind uplift and corrosion resistance, as recommended by insulation manufacturer.

2.13 ACCESSORIES

- .1 Adhesive: listed by ULC under Roof Deck Construction Material Guide No. 360 R13 and as recommended by manufacturer of material be adhered and for use climatic conditions to be encountered.
- .2 Nails: to CSA B111-1974, hot dipped galvanized.
- .3 Mechanical fasteners: as approved by ULC or Factory Mutual, length to suit application.
- .4 Sealing compound: to CAN/CGSB-19.13-M87.
- .5 Polyethylene back-up rope: extruded closed cell foam, Shore A hardness 20, tensile strength 140 kPa, compatible with primers and sealants, oversized 30 to 50%.
- .6 Pipe supports: (single insulated pipe): adjustable height hollow aluminum with mill finish, urethane insulated supports, various dia., with appropriate hardware (adhesive type supplied by others) for fastening to structural roof deck, and type 304 stainless steel pipe cradle assembly sized to suit actual O.D.
- .7 Pipe penetration sleeve flashing: Aluminum Pre-Insulated Flashing for Rigid Conduit minimum 300 mm high with 100 mm flange at base with EPDM Triple Pressure Grommet Seal at top and EPDM Base Seal. Fill remaining space as a pitch pocket with no surfaces for standing water. Size to suit pipe penetration sizes.
- .8 Conduit penetration sleeve flashing: Aluminum Pre-Insulated Flashing for Rigid Conduit minimum 300 mm high with 100 mm flange at base with EPDM Triple Pressure Grommet Seal at top and EPDM Base Seal. Fill remaining space as a pitch pocket with no surfaces for standing water. Size, number and type to suit conduit / pipe penetration sizes.
- .9 Exhaust vent sleeve flashing: Aluminum Exhaust Vent Flashing - General Purpose to be insulated and minimum 300 mm high and 100 mm flange. Provide perforated collar and removable hood all in aluminum. Diameter to suit exhaust vent.
- .10 Gas Pipe Supports: Non Penetrating adjustable roof top supports. Type 4 polystyrene insulation 100 x 400mm, 50mm thick with preservative treated wood blocking, galvanized 'U' clamps, as detailed on drawing.
- .11 Roof drain: Standard roof drain with cast iron body with aluminum or cast iron dome, under-deck clamp to suit roof construction, complete with flashing clamp ring.

3.1 QUALITY OF WORK

- .1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual.
- .2 Do priming in accordance with manufacturers written recommendations.
- .3 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

- .1 Verification of Conditions:
 - .1 Inspect with DCC Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.
- .2 Evaluation and Assessment:
 - .1 Prior to beginning of work ensure:
 - .1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
 - .2 Curbs have been built.
 - .3 Roof drains have been installed at proper elevations relative to finished roof surface.
 - .4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.
- .3 Do not install roofing materials during rain or snowfall.
- .4 Insert metal flashing under cap flashing to form weather tight junction.

3.3 PROTECTION OF IN-PLACE CONDITIONS

- .1 Cover walls, walks and adjacent work where materials hoisted or used.
- .2 Use warning signs and barriers. Maintain in good order until completion of Work.
- .3 Clean off drips and smears of bituminous material immediately.
- .5 Protect roof from traffic and damage. Comply with precautions deemed necessary by DCC Representative.
- .6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.
- .7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.4 PRIMING DECK

- .1 Apply deck primer to concrete roofing substrate at the rate recommended by manufacturer

3.5 VAPOUR RETARDER (CONCRETE DECK)

- .1 Embed two ply of felts organic in hot bitumen spread at rate of 1 kg/m² for organic asphalt.

3.6 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

- .1 Insulation: fully adhered, adhesive application:
 - .1 Adhere insulation to laminated vapour barrier using solvent-based adhesive.
 - .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
 - .3 Cut end pieces to suit.
 - .4 Apply adhesive in continuous ribbons at 300 mm on centre.
 - .5 Separate the membrane and insulation with a drainage layer or slipsheet.
- .2 Insulation: fully adhered, bitumen application:
 - .1 Embed insulation in 1 to 1.5 kg/m² mopping of bitumen.
 - .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
 - .3 Cut end pieces to suit.
- .3 Overlay Board: adhesive application:
 - .1 Adhere overlay board to insulation with vulcanized adhesive at the rate of one litre per m².
 - .2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.
 - .3 Cut ends to suit and apply adhesive in continuous ribbons at 300 mm on centre.
- .4 Base sheet application:
 - .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
 - .2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m², at 230 degrees C.
 - .3 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.
 - .4 Application to be free of blisters, wrinkles and fishmouths.
- .5 Cap sheet application:
 - .1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.
 - .2 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/m², EVT at point of contact.
 - .3 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
 - .4 Application to be free of blisters, fishmouths and wrinkles.

- .5 Do membrane application in accordance with manufacturer's recommendations.
- .6 Flashings:
 - .1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
 - .2 Mop base and cap sheet onto substrate in 1 metre wide strips.
 - .3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.
 - .4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
 - .5 Provide 75 mm minimum side lap and seal.
 - .6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
 - .7 Do work in accordance with Section 07 62 00 - Sheet Metal Flashing and Trim.
- .7 Roof penetrations:
 - .1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.7 CANTS

- .1 Install fiber cants over rigid insulation.
- .2 Apply hot bitumen to receiving surface and embed cant firmly by hand.
- .3 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90 degrees.

3.8 FIELD QUALITY CONTROL

- .1 Inspections:
 - .1 Inspection and testing of roofing application will be carried out by testing laboratory designated by DCC Representative.

3.9 CLEANING

- .1 Remove bituminous markings from finished surfaces.
- .2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- .3 Repair or replace defaced or disfigured finishes caused by work of this section.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 07 52 00 Modified Bituminous Membrane Roofing

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A 792/A 792M-06a, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .3 ASTM D 523-89(1999), Standard Test Method for Specular Gloss.
- .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual 1997.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA A123.3-05, Asphalt Saturated Organic Roofing Felt.
 - .2 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 43 - Environmental Procedures.
- .3 Shop Drawings:
 - .1 Shop drawings: submit drawings stamped and signed by professional engineer registered in Province of Ontario.
- .4 Samples:
 - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.
- .5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
 - .2 Manufacturer's Field Reports: submit to manufacturer's written reports within 3

days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative and DCC 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.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.

Part 2 Products

2.1 SHEET METAL MATERIALS

- .1 Zinc coated steel sheet: steel of adequate thickness to perform function intended, commercial quality to ASTM A 653/A 653M, with Z275 designation zinc coating.

2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied polyvinyl chloride.
 - .1 Class F2S.
 - .2 Colour selected DCC Representative from manufacturer's standard range.
 - .3 Specular gloss: 30 units +/- 5 in accordance with ASTM D 523.
 - .4 Coating thickness: not less than 200 micrometres.
 - .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D 822 as follows:
 - .1 Outdoor exposure period 5000 hours.
 - .2 Humidity resistance exposure period 5000 hours.

2.3 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Plastic cement: to CAN/CGSB 37.5.
 - .1 Maximum VOC limit 50 g/L to SCAQMD Rule 1168.
- .3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32
- .4 Sealants: Maximum VOC limit 50 g/L to SCAQMD Rule 1168.
- .5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness

same as sheet metal being secured.

- .6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.
- .7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .8 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.
- .9 Touch-up paint: as recommended by prefinished material manufacturer.
 - .1 Maximum VOC limit 150 g/L to Standard GS-11 to SCAQMD Rule 1113.

2.5 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and as indicated.
- .2 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 12 mm.
 - .1 Mitre and seal corners with sealant.
- .4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- .5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.6 METAL FLASHINGS

- .1 Form flashings, copings and fascias to profiles indicated of 26 gauge thick prefinished steel

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 INSTALLATION

- .1 Install sheet metal work in accordance with CRCA FL series details, and as detailed.
- .2 Use concealed fastenings except where approved before installation.
- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and

curbs.

- .1 Flash joints using standing seams forming tight fit over hook strips.
- .5 Lock end joints and caulk with sealant.
- .6 Install surface mounted reglets true and level, and caulk top of reglet with sealant.
- .7 Insert metal flashing under cap flashing to form weather tight junction.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Provide manufacturer's field services consisting of product use **recommendations** and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 SYSTEMS DESCRIPTION

- .1 This Section specifies fire stop systems and/or fire stop materials intended to fill gaps between fire separations, between fire separations and other construction assemblies, or used in or around items which fully or partially penetrate a fire separation, to restrict the spread of fire and smoke thus maintaining the integrity of a fire separation.
- .2 This Section includes requirements for:
 - .1 Through-penetration fire stops:
 - .1 For openings created to allow a penetrating item such as piping, conduits, raceways, ducts, cable trays, cables, tubing or structural components to pass completely through a fire separation or fire-resistance rated assembly.
 - .2 Membrane penetration fire stops:
 - .1 For openings where penetrating items such as piping, conduits, raceways, ducts, cable trays, cables, tubing, recessed components (e.g.: panels, electric boxes, devices) or structural components pass through only one membrane of a fire separation or fire-resistance rated assembly.
 - .3 Blank opening fire stops:
 - .1 For openings created in a fire separation where the penetrating item has not yet been installed or has been removed.
 - .4 Construction joint fire stops:
 - .1 For locations where adjacent fire separations or components of fire separations meet. These locations include: ceiling/wall and roof/wall joints, wall/wall joints at corners or in the same plane, wall/floor joints, floor/floor joints and ceiling/ceiling joints.
 - .2 Includes fire stops for seismic joints, vertical control joints, expansion joints, and joints which occur at the tops and bottoms of fire separation walls.
 - .3 Includes fire stops for head of wall to non-rated roof or floor assemblies.
 - .5 Building perimeter fire stops:
 - .1 For the space between a fire-resistance rated floor assembly and the curtain wall (e.g.: safing slot gaps).
- .3 This Section includes fire stopping work for entire Project including selection, installation and inspection of all required fire stops.

1.2 RELATED REQUIREMENTS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 61 00 – Common Product Requirements
- .3 Section 01 74 11 – Cleaning
- .4 Section 02 81 01 – Hazardous Materials

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM E595-15, Standard Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment.
 - .2 ASTM E2032-09 (2013), Standard Guide for Extension of Data From Fire Resistance Tests Conducted in Accordance with ASTM E 119.
 - .3 ASTM E2174-14b, Standard Practice for On-Site Inspection of Installed Firestops.
 - .4 ASTM E2307-15be1, Standard Test Method for Determining Fire Resistance of Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.
 - .5 ASTM E2393-10a(2015), Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
 - .6 ASTM E2837- 13 (2017), Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.
- .2 Firestop Contractors International Association (FCIA)
 - .1 FCIA Firestop Manual of Practice, 6th Edition 2015.
- .3 Factory Mutual Approvals (FM)
 - .1 FM 4991, Approval Standard for Firestop Contractors.
- .4 International Accreditation Service (IAS)
 - .1 IAS AC291, Accreditation Criteria for Special Inspection Agencies.
- .5 International Firestop Council (IFC)
 - .1 IFC Guidelines for Evaluating Engineering Judgments.
 - .2 IFC Guidelines for Evaluating Engineering Judgments - Perimeter Fire Barrier Systems.
 - .3 IFC Inspection Guidelines for Penetration Firestop Systems and Fire Resistive Joint Systems in Fire Resistance Rated Construction, 5th Edition.
- .6 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .7 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S115-11 (R2016), Standard Method of Fire Tests of Firestop Systems.
 - .2 ULC Qualified Firestop Contractor Program.

1.4 DEFINITIONS

- .1 Fire Blocking: materials, components or system installed in a concealed space in the building to restrict the spread of fire and smoke in that concealed space or from that concealed space to an adjacent space.
- .2 Fire Stop: a material, component or system, and its means of support, used to protect gaps between fire separations, between fire separations and other construction assemblies, or

- used in openings where penetrating items wholly or partially penetrate fire separations, to restrict the spread of fire and smoke thus maintaining the fire-resistance continuity of a fire separation.
- .3 Fire Stop System: the combination of specific materials and/or devices required with the penetrating item(s), the assembly and the opening to assemble the fire stop.
 - .4 Intumescent: materials that expand with heat to prevent fire spread through fire separations.
 - .5 Listed Fire Stop System: a specific field erected construction consisting of the assembly, fire stop materials, any penetrating items and their means of support which have met the requirements for an F, FT, FH, FTH and/or L rating when tested in a fire-resistance rated assembly in accordance with CAN/ULC-S115 - Standard Method of Fire Tests of Firestop Systems.
 - .1 F-Rating: the amount of time a fire stop system can remain in place without the passage of flame through the opening or the occurrence of flaming on the unexposed face of the fire stop.
 - .2 FT-Rating: a fire stop system with an F-Rating for the required time period which can also resist the transmission of heat through the fire stop during the same period and limit the rise in temperature on the unexposed face and/or penetrating item of the fire stop.
 - .3 FH-Rating: a fire stop system with an F-Rating for the required time period which can also resist the force of a hose stream without developing openings for a prescribed period.
 - .4 FTH-Rating: a fire stop system with an FT-Rating for the required time period which also passed the hose stream test for a prescribed period.
 - .5 L-Rating: largest test sample leakage rate, determined in accordance with the optional air leakage test of CAN/ULC-S115.
 - .6 Multi-penetration: two or more service penetrations through an opening in the fire separation.
 - .7 Non-rated Fire Separation: fire separation acting as a barrier to the spread of smoke until a response is initiated such as the activation of a fire suppression system.
 - .8 Single-penetration: single service penetration through an opening in the fire separation.
 - .9 System Design Listing: document providing proof of testing with technical details, specifications and requirements that leads to the application of a specific listed fire stop system.

1.5 PRE-INSTALLATION MEETINGS

- .1 Convene pre-installation meeting two weeks prior to beginning work of this Section, with DCC Representative and Contractor's representative to:
 - .1 Verify Project requirements.
 - .2 Review sustainable requirements.
 - .3 Review installation and substrate conditions.
 - .4 Coordinate with other building trades.

- .5 Review system design listings, manufacturer's installation instructions and warranty requirements.
- .6 Review quantity and location of mock-ups.
- .2 Convene pre-installation meetings with other trades to review:
 - .1 Installation procedures and precautions.
 - .2 Location, scheduling and sequencing of other work around fire stops that can affect the outcome of the installation.
 - .3 Requirements for annular opening sizes.
 - .4 Requirements and preparations for wall/floor single and multi-penetrations.
 - .5 Requirements for construction and perimeter joints.
 - .6 Mock-up requirements.
- .3 Submit copies of applicable listed fire stop system details to each trade for opening preparation. Include installation details required for the listed system.
- .4 Meeting minutes: Contractor to take minutes of pre-installation meetings and distribute to DCC Representative and each affected trades.

1.6 SEQUENCING

- .1 Proceed with installation only when submittals have been reviewed by DCC Representative.
- .2 Fire stops located in floor assemblies: install before interior partition erections.
- .3 Metal deck bonding: unless noted otherwise on system design listing and manufacturer's installation instructions, fire stopping to precede spray applied fireproofing to ensure required bonding.
- .4 Pipe and duct insulation: certified fire stop system component.
 - .1 Ensure pipe and duct insulation installation precedes fire stopping.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Qualification Statement
 - .1 Submit contractor qualification statements and certificates demonstrating compliance with the qualification requirements of this Section, as described in PART 1 - QUALITY ASSURANCE, within 10 working days after award of contract and before starting Work.
- .3 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet. Submit complete product data for each individual component and include:
 - .1 Product name and product number.
 - .2 Product characteristics and performance criteria.
 - .3 Physical size, finish and limitations.
 - .4 Technical data on out-gassing, off-gassing and age testing.

- .5 Curing time.
- .6 Chemical compatibility to other construction materials.
- .7 Shelf life.
- .8 Life expectancy.
- .9 Temperature range for installation.
- .10 Humidity range for installation.
- .11 Sound attenuation STC-Rating.
- .2 Manufacture Product Certification:
 - .1 Submit certification by the manufacturer that products supplied comply with local regulations controlling use of Volatile Organic Compounds (VOC's) and are non-toxic to building occupants.
 - .2 Submit test reports showing compliance to ASTM E595.
- .3 For each individual component, Submit copies of WHMIS Safety Data Sheets (SDS) in accordance with Section 02 81 00 - Hazardous Materials.
- .4 Submit a comprehensive list of all products and components included in submittal.
- .4 Shop Drawings:
 - .1 Submit shop drawings showing system design listings for Project including proposed materials, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details to accurately reflect actual job conditions for each product and assembly.
 - .3 Submit details for materials and prefabricated devices.
 - .4 Submit electronic copy and printed copy in hard covered D-ring binder of shop drawings and include:
 - .1 Title page, labelled "Fire and Smoke Stop System Listings". Include project name, date and the names of the installation company and the manufacturer of proposed products. Insert title in front and spine of binder.
 - .2 Table of Contents at the front of each binder.
 - .3 List of each proposed listed fire stop system and corresponding service penetration type or joint type in a matrix spreadsheet schedule, indicating floor and wall system, including rating for each.
 - .4 Location of penetrations:
 - .1 Drawings showing the location of each penetration with a unique penetration identification number and associated listing number.
 - .2 Schedules listing each penetration with a unique identification number, their associated listing number, organized by floor, wall and ceiling area and indicating each room number.
 - .5 System Design Listings:
 - .1 Submit CAN/ULC-S115 design listings for each listed fire stop system and each application identified.

- .2 When more than one product is specified for the listed fire stop system or more than one packing/damming material is indicated, identify the item that will be used on this Project.
 - .6 Certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .6 Samples: submit to DCC Representative minimum one week prior to commencing on site work:
 - .1 Duplicate 300 x 300 mm samples of each system showing actual fire stop materials proposed for Project including anchors/fasteners and damming materials.
 - .2 Duplicate samples of each type of label proposed for the identification of fire stops.
- .7 Engineering Judgments:
 - .1 Where there is no specific tested listed fire stop system available from the manufacturer for a particular fire stop configuration, review systems from other manufacturers to obtain a listed fire stop system.
 - .2 Submit an Engineering Judgment (EJ) from the system manufacturer if there are no listed systems available from other manufacturers.
 - .3 Prepare and submit an EJ in accordance with best practices established in the following documents:
 - .1 IFC Guidelines for Evaluating Engineering Judgments.
 - .2 IFC Guidelines for Evaluating Engineering Judgments - Perimeter Fire Barrier Systems.
 - .4 For each EJ submitted, include:
 - .1 Project name, number and location.
 - .2 A description of the proposed system with detailed drawing.
 - .3 Installation instructions.
 - .4 Complete descriptions of critical elements for the fire stop configuration.
 - .5 Copies of all referenced system design listings on which the EJ is based on.
 - .6 EJ issuer name and contact information.
 - .7 Date of issue of EJ with authorization signature of issuer.
 - .8 Manufacturer letter stating their opinion, with supporting justification, that the EJ will perform as a fire stop system were it to be subjected to the appropriate standard fire test method for the required fire rating duration.
- .8 Once the EJ has been reviewed, submit the EJ to the authority having jurisdiction for final approval.
- .9 EJ shall be issued only by fire stop manufacturer's qualified technical personnel or in concert with the manufacturer by a knowledgeable registered Professional Engineer, a

Fire Protection Engineer or an independent testing agency that provides testing and listing services for fire stop systems similar to the EJ being contemplated.

- .10 EJ shall be based upon interpolations of previously tested fire stop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the Engineering Judgment is to be given. Additional knowledge and technical interpretations based upon accepted engineering principles, fire science and fire testing guidelines (e.g.: ASTM E2032) may also be used as further support data.
- .11 EJ shall be based upon knowledge of the elements of the construction to be protected and understanding of the probable behaviour of that construction and the recommended fire stop system protecting it were they to be subjected to the adequate standard fire test method for the required fire rating duration.
- .12 EJ shall be limited to the specific conditions and configurations upon which EJ was rendered and should be based upon reasonable performance expectations for the recommended fire stop system under those conditions.
- .13 EJ shall be accepted only for a single specific job and location and should not be transferred to any other job or location without thorough and appropriate review of all aspects of the next job or location's circumstances.
- .14 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.8 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual. Include:
 - .1 WHMIS Safety Data Sheets (SDS).
 - .2 Product data and manufacturer's installation and maintenance instructions for each product/system used on this project.
 - .3 Approved system design listings and Engineering Judgments.
 - .4 Matrix schedule listing all system design listings and Engineering Judgments with a description of their penetration or joint type.
 - .5 Certifications:
 - .1 Proof of company as a FCIA - Member in Good Standing.
 - .2 Accreditation of third-party inspection firm.
 - .6 Manufacturer's field reports.
 - .7 Warranty information on fire stop installations.
 - .8 Life expectancy of each product installed as part of Project. For each system, list the installation date of products and the expected expiration date (month/year).
- .3 Record Documentation:
 - .1 Maintain a daily log of all activities on site during the course of construction. Submit a copy of all daily logs after completion of fire stopping work.
 - .2 As-built Drawings:

- .1 Submit marked-up set of drawings to provide referencing system identifying the location of each fire stop.
- .2 Identify each penetration type fire stop with their penetration identification number.
- .3 Provide detailed drawings of system design listings for each type of fire stop (i.e.: through-penetration, membrane penetration, blank opening, construction joint, building perimeter).
- .3 Fire Stop Schedules:
 - .1 Submit complete fire stop schedules for floors, walls and ceilings.
 - .2 Indicate all penetration fire stops and joint fire stops through each reference wall, floor and ceiling in the schedules.
 - .3 Cross-reference fire stop schedules with as-built drawings and indicate design listing numbers associated to each penetration fire stop and joint fire stop.

1.9 QUALITY ASSURANCE

- .1 Provide systems selection and analysis, installation, and inspection of fire stop systems in accordance with the recommended practices detailed in the following guides:
 - .1 FCIA Firestop Manual of Practice (MOP).
- .2 Qualifications:
 - .1 Contractor specializing in selection and installation of fire stops approved by manufacturer.
 - .2 Company recognized as a Member in Good Standing with the Firestop Contractors International Association (FCIA). Submit written proof of current membership.
 - .3 Training: workers, including site supervisor, to have completed:
 - .1 Manufacturer training on the products/systems installed as part of this Section.
 - .2 Training under the FCIA Firestop Containment Worker Education Program.
 - .4 Certified Firestop Contractor: company certified with one of the following programs:
 - .1 ULC Qualified Firestop Contractor Program. Submit signed copy of ULC Qualified Firestop Contractor Program certificate.
 - .2 FM 4991 Approved Firestop Contractor. Submit signed copy of FM 4991 Approval certificate.
 - .5 Third-Party Inspection Firm: IAS AC291 Accredited inspection agency with inspectors who have passed the ULC Firestop Exam or FM Firestop Exam.
- .3 Mock-ups:
 - .1 Construct mock-up of fire stop systems in accordance with Section 01 45 00 - Quality Control.
 - .2 Prior to commencement of construction, provide mock-up of each proposed listed fire stop system for review by DCC Representative. Mock-up shall include

- work by other trades to demonstrate the required finish work, such as steel stud/gypsum board trade framing out multi-penetrations openings.
- .3 Install proposed identification labels for each penetration.
- .4 Locations for mock-ups as directed by the DCC Representative.
- .5 Once a mock-up is completed and materials had adequate time to properly cure, provide minimum of 48 hours written notification to DCC Representative to conduct review.
- .6 Manufacturer's representative and inspection firm to be present during review of mock-ups.
- .7 Correct mock-up deficiencies as directed by DCC Representative.
- .8 When accepted, mock-ups will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.
- .9 DCC Representative may perform destructive tests to each mock-up to ensure the system meets or exceeds the approved system design listing.
- .4 Manufacturer Site Visits: 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 the mock-up review.
 - .3 Three times during progress of Work at 30%, 60% and 90% completion stages. Confirm completion percentages with DCC Representative.
 - .4 Upon completion of Work, after cleaning is carried out.

1.10 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings, manufacturing date, and shelf life expiry date.
- .2 Storage and Protection:
 - .1 Store materials in dry location, indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective, expired or damaged materials with new.
 - .3 Coordinate delivery of materials with scheduled installation dates to allow minimum storage time on site.
 - .4 Comply with recommended procedures, precautions and measures described in WHMIS Safety Data Sheets (SDS).
- .3 Waste Management and Disposal:

- .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

1.11 FIELD CONDITIONS

- .1 Ambient Conditions:
 - .1 Install fire stops when ambient and substrate temperatures are within the limits prescribed by the manufacturer and when the substrate is dry and without risk of condensation.
 - .2 Maintain manufacturer's recommended ambient and substrate temperatures for 48 hours before and 72 hours after installation.
- .2 Ventilate fire stops in accordance with manufacturers' instructions by natural means or where this is inadequate using forced air circulation.

1.12 WARRANTY

- .1 For the Work of this Section 07 84 00 - Fire Stopping, the 12 month warranty period is extended to 24 months.
- .2 Manufacturers shall warrant work of this section against defects and deficiencies in the product material for a period of 24 months. Promptly correct any defects or deficiencies, which become apparent within warranty period at no expense.
- .3 Contractor shall warrant workmanship on materials and installation for a period of 24 months. Promptly correct any defects or deficiencies which become apparent within warranty period at no expense.

Part 2 Products

2.1 MANUFACTURERS

- .1 Provide products from a single manufacturer, to the greatest extent possible, to perform all fire stopping work. Materials of different manufacturers will not be permitted without written authorization from DCC Representative.
- .2 Where there is no specific tested listed fire stop system available from the manufacturer for a particular fire stopping application, provide a listed system from an alternative manufacturer to avoid providing an Engineering Judgment.

2.2 DESIGN/PERFORMANCE CRITERIA

- .1 Fire stop and smoke stop systems and systems providing a barrier to smoke spread consisting of a material or combination of materials installed to maintain the integrity of the fire resistance rating of a fire separation in accordance with the requirements of NBC-2015.
- .2 Non-rated fire separations: provide L-Rated smoke protection fire stop system for application on both sides of separation.
- .3 Dynamic joints: where required, fire and smoke stop systems to be designed to accommodate a defined amount of movement to account for expansion or contraction in

- construction joints and mechanical piping, for movement in structural elements and to accommodate for movement and sound and vibration control in mechanical installations.
- .4 Insulated pipes and ducts: listed fire stop system designed and tested with actual insulation materials penetrating the fire separation, as indicated on the system design listing.
 - .5 Use in wet areas: water based products are unacceptable in wet areas or areas that may be subject to occasional water exposure or flooding during and after construction.
 - .6 Architectural considerations: when exposed to view, fire stop system to consider architectural finish, potential traffic, and exposure to moisture and heat.
 - .7 Environment considerations: materials selected to consider the environment in which they will be used during and after curing as well as the intended use of space. Fire stop manufacturer to confirm compatibility of the proposed materials/products for the following cases:
 - .1 Spaces requiring resistance to infection and biological spread through assemblies.
 - .2 Spaces containing sensitive electronic equipment.
 - .3 Preventing contamination of laboratory and manufacturing environments.

2.3 MATERIALS

- .1 Fire stop and smoke stop systems: in accordance with CAN-ULC-S115.
 - .1 Asbestos-free materials and systems capable of maintaining effective barrier against the passage of flame, smoke and water and the transmission of heat in compliance with requirements of CAN-ULC-S115 and not to exceed opening sizes for which they are intended, as indicated on System Design Listing.
 - .2 Fire stop system rating: to match fire resistance rating of fire separation as indicated on drawings.
 - .3 Service penetration assemblies and fire stop components: certified by test laboratory to CAN/ULC-S115.
- .2 Fire and smoke stop systems at openings intended for re-entry such as cables: provide elastomeric seal or non-shrink foam cement mortar.
- .3 Fire and smoke stop systems at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: provide elastomeric protection.
- .4 Fire and smoke stops behind and around mechanical and electrical boxes within wall, floor and ceiling assemblies: provide elastomeric seal.
- .5 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
- .6 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
- .7 Packing/damming materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.
- .8 Fire stop insulation: pre-formed, semi rigid, non-combustible mineral wool, pre-cut in 1220 mm lengths to required depth and width.

- .9 Junction box/outlet sealing putty: intumescent putty, pre-formed in pads.
- .10 Sealants: good adhesion without use of primer, high visibility safety colours.
 - .1 Flame spread rating: maximum 25.
 - .2 Smoke development classification: maximum 50.
 - .3 For vertical joints: non-sagging.
 - .4 For horizontal joints: single component, self-levelling.

2.4 FIRE STOP IDENTIFICATION

- .1 Identification labels and markings to be indelible for the expected service life of the installation.
- .2 Fire Stopped Penetrations:
 - .1 Provide identification labels at each penetration.
 - .2 Identification labels: with metal fastening device with the following information:
 - .1 Penetration number.
 - .2 Floor number.
 - .3 Room number.
 - .4 Product name and number.
 - .5 System Design number.
 - .6 Fire Rating Required: in hours.
 - .7 Fire Stop Contractor's Name and phone number.
 - .8 Installer's Name.
 - .9 Date of Installation.
 - .10 Re-penetrated by: Company, Installer and Date.
 - .3 Label shall state that the fill material around the penetration is a fire stop system and it shall not be disturbed except by authorized personnel.
- .3 Fire Separation (Barrier) Markings:
 - .1 Provide identification for all vertical fire separations.
 - .2 Identification markings: stencil painted with lettering at least 75 mm in height with a minimum 10 mm stroke in contrasting colour.
 - .3 Marking to incorporate the assembly's fire-resistance rating and the following suggested wording, "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS", or other accepted wording.
- .4 Include horizontal 75 mm red in width, between identification markings.
- .5 For occupied areas with exposed ceilings: use 50 mm without horizontal painted lines.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

- .1 Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions and approved system design listings for each condition.
- .2 Verify each opening/annular space to ensure it does not exceed the maximum and minimum dimensions indicated on the approved system design listing.
- .3 Verify that all joints, service penetrating elements and supporting devices/hangers have been properly installed as indicated on approved system design listings. All temporary lines and markings have been removed to meet the approved system design listings.
- .4 Verify that the proposed fire stop system is composed of components that are compatible with each other, the substrates forming the openings, and the items, if any, penetrating the fire stop under conditions of application and service, as demonstrated by the fire stop manufacturer based on testing and field experience.
- .5 Pipe and duct insulation: confirm that the proposed fire stop system has been tested with the actual insulation penetrating the fire separation on site, as indicated in the approved system design listing. Maintain insulation around pipes and ducts penetrating the fire separation.
- .6 Ensure no additional items have been installed through opening that does not appear on the approved system design listing.
- .7 Ensure areas that are to be fire stopped are accessible for proper application and conditions are suitable for installation of the fire stop system. Areas to remain accessible for inspection.
- .8 Report in writing to DCC Representative any defective surfaces or conditions affecting the fire stop system installation, immediately and prior to commencing any installations.
- .9 Proceed only once defected surfaces or conditions have been corrected.
- .10 Beginning of installation means acceptance of site conditions.

3.3 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 Ensure substrates and surfaces are free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
- .2 Prepare surfaces in contact with fire stop and smoke stop materials 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.
- .5 Protect adjacent work areas and finish surfaces from damage during product installation.
- .6 Ensure multi-penetration openings have been framed and boarded out, all around the annular opening as indicated in the system design listing prior to prepping the opening.

3.4 INSTALLATION

- .1 Install fire stop and smoke stop materials and components in accordance with manufacturer's certified tested system listing.
- .2 Coordinate with other sub-trades to ensure that all pipes, conduits, cables, and other items, which penetrate fire separations, have been permanently installed before installation of fire stop systems.
- .3 Schedule work to ensure that fire separations and all other construction that conceals penetrations are not erected before installation of fire and smoke stop systems
- .4 Protect holes or gaps made by through penetrations, poke through termination devices, and un-penetrated openings or joints to ensure that both continuity and integrity of fire separation are maintained.
- .5 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing per manufacturer's instructions.
- .6 Tool or trowel exposed surfaces to neat finish.
- .7 Remove excess compound promptly as work progresses and upon completion.
- .8 Protect gaps around recessed components (e.g.: panels, electrical boxes, outlets) with sealing putty in accordance with manufacturer's instructions.
- .9 Do not use damaged or expired material.
- .10 Joint Fire Stops:
 - .1 For sealant applications, install joint fillers to support fire stop materials during application. Position joint fillers to ensure fire stop material cross-sectional shape and thickness relative to the joint width allows for optimum sealant movement, while developing the required fire-resistance rating.
 - .2 Install fire stops using techniques recommended by the manufacturer:
 - .1 Fully wetting joint substrates to optimize adhesion.
 - .2 Completely filling recesses provided for each joint configuration.
 - .3 Providing uniform, cross-sectional shapes and thickness relative to joint width that optimize movement capability.
 - .4 Tooling non-sag fire stop materials immediately after their application and prior to the time skinning begins. Form smooth, uniform beads of configuration indicated or required to:
 - .1 Provide required fire-resistance rating.
 - .2 Eliminate air pockets

- .3 Ensure contact and adhesion with sides of joint.
- .3 Joint Systems and Perimeter Fire Containment Systems:
 - .1 For systems with dynamic joints, ensure movement capabilities of the installation meet or exceed the movement expectations of the system design listing and manufacturer's installation instructions.

3.5 IDENTIFICATION

- .1 General:
 - .1 Clean substrate prior to applying identification.
 - .2 Final location of identification to be determined on site.
 - .3 Identification is not required on both sides of the fire separation.
 - .4 Refer to drawings for locations of fire separations and rating required.
- .2 Fire Stopped Penetrations:
 - .1 Install identification label adjacent to each wall/floor service penetrations fire stopped. Provide one identification label per single opening or per grouping cluster.
 - .2 Securely apply identification to substrate by providing adequate adhesive.
 - .3 Secure tags with metal fasteners or hang with metal chain or wire.
 - .4 Identification shall be completely filled out and installed prior to requesting substantial performance.
- .3 Fire Separations (Barriers):
 - .1 Provide identification at least 4500 mm of the end of each wall and at intervals not exceeding 9000 mm along wall/floor joint fire stops.
 - .2 Markings to be installed within ceiling spaces, 600 mm below horizontal fire separation or roof structure unless otherwise indicated.
 - .3 For occupied areas with exposed ceilings: review location of identification with DCC Representative before proceeding.

3.6 REPAIRS AND MODIFICATIONS

- .1 Identify damaged or re-entered seals requiring repair or modification.
- .2 Remove loose or damaged materials. If penetrating items are to be added, remove sufficient material to insert new elements and to avoid damaging the balance of the seal.
- .3 Ensure that surfaces to be sealed are clean and dry.
- .4 Use only materials that are suitable for repair of original seal, as approved by manufacturer. Do not mix products from different manufacturers.
- .5 Repair all damage resulting from fire stop destructive testing.

3.7 FIELD QUALITY CONTROL

- .1 Inspections: notify DCC Representative when ready for inspection and prior to concealing or enclosing fire stop materials and service penetration assemblies.
- .2 Manufacturer's Field Services:

- .1 Mock-ups: manufacturer to provide written confirmation that the fire stop system installed meets or exceeds the system design listing requirements for each mock-up application.
- .2 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.
- .3 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
- .4 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.8 INSPECTIONS

- .1 Third-Party Inspection Firm: provide the services of a third-party inspection firm to conduct random inspections and direct exploratory review (i.e.: destructive testing) during the course of construction and prior to closing off any concealed areas. Inspections and destructive testing shall be performed in compliance with ASTM E2174 and ASTM E2393.
- .2 DCC Representative will conduct random inspections and direct exploratory review (i.e.: destructive testing) during the course of construction and prior to closing off any concealed areas. Inspections and destructive testing will be performed in compliance with ASTM E2174 and ASTM E2393.
 - .1 Include for a minimum of 2% for each area of 900 square meters for exploratory reviews for each approved system design listing and each trade involved. Perform cut tests at perimeter joints every 15 meters. Perform cut test at bottom and top of wall joints and wall to wall joints and building expansion joints every 15 meters.
 - .2 Perform exploratory review as directed by DCC Representative. Cut out fire stop and remove to ensure fire stop system installation meets or exceeds the system design listing as identified.
- .3 Upon completion of construction and before requesting substantial performance review, fire stop contractor and manufacturer's representative shall inspect all fire stopping work and prepare a deficiency list. Submit deficiency list to DCC Representative for review. Repair any deficiencies and re-inspect work to ensure that all deficiencies have been completed.
- .4 Submit formal request for substantial performance review of work once all work is completed, quality control has been performed and all fire stop installations have been inspected and identified with the approved fire stop identification labels.
- .5 DCC Representative will conduct the substantial performance review in the presence of the fire stop contractor and the manufacturer's representative.
- .6 Perform all cutting and removal of systems for visual review by DCC Representative. After review and acceptance are completed, replace fire stop system with new materials.

3.9 FIRE STOPPING LOCATIONS

- .1 Provide fire stop and L-Rated smoke-resistant fire stop systems at:

- .1 Penetrations through fire-resistance and smoke-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Penetrations through fire-resistance rated floor slabs/systems, ceilings and roof.
 - .3 Edge of floor slabs at curtain wall and precast concrete panels.
 - .4 Edge of fire-resistant floor or roof assemblies and exterior wall assemblies.
 - .5 Joints at top and bottom of fire-resistance rated masonry and gypsum board partitions. Joints to allow for independent movement.
 - .6 Joints at top and bottom of fire-resistance rated walls where they meet non-rated fire separation assemblies.
 - .7 Intersection of fire-resistance rated masonry, concrete and gypsum board partitions.
 - .8 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .9 Expansion joints in fire-resistance rated floors, walls, ceilings and roof assemblies.
 - .10 Perimeter gaps at curtain wall or other exterior wall assembly and horizontal fire-separation.
 - .11 Openings and sleeves installed for future use through fire separations.
 - .12 Around mechanical and electrical assemblies/devices penetrating fire separations.
 - .13 Mechanical and electrical recessed boxes in walls and partitions.
 - .14 Rigid ducts: fire stopping to consist of bead of fire stop material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.
- .2 Provide fire stop and L-Rated smoke-resistant fire stop systems at locations shown on drawings.

3.10 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove equipment, excess materials and debris and clean adjacent surfaces immediately after application. Use methods and cleaning materials approved by manufacturer.
- .3 Protect fire stops during and after curing period from contact with contaminating substances. Repair all damage.
- .4 Remove temporary dams after initial set of fire stop and smoke stop materials.

END OF SECTION

Part 1 General

REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C919-18, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-E (2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

1.2 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 joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
 - .3 Submit 2 copies of WHMIS SDS.

- .3 Samples:
 - .1 Submit 2 samples of each type of material and colour.
 - .2 Cured samples of exposed sealants for each colour where required to match adjacent material.
- .4 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

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.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect joint sealants from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

1.5 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:
 - .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Safety Data Sheets (SDS) acceptable to Health Canada.
- .2 Ventilate area of work as directed by DCC Representative by use of approved portable supply and exhaust fans. DCC Representative will arrange for ventilation system to be operated on maximum outdoor air and exhaust during installation of caulking and sealants.

Part 2 Products

2.1 SEALANT MATERIALS

- .1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
- .2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.
- .3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Colours: Two (2) colours to be selected by DCC Representative from manufacturer's complete range.
- .2 Type A: Polyurethanes One Part:
 - .1 Modulus of elasticity to accommodate joint substrate and design.
- .3 Type B: Silicones One Part:
 - .1 Modulus of elasticity to accommodate joint substrate and design.
- .4 Type C: Acrylic Latex One Part.
- .5 Performed Compressible and Non-Compressible back-up materials (backer rod):
 - .1 Polyethylene, Urethane, Neoprene, or Vinyl Foam.
 - .1 Extruded open cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
- .6 Bond Breaker Type:
 - .1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

- .1 Perimeters of exterior openings where frames meet exterior façade of building: Sealant Type A
- .2 Expansion and control joints in exterior surfaces of masonry veneers: Sealant Type A

2.4 JOINT CLEANER

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .2 Primer: in accordance with sealant manufacturer's written recommendations.

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 joint sealants installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

3.2 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.
- .2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.
- .3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.
- .4 Ensure joint surfaces are dry and frost free.
- .5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

- .1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.
- .2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

- .1 Apply bond breaker tape where required to manufacturer's instructions.
- .2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

- .1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

- .1 Sealant:
 - .1 Apply sealant in accordance with manufacturer's written instructions.
 - .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
 - .3 Apply sealant in continuous beads.
 - .4 Apply sealant using gun with proper size nozzle.
 - .5 Use sufficient pressure to fill voids and joints solid.
 - .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
 - .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
 - .8 Remove excess compound promptly as work progresses and upon completion.
- .2 Curing:
 - .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by joint sealants installation.

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 all new equipment, devices, and piping and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
 - .4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for all new equipment, devices, and piping for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, DCC Representative before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.

- .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to DCC Representative for approval. Submission of individual data will not be accepted unless directed by DCC Representative.
 - .2 Make changes as required and re-submit as directed by DCC Representative.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 DCC Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to DCC Representative for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

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

.2 Furnish spare parts as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass for each gauge glass.

.3 Provide one set of special tools required to service equipment as recommended by manufacturers.

.4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE AND HANDLING

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

.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 indoors, in dry location, off ground, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect materials from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 NOT USED

.1 Not used.

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 installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of DCC Representative.

.2 Inform DCC 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 DCC Representative.

3.2 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 -ACTION AND INFORMATIONAL SUBMITTALS.
- .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 - 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.

3.4 DEMONSTRATION

- .1 Contractor will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing to DND. Contractor shall provide to DCC instruments required for testing.
- .2 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .3 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .4 Instruction duration time requirements as specified in appropriate sections.
- .5 DCC Representative will record these demonstrations on video tape for future reference.

3.5 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.

3.6 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of plumbing, and related mechanical components and incidentals required to complete work described in this Section.

1.2 RELATED REQUIREMENTS

- .1 Section 02 41 13 - Selective Site Demolition
- .2 Section 02 41 19.13- Selective Building Demolition
- .3 Section 02 81 00 - Hazardous Materials

1.3 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to DCC Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following in accordance with Section 01 33 00- Submittal Procedures before starting work of this Section:

- .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.
- .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for Owner's continued occupancy requirements during selective demolition with Section 02 41 19.13 - Selective Building Demolition and schedule staged occupancy and worksite activities as a defined item in accordance with Section 01 31 19 – Project Management and Coordination.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with the following:
 - .1 Government of Canada, Labour Program: Workplace Safety

1.8 SITE CONDITIONS

- .1 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify DCC Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - .1 Refer to Section 01 41 00- Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in the Hazardous Products Act.
 - .3 Stop work in the area of the suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.

- .5 Hazardous substances will be removed by DCC Representative under a separate contract or as a change to the Work.
- .6 Proceed only after written instructions have been received from DCC Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain DCC Representative's property.

Part 2 Products

2.1 MATERIALS

- .1 Plumbing Repair Materials: Use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and carry CSA approval labels required by the Authority Having Jurisdiction.
- .2 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 EXAMINATION

- .1 (NOT IN USE)

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify DCC Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that must remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the DCC Representative and users is minimized and as follows:
 - .1 Prevent debris from endangering the safe access to and egress from occupied buildings.
 - .2 Notify DCC Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Removal and Demolition: Coordinate requirements of this Section with information contained in Section 02 41 19.13 - Selective Building Demolition and as follows:
 - .1 Disconnect and cap mechanical services in accordance with requirements of local Authority Having Jurisdiction.
 - .2 Do not disrupt active or energized utilities without approval of the DCC Representative.
 - .3 Erect and maintain dust proof and weather tight partitions to prevent the spread of dust and fumes to occupied building areas; remove partitions when complete.
 - .4 Demolish parts of existing building to accommodate new construction and remedial work as indicated.
 - .5 At end of each day's work, leave worksite in safe condition.
 - .6 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove any tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre) except where explicitly noted otherwise for materials being salvaged for re use in new construction.
- .2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 81 00 - Hazardous Materials.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Use of mechanical systems during construction.

1.2 USE OF SYSTEMS`

.1 Use of existing systems for supplying temporary ventilation is permitted only under following conditions:

- .1 Entire system is complete, pressure tested, cleaned, flushed out.
- .2 Specified water treatment system has been commissioned, water treatment is being continuously monitored.
- .3 Building has been closed in, areas to be heated/ventilated are clean and will not thereafter be subjected to dust-producing processes.
- .4 There is no possibility of damage.
- .5 Supply ventilation systems are protected by 60% filters, inspected daily, and changed every 2 weeks or more frequently as required.
- .6 Return systems have approved filters over openings, inlets, outlets.
- .7 Systems will be:
 - .1 Operated as per manufacturer's recommendations and instructions.
 - .2 Operated by Contractor.
 - .3 Monitored continuously by Contractor.
- .8 Warranties and guarantees are not relaxed.
- .9 Regular preventive and other manufacturers recommended maintenance routines are performed by Contractor at own expense and under supervision of DCC Representative.
- .10 Refurbish entire system before static completion; clean internally and externally, restore to "as- new" condition, replace filters in air systems.

.2 Filters specified in this Section are over and above those specified in other Sections of this project.

.3 Exhaust systems are not included in approvals for temporary heating ventilation.

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 REFERENCE STANDARDS

- .1 National Air Duct Cleaners Association (NADCA)
 - .1 ACR Standard, Assessment, Cleaning and Restoration of HVAC Systems.
- .2 North American Insulation Manufacturers Association (NAIMA)
 - .1 NAIMA, Cleaning Fibrous Glass Insulated Duct Systems - Recommended Practices.
- .3 United States Environmental Protection Agency (US EPA)
 - .1 US EPA, 40 CFR Parts 152 and 156.

1.2 DEFINITIONS

- .1 HVAC System: complete air duct system from outside air intake louvers to furthest air supply terminal unit and including:
 - .1 Rigid supply and return ductwork;
 - .2 Flexible ductwork;
 - .3 Mixing plenum boxes;
 - .4 Return air plenums including ceiling plenums;
 - .5 Cooling and heating coils and compartments;
 - .6 Condensate drain pans, eliminator blades and humidifiers;
 - .7 Fans, fan blades and fan housing;
 - .8 Filter housing and frames;
 - .9 Acoustically insulated duct linings;
 - .10 Diffusers, registers and terminal units;
 - .11 Dampers and controls;

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Site Evaluation: conduct site visit 2 weeks before start of work to establish specific co-ordinated video survey and cleaning plan to establish specific co-ordinated video survey and cleaning plan determining how areas of facility and HVAC systems will be protected during cleaning operations.
 - .1 Organize and lay out plan for video survey and identify camera and cleaning apparatus insertion points.
 - .2 Ensure plan identifies sequence and schedule of survey and cleaning operations for each individual HVAC system and for complete facility.
 - .1 Take account of elbows, bends, turning vanes, dampers, transitions, take-offs, and other internal features.
 - .3 DCC Representative to review video survey and cleaning plan 1 week minimum prior to start of work.
 - .1 Proceed with survey and cleaning work only after receiving written approval from DCC Representative.

- .2 Scheduling: Hours of Operation: complete work during non-business hours as follows:
 - .1 Monday to Friday between 08:00 hours and 16:00 hours.
 - .2 Work may not be carried out during statutory holidays.
 - .3 Hours of operation are subject to change with 24 hours' notice.
- .3 Project Co-ordination: assign Project Co-ordinator to oversee air duct cleaning processes.
 - .1 Provide DCC Representative with contact information of Project Co-ordinator including: name, telephone number, cell phone number.
- .4 Security: DCC Representative will pay costs and provide security escort at times requested on Contractor's submitted work schedule.
 - .1 Cancellation of security escort requires 72 hours minimum written notice.
 - .2 Failure to cancel security escort requirements 72 hours minimum before scheduled event will result in Contractor paying for security costs.
- .5 Damaged or broken equipment and components found during initial testing and inspection will be repaired or replaced by Contractor.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit video survey and cleaning plan developed during site evaluation.
 - .1 Ensure plan includes sequence of operation, identification of camera and cleaning apparatus insertion points and schedule for work.
- .3 Product Data:
 - .1 Submit manufacturer's printed product literature and data sheets for antimicrobial agents and include product characteristics, performance criteria and limitations.
 - .2 Provide two copies of WHMIS SDS in accordance with Section 01 35 43 - Environmental Procedures for antimicrobial agents or coatings.
- .4 Testing Laboratory Services: submit name and address of laboratory engaged for work of this Section.
 - .1 Submit laboratory analysis report of particulate collection indicating:
 - .1 Location of collection;
 - .2 Particulate grade;
 - .3 Particulate size;
 - .4 Percentage concentration of individual particulates in each sample.
- .5 US EPA Registration: submit verification of EPA Registration of antimicrobial agent.
- .6 Submit verification of delivery of hazardous or toxic waste materials to contaminated waste facility, as described in PART 3 - CLEANING - Waste Management.

1.5 CLOSEOUT SUBMITTALS

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

- .2 Post Cleaning Inspection Report: submit 4 copies of Final Inspection Report, including data collected, observations and recommendations as well as following information:
 - .1 Name and address of facility;
 - .2 Name and address of HVAC cleaning contractor;
 - .3 Description of HVAC systems with drawings identifying systems cleaned;
 - .4 Identification scheme for location points in systems that were inspected with accompanying notes describing methods of inspection or tests used;
 - .5 Identification of points where samples were collected and type of analysis used for each collection;
 - .6 Identification of each sample collected;
 - .7 Comments complete with photographs of each sampling location and other observed system features;
 - .8 Identify systems tested, observations, actions taken and recommendations for future maintenance.
- .3 Record post cleaning video survey: submit 2 copies of video survey USB Drive media, and include on video survey following:
 - .1 Areas tested for particulate analysis or microbial growth evaluation;
 - .2 Areas of special interest and location;
 - .3 Special internal features;
 - .4 Problems such as broken or damaged controls or components;
 - .5 Ensure system tested, locations, observations, actions taken and recommendations are clearly identified in English on video using text or voice over.
- .4 Submit verification of delivery of hazardous or toxic waste materials to contaminated waste facility.

1.6 EXTRA MATERIALS

- .1 Extra Stock Materials:
 - .1 Supply 4 extra filters for each HVAC System cleaned.
 - .2 Ensure filters are correct match, size, type and configuration of existing HVAC Systems.

1.7 QUALITY ASSURANCE

- .1 Contractor: Member in good standing with NADCA.
- .2 Project Co-ordinator: Air System Cleaning Specialist (ASCS) certified by NADCA.

Part 2 Products

2.1 ACCESS DOORS AND PANELS

- .1 Equipment Access Doors and Panels: construct from same materials as equipment panelling complete with sealing gasket and positive locking device.
 - .1 Size access doors and panels in equipment to allow for inspection and cleaning.

- .2 Ductwork Access Doors: construct access doors from 1.27 mm minimum galvanized sheet steel with gasketed seal.
 - .1 Ensure access door is 25 mm greater in every dimension than access opening.
 - .2 Access door size 200 mm x 200 mm minimum.
 - .3 Secure access doors with sheet metal screws on 75 mm centres minimum. Ensure 3 screws per side minimum.
- .3 Access Doors and Panels Acoustic Lining:
 - .1 Install acoustic lining to match existing.
 - .2 Self-adhesive glass fibre tape capable of adhering to both acoustic lining and metal access door or panel materials.
 - .3 Water-based duct sealer for repairing cut acoustic lining.

2.2 ANTIMICROBIAL AGENT

- .1 Use antimicrobial agents registered with US EPA-40 CFR.

2.3 SYSTEM FILTERS

- .1 Supply and install new filters for each HVAC System cleaned.

2.4 AIR DUCT CLEANING EQUIPMENT

- .1 Manually propelled full contact brushes:
 - .1 Ensure brushes are specifically manufactured and shaped to fit individual ducts, equipment and components of HVAC system.
 - .1 Ensure brushes are sized to fit various duct sizes in HVAC system.
 - .2 Ensure brushes make scrubbing motion and full contact with HVAC system interior surfaces to be cleaned.
- .2 Brushes: manually propelled with integrally-mounted drive and nylon or other non-metallic material bristles.
 - .1 Ensure drive has capacity to continue to push brush after bristles are distorted.
 - .2 Replace worn and ineffective brushes when required.

2.5 MULTI-FUNCTIONAL ROBOTIC CLEANING SYSTEM

- .1 Self-propelled remote controlled, wheeled drive equipped with: halogen lights, camera: rotating brushes, and spraying system attachment, and vacuum.
 - .1 Ensure brushes are specifically manufactured and shaped to fit individual ducts, equipment and components of HVAC system.
 - .2 Ensure brushes make scrubbing motion and full contact with HVAC system interior surfaces.
 - .3 Replace worn and ineffective brushes when required.
- .2 Camera: fully rotational remote control focus and dustproof digital video with 480 lines of resolution, capable of storing 4 hours of recorded media.
 - .1 Camera Light: 2 x 20 watt Halogen with dimmer

2.6 HEPA FILTER EVACUATION FAN

- .1 Evacuation Fan: includes fan, HEPA filter, flexible hose and motor capable of maintaining debris and particulates airborne in airstream until they reach evacuation fan and maintaining system under negative pressure.
 - .1 Ensure HEPA filters are clean and maintain evacuation fan and HEPA filter to run efficiently.

2.7 HEPA VACUUM UNIT

- .1 Vacuum Unit: includes vacuum fan, integral HEPA filter, suction hose and vacuum head, capable of maintaining HVAC System debris and particulates airborne in air stream until they reach vacuum unit and maintaining system under negative pressure.
 - .1 Ensure HEPA filters are clean and maintain vacuum unit and HEPA filter to run efficiently.

Part 3 Execution

3.1 PREPARATION

- .1 Close down HVAC system.
- .2 Locate and identify externally visible HVAC system features which may affect cleaning process including:
 - .1 Control devices;
 - .2 Fire and smoke control dampers;
 - .3 Balancing dampers: indicate and record positions for resetting;
 - .4 Air volume control boxes: indicate and record positions for resetting;
 - .5 Fire alarm devices;
 - .6 Monitoring devices and controls;
- .3 Cut openings in equipment panels and ductwork for access to system interior.
 - .1 Square or rectangular opening sizes: 200 mm minimum each side.
 - .2 Circular opening sizes: 200 mm minimum diameter.
- .4 Installation of Access Doors and Panels: install access doors and panels for equipment where instructed by DCC Representative to facilitate system inspection and cleaning.
 - .1 Install access doors and panels for inspection and cleaning of equipment as follows:
 - .1 Heating and cooling coils;
 - .2 Fan units;
 - .3 Filters;
 - .4 Dampers;
 - .5 Sensors;
- .5 Installation of Access Doors in Ductwork: install access doors in ductwork where instructed by DCC Representative to facilitate system inspection and cleaning.
 - .1 Access door installation is not permitted in flexible ductwork.

- .1 Inspect flexible ductwork only by disconnecting from main duct and inspecting from open end.
- .6 When acoustically lined duct is cut for access, repair cut edges of acoustic lining using self-adhesive fibre glass tape and water based duct sealer.
 - .1 Adhere new acoustic lining to match existing to inside of access panel or door to ensure continuity of acoustic properties of system.
- .7 Remove and reinstall ceiling tiles to gain access to HVAC system as required.
 - .1 Replace ceiling tiles damaged or soiled by air duct cleaning procedures.

3.2 EXAMINATION/PRE-CLEANING INSPECTION

- .1 Verification of Conditions:
 - .1 Make visual inspection of interior of HVAC system using remote controlled robotic camera.
 - .2 Insert camera at pre-established strategic locations to evaluate condition and cleanliness of HVAC systems and components.
- .2 Evaluation and Assessment:
 - .1 Identify location and type of internal components.
 - .2 Identify extent of potential problems.
 - .3 If toxic or hazardous materials or deposits are suspected after initial inspection immediately stop work and inform DCC Representative.
 - .1 Do not proceed further with inspection operations until written approval from DCC Representative.

3.3 PARTICULATE COLLECTION

- .1 Before starting duct cleaning, identify locations for sample collection and collect particulate samples.
- .2 Take samples from interior surfaces of HVAC system using sterile wipes for submission to independent testing laboratory.
- .3 For each HVAC system collect 4 samples from each HVAC unit as follows:
 - .1 Sample 1: collect from inside ventilation unit downstream of air filters but before fan discharge;
 - .2 Sample 2: collect downstream of fan discharge and 1 metre maximum downstream in first horizontal branch;
 - .3 Sample 3: collect at junction of last horizontal branch and start of low-pressure duct;
 - .4 Sample 4: collect at junction each air terminal unit and supply duct.

3.4 LABORATORY ANALYSIS

- .1 Ensure independent testing laboratory has demonstrated experience in work associated with air duct cleaning.
- .2 Ensure Super Electron Microscope (SEM) is used for analyzing and determining components of particulate collection samples:

- .1 Identify components by grade and size;
- .2 Report findings including percentage concentration of components to DCC Representative.
- .3 Proceed with HVAC System Cleaning only after laboratory analysis test results have been received.
- .4 Ensure cleaning technicians have safety equipment appropriate for toxic or hazardous conditions identified by laboratory analysis before proceeding with cleaning operations.

3.5 DUCT CLEANING

- .1 Do duct cleaning in accordance with NADCA ACR Standard.
- .2 Isolate and clean sections in zones to ensure that dirt deposits and debris from zone being cleaned does not pass through another zones which has already been cleaned.
 - .1 Isolate zone of duct using air inflated zone bag before cleaning.
- .3 Ensure vacuum units and evacuation fans are securely in place before starting cleaning operation of isolated section of HVAC air duct system.
- .4 Install HEPA filter evacuation fan at one end of zone section and insert full contact brushes at other end.
- .5 Clean HVAC supply air duct system and components where particulate sample collected from surfaces is greater than 75 mg of particulate per 0.01 square metres.
- .6 Clean exhaust, return, transfer ductwork and plenums, equipment and components where particulate sample collected from surfaces is greater than 75 mg of particulate per 0.01 square metres.
- .7 Energize brushes to travel from insertion point to HEPA filter evacuation fan.
 - .1 Pass brushes through sections as often as necessary to achieve required cleanliness.
 - .2 Change brush sizes as required to ensure positive contact with duct and component interiors.
 - .3 Clean corners and pockets where dirt and debris can accumulate.
- .8 Clean equipment, components and other features in isolated zone before moving to next zone of HVAC air duct system.
- .9 Clean diffusers, registers, louvers, and other terminal units.
- .10 Remove perforated supply diffusers from suspended tee-bar ceiling.
 - .1 Dismantle and clean perforated plates and supply diffuser duct collars.
 - .2 Re-assemble perforated plate diffusers and reconnect to HVAC system using supply diffuser duct collar after cleaning.
- .11 Advise DCC Representative 72 hour's minimum before deactivation of fire alarm and smoke detectors duct cleaning operations.
 - .1 DCC Representative will pay for costs of deactivation of fire alarm and smoke detector system.

3.6 ACOUSTICALLY LINED DUCTWORK CLEANING

- .1 Clean glass fibre acoustically insulated ducts to NAIMA recommended practices.
 - .1 Use specifically designed robotic apparatus that has been demonstrated not to damage acoustic glass fibre lining.
 - .2 Monitor cleaning process progress by onboard camera.

3.7 COMPONENTS AND EQUIPMENT CLEANING

- .1 Brush and vacuum coils, humidifiers, air handling unit enclosures, and heat exchanger surfaces to achieve required cleanliness.
- .2 When cleaning equipment and components by brushing and vacuuming is inappropriate or insufficient, dismantle and remove equipment or component and move to area designated by DCC Representative for cleaning.
 - .1 Pressure wash with water and cleaning solution until required cleanliness is achieved.
 - .2 Clean equipment and components in place only if there is no hazard to adjacent materials.
- .3 Proceed to next section in cleaning sequence only after written approval from DCC Representative.
- .4 Compressed air and manual cleaning is acceptable only for cleaning individual components and small areas as follows and only after written approval from DCC Representative:
 - .1 Fan blades;
 - .2 Dampers;
 - .3 Turning vanes;
 - .4 Controls;
 - .5 Sensor bulbs;
 - .6 Fire alarms;
 - .7 Smoke detectors;

3.8 ANTI MICROBIAL APPLICATION

- .1 Apply antimicrobial agents when fungal growth is suspected and where unacceptable levels of fungal contamination have been verified through testing and visual inspection.
- .2 Apply antimicrobial agents after removal of surface deposits and debris.
 - .1 Verify air duct interiors are free from deposits and debris by testing.
 - .2 Report findings to DCC Representative.
 - .3 Proceed with application of antimicrobial agents after written approval from DCC Representative.
- .3 Apply antimicrobial agents in accordance with manufacturer's written instructions and US EPA 40 CFR registration and listing.
- .4 Robotic spray antimicrobial agents directly onto interior surfaces of HVAC air duct system.

- .1 Do not use fog mist for downstream surfaces.

3.9 FIELD QUALITY CONTROL/FINAL INSPECTIONS

- .1 Post Cleaning Inspection: carry out final inspection using robotic camera and other visual inspection methods after final cleaning has been completed.
 - .1 Carry out video survey as directed by DCC Representative.
 - .2 Include in final survey areas inspected by DCC Representative prior to cleaning.
 - .3 Identify on HVAC system record drawings access points used for inspection and cleaning.
 - .4 Re-collect and analyse particulates collected at same locations where original samples were collected before cleaning.
 - .5 Reset components including dampers and sensors, which have been disturbed during cleaning operations.

3.10 SYSTEM STARTUP

- .1 Install new system filters after cleaning operations are completed.
- .2 Cover each inspection opening with access door or panel and secure in place after inspection and cleaning are completed.
- .3 Restart each HVAC system.

3.11 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
- .2 Waste Management: separate waste materials in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Dispose of hazardous or toxic waste materials extracted from ductwork system to appropriate contaminated waste facility and provide proof.
 - .2 Dispose of existing HVAC filter materials to appropriate contaminated waste 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 all new equipment, devices, piping, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Indicate on drawings:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
 - .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
 - .4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.2 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for all new equipment, devices, and piping for incorporation into manual.
 - .1 Operation and maintenance manual approved by, and final copies deposited with, DCC Representative before final inspection.
 - .2 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.

- .3 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
- .4 Performance data to include:
 - .1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.
 - .2 Equipment performance verification test results.
 - .3 Special performance data as specified.
 - .4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
- .5 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to DCC Representative for approval. Submission of individual data will not be accepted unless directed by DCC Representative.
 - .2 Make changes as required and re-submit as directed by DCC Representative.
- .6 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .7 Site records:
 - .1 DCC Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.
 - .2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.
 - .3 Use different colour waterproof ink for each service.
 - .4 Make available for reference purposes and inspection.
- .8 As-built drawings:
 - .1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.
 - .2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).
 - .3 Submit to DCC Representative for approval and make corrections as directed.
 - .4 Perform testing, adjusting and balancing for HVAC using as-built drawings.
 - .5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

- .9 Submit copies of as-built drawings for inclusion in final TAB report.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Furnish spare parts as follows:
 - .1 One set of packing for each pump.
 - .2 One casing joint gasket for each size pump.
 - .3 One head gasket set for each heat exchanger.
 - .4 One glass for each gauge glass.
 - .5 One filter cartridge or set of filter media for each filter or filter bank in addition to final operating set.
- .3 Provide one set of special tools required to service equipment as recommended by manufacturers.
- .4 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials in dry location, indoors, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect all new equipment, devices, and piping from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 NOT USED

- .1 Not Used

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 installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.

- .2 Inform DCC 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 DCC Representative.

3.2 SYSTEM CLEANING

- .1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.
- .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 - 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.

3.4 DEMONSTRATION

- .1 Supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.
- .2 Use operation and maintenance manual, as-built drawings, and audio visual aids as part of instruction materials.
- .3 Instruction duration time requirements as specified in appropriate sections.
- .4 Contractor will record these demonstrations on video tape for future reference. Provide recording on USB to DCC Representative.

3.5 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.

3.6 PROTECTION

- .1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of heating, ventilation and air conditioning systems, controls and automated automation components, and related mechanical components and incidentals required to complete work described in this Section ready for new construction.

1.2 RELATED REQUIREMENTS

- .1 Section 02 41 13 - Selective Site Demolition
- .2 Section 02 41 19.13- Selective Building Demolition
- .3 Section 02 81 00 - Hazardous Materials
- .4 Section 22 05 05- Selective Demolition for Plumbing
- .5 Section 26 05 05- Selective Demolition for Electrical

1.3 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures.

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Salvage: Detach items from existing construction and deliver them to DCC Representative ready for reuse.
- .4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide the following in accordance with Section 01 33 00- Submittal Procedures before starting work of this Section:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.
 - .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.
- .2 Scheduling: Account for Owner's continued occupancy requirements during selective demolition with Section 02 41 19.13 - Selective Building Demolition and schedule staged occupancy and worksite activities.

1.7 QUALITY ASSURANCE

- .1 Government of Canada, Labour Program: Workplace Safety.

1.8 SITE CONDITIONS

- .1 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify DCC Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:
 - .1 Refer to Section 01 41 00- Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in the Hazardous Products Act.
 - .3 Stop work in the area of the suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by DCC Representative under a separate contract or as a change to the Work.

- .6 Proceed only after written instructions have been received from DCC Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor's property and will be removed from Project site.

Part 2 Products

2.1 MATERIAL

- .1 General Patching and Repair Materials: Refer to Section 02 41 19.13 - Selective Building Demolition for listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.
- .2 HVAC Repair Materials: Use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and carry CSA approval labels required by the Authority Having Jurisdiction.
- .3 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 EXAMINATION

- .1 (NOT IN USE)

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify DCC Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that must remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the DCC Representative and users is minimized and as follows:
 - .1 Prevent debris from endangering the safe access to and egress from occupied buildings.
 - .2 Notify DCC Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition: Coordinate requirements of this Section with information contained in Section 02 41 19.13 - Selective Building Demolition and as follows:
 - .1 Disconnect and cap gas supply and electrical services in accordance with requirements of local Authority Having Jurisdiction.
 - .2 Do not disrupt active or energized utilities without approval of the DCC Representative.
 - .3 Erect and maintain dust proof and weather tight partitions to prevent the spread of dust and fumes to occupied building areas; remove partitions when complete.
 - .4 Demolish parts of existing building to accommodate new construction and remedial work as indicated.
 - .5 At end of each day's work, leave worksite in safe condition.
 - .6 Perform demolition work in a neat and workmanlike manner:
 - .1 Remove any tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
 - .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.

3.4 CLOSEOUT ACTIVITIES

- .1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site (recycle centre).
- .2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 81 00 - Hazardous Materials.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Electrical motors, drives and guards for mechanical equipment and systems.
 - .2 Supplier and installer responsibility indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
 - .3 Control wiring and conduit is specified in Division 26 except for conduit, wiring and connections below 50 V which are related to control systems specified in Division 22 and 23. Refer to Division 26 for quality of materials and workmanship.

1.2 REFERENCE STANDARDS

- .1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
 - .1 ASHRAE 90.1-01, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA cosponsored; ANSI approved; Continuous Maintenance Standard).
- .2 Electrical Equipment Manufacturers' Association Council (EEMAC)
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop Drawings: submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .3 Quality Control: in accordance with Section 01 45 00 - Quality Control.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .1 DCC Representative will make available 1 copy of systems supplier's installation instructions.

- .4 Closeout Submittals
 - .1 Provide maintenance data for motors, drives and guards for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements: work to be performed in compliance with CEAA, TDGA, applicable Provincial/Territorial regulations, and CEPA.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 70 03 – Safety Requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 00 - Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Waste Management and Disposal:
 - .1 Waste Management and Disposal: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 GENERAL

- .1 Motors: high efficiency, in accordance with local Hydro company standards and to ASHRAE 90.1.

2.2 MOTORS

- .1 Provide motors for mechanical equipment as specified.
- .2 Motors under 373 W 1/2 HP: speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.
- .3 Motors 373 W 1/2 HP and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40 degrees C, 3 phase, 120 V, unless otherwise indicated.

2.3 TEMPORARY MOTORS

- .1 If delivery of specified motor will delay completion or commissioning work, install motor approved by DCC Representative for temporary use. Work will only be accepted when specified motor is installed.

2.4 BELT DRIVES

- .1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.
- .2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise indicated.

- .3 For motors under 10 HP 7.5 kW: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.
- .4 For motors 7.5 kW 10 HP and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.
- .5 Correct size of sheave determined during commissioning.
- .6 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.
- .7 Motor slide rail adjustment plates to allow for centre line adjustment.
- .8 Supply one set of spare belts for each set installed in accordance with Section 01 78 00 - Closeout Submittals.

2.5 DRIVE GUARDS

- .1 Provide guards for unprotected drives.
- .2 Guards for belt drives;
 - .1 Expanded metal screen welded to steel frame.
 - .2 Minimum 1.2 mm thick sheet metal tops and bottoms.
 - .3 38 mm dia holes on both shaft centres for insertion of tachometer.
 - .4 Removable for servicing.
- .3 Provide means to permit lubrication and use of test instruments with guards in place.
- .4 Install belt guards to allow movement of motors for adjusting belt tension.
- .5 Guard for flexible coupling:
 - .1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.
 - .2 Securely fasten in place.
 - .3 Removable for servicing.
- .6 Unprotected fan inlets or outlets:
 - .1 Wire or expanded metal screen, galvanized, 19 mm mesh.
 - .2 Net free area of guard: not less than 80% of fan openings.
 - .3 Securely fasten in place.
 - .4 Removable for servicing.

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 datasheet.

3.2 INSTALLATION

- .1 Fasten securely in place.

- .2 Make removable for servicing, easily returned into, and positively in position.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report as described in PART 1 - SUBMITTALS.
- .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.

3.4 CLEANING

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

END OF SECTION

Part 1 General

1.1 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 datasheets for piping and equipment 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.
- .2 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

Part 2 Products

2.1 MATERIAL

- .1 Fire Stopping: in accordance with Section 07 84 00 - Fire Stopping.

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and National Fire Code of Canada.
- .2 Provide space for disassembly, removal of equipment and components without interrupting operation of other system, equipment, and components.

3.4 DIELECTRIC COUPLINGS

- .1 General: compatible with system, to suit pressure rating of system.
- .2 Locations: where dissimilar metals are joined.
- .3 NPS 2 and under: isolating unions or bronze valves.
- .4 Over NPS 2: isolating flanges.

3.5 PIPEWORK INSTALLATION

- .1 Install pipework to CAN/CSA B139.
- .2 Screwed fittings jointed with Teflon tape.
- .3 Protect openings against entry of foreign material.
- .4 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .5 Assemble piping using fittings manufactured to ANSI standards.
- .6 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
 - .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- .7 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .8 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .9 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .10 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .11 Group piping wherever possible and as indicated.
- .12 Ream pipes, remove scale and other foreign material before assembly.
- .13 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .14 Provide for thermal expansion as indicated.
- .15 Valves:
 - .1 Install in accessible locations.
 - .2 Remove interior parts before soldering.
 - .3 Install with stems above horizontal position unless indicated.
 - .4 Valves accessible for maintenance without removing adjacent piping.
 - .5 Install globe valves in bypass around control valves.
 - .6 Use ball valves at branch take-offs for isolating purposes except where specified.
 - .7 Install butterfly valves between weld neck flanges to ensure full compression of liner.
 - .8 Install ball valves for glycol service.

3.6 SLEEVES

- .1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and as indicated.
- .2 Material: schedule 40 black steel pipe.
- .3 Construction: use annular fins continuously welded at mid-point at foundation walls and where sleeves extend above finished floors.
- .4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.
- .5 Installation:
 - .1 Concrete, masonry walls, and concrete floors on grade: terminate flush with finished surface.
 - .2 Other floors: terminate 25 mm above finished floor.
 - .3 Before installation, paint exposed exterior surfaces with heavy application of zinc-rich paint to CAN/CGSB-1.181.
- .6 Sealing:
 - .1 Foundation walls and below grade floors: fire retardant, waterproof non-hardening mastic.
 - .2 Elsewhere:
 - .1 Provide space for fire stopping.
 - .2 Maintain the fire-resistance rating integrity of the fire separation.
 - .3 Sleeves installed for future use: fill with lime plaster or other easily removable filler.
 - .4 Ensure no contact between copper pipe or tube and sleeve.

3.7 ESCUTCHEONS

- .1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.
- .2 Construction: one piece type with set screws.
 - .1 Chrome or nickel plated brass or type 302 stainless steel.
- .3 Sizes: outside diameter to cover opening or sleeve.
 - .1 Inside diameter to fit around pipe or outside of insulation if so provided.

3.8 PREPARATION FOR FIRE STOPPING

- .1 Coordinate the installation of fire stopping around pipes, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.
- .2 Pipes subject to movement: conform to fire stop system design listing to ensure pipe movement without damaging fire stopping material or installation.
- .3 Insulated pipes: ensure integrity of insulation and vapour barriers.

3.9 FLUSHING OUT OF PIPING SYSTEMS

- .1 Flush system in accordance with Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

- .2 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 11 - Cleaning supplemented as specified in relevant mechanical sections.
- .3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.10 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

- .1 Advise Representative 48 hour's minimum prior to performance of pressure tests.
- .2 Pework: test as specified in relevant sections of heating, ventilating and air conditioning work.
- .3 Maintain specified test pressure without loss for 4 hours minimum unless specified for longer period of time in relevant mechanical sections.
- .4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.
- .5 Conduct tests in presence of DCC Representative.
- .6 Pay costs for repairs or replacement, retesting, and making good. DCC Representative to determine whether repair or replacement is appropriate.
- .7 Insulate or conceal work only after approval and certification of tests by DCC Representative.

3.11 EXISTING SYSTEMS

- .1 Connect into existing piping systems at times approved by DCC Representative.
- .2 Request written approval by DCC Representative 10 working days minimum, prior to commencement of work.
- .3 Be responsible for damage to existing plant by this work.

3.12 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
 - .1 ANSI/ASME B1.20.1-1983 (R2006), Pipe Threads, General Purpose (Inch).
 - .2 ANSI/ASME B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings.
- .2 ASTM International (ASTM)
 - .1 ASTM A276-08, Standard Specification for Stainless Steel Bars and Shapes.
 - .2 ASTM B62-02, Standard Specification for Composition Bronze or Ounce Metal Castings.
 - .3 ASTM B283-08a, Standard Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
 - .4 ASTM B505/B505M-08a, Standard Specification for Copper-Base Alloy Continuous Castings.
- .3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
 - .1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS-SP-80-2008, Bronze Gate Globe, Angle and Check Valves.
 - .3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.2 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 and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Submit data for valves specified in this Section.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for valves for incorporation into manual.

- .1 Description of valves, giving manufacturers name, type, model, year and capacity.
- .2 Details of operation, servicing and maintenance.
- .3 Recommended spare parts list.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials/Spare Parts:
 - .1 Furnish following spare parts:
 - .1 Valve seats: one for every 10 valves each size, minimum 1.
 - .2 Discs: one for every 10 valves, each size. Minimum 1.
 - .3 Stem packing: one for every 10 valves, each size. Minimum 1.
 - .4 Valve handles: 2 of each size.
 - .5 Gaskets for flanges: one for every 10 flanged joints.
 - .2 Tools:
 - .1 Furnish special tools for maintenance of systems and equipment.
 - .2 Include following:
 - .1 Lubricant gun for expansion joints.

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:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse by manufacturer and return of pallets, packaging materials, crates, padding in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Valves:
 - .1 Except for specialty valves, to be single manufacturer.
 - .2 Products to have CRN registration numbers.
- .2 End Connections:
 - .1 Connection into adjacent piping/tubing:
 - .1 Steel pipe systems: screwed ends to ANSI/ASME B1.20.1.
 - .2 Copper tube systems: solder ends to ANSI/ASME B16.18.

- .3 Lockshield Keys:
 - .1 Where lockshield valves are specified, provide 10 keys of each size: malleable iron cadmium plated.
- .4 Gate Valves:
 - .1 Requirements common to gate valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: union with hexagonal shoulders.
 - .3 Connections: screwed with hexagonal shoulders.
 - .4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
 - .5 Packing: non-asbestos.
 - .6 Handwheel: non-ferrous.
 - .7 Handwheel Nut: bronze to ASTM B62.
 - .2 NPS 2 and under, non-rising stem, solid wedge disc, Class 125
 - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.
 - .2 Operator: Handwheel.
 - .3 NPS 2 and under, non-rising stem, solid wedge disc, Class 150:
 - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.
 - .2 Operator: handwheel.
 - .4 NPS 2 and under, rising stem, split wedge disc, Class 125:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Disc: split wedge, bronze to ASTM B283, loosely secured to stem.
 - .3 Operator: handwheel.
 - .5 NPS 2 and under, rising stem, solid wedge disc, Class 125:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Operator: handwheel.
 - .6 NPS 2 and under, rising stem, solid wedge disc, Class 150:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Operator: handwheel.
- .5 Globe Valves:
 - .1 Requirements common to globe valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: union with hexagonal shoulders.
 - .3 Connections: screwed with hexagonal shoulders.
 - .4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.
 - .5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.
 - .6 Handwheel: non-ferrous.
 - .7 Handwheel Nut: bronze to ASTM B62.
 - .2 NPS 2 and under, composition disc, Class 125:

- .1 Body and bonnet: screwed bonnet.
 - .2 Disc and seat: renewable rotating disc composition to suit service conditions, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
 - .3 Operator: handwheel.
- .3 NPS 2 and under, composition disc, Class 150:
 - .1 Body and bonnet: union bonnet.
 - .2 Disc and seat: renewable rotating disc in easily removable disc holder, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
 - .3 Operator: handwheel.
- .4 NPS 2 and under, plug disc, Class 150, screwed ends:
 - .1 Body and bonnet: union bonnet.
 - .2 Disc and seat ring: tapered plug type with disc stem ring of AISI S420 stainless steel to ASTM A276, loosely secured to stem.
 - .3 Operator: handwheel.
- .5 Angle valve, NPS 2 and under, composition disc, Class 150:
 - .1 Body and bonnet: union bonnet.
 - .2 Disc and seat: renewable rotating PTFE disc in slip-on easily removable disc holder having integral guides, regrindable bronze seat, loosely secured to stem.
 - .3 Operator: handwheel.
- .6 Check Valves:
 - .1 Requirements common to check valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Connections: screwed with hexagonal shoulders.
 - .2 NPS 2 and under, swing type, bronze disc, Class 125:
 - .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
 - .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
 - .3 NPS 2 and under, swing type, bronze disc:
 - .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
 - .2 Disc and seat: renewable rotating disc, two-piece hinge disc construction; seat: regrindable.
 - .4 NPS 2 and under, swing type, composition disc, Class 200:
 - .1 Body: Y-pattern with integral seat at 45 degrees, screw-in cap with hex head.
 - .2 Disc: renewable rotating disc of number 6 composition to suit service conditions, bronze two-piece hinge disc construction.
 - .5 NPS 2 and under, horizontal lift type, composition disc, Class 150:
 - .1 Body: with integral seat, union bonnet ring with hex shoulders, cap.

- .2 Disc: renewable rotating disc in disc holder having guides top and bottom, of bronze to ASTM B62.
- .6 NPS 2 and under, vertical lift type, bronze disc, Class 125:
 - .1 Disc: rotating disc having guides top and bottom, disc guides, retaining rings.
- .7 Silent Check Valves:
 - .1 NPS 2 and under:
 - .1 Body: cast high tensile bronze to ASTM B62 with integral seat.
 - .2 Pressure rating: Class 125.
 - .3 Connections: screwed ends to ANSI B1.20.1 and with hex. shoulders.
 - .4 Disc and seat: renewable rotating disc.
 - .5 Stainless steel spring, heavy duty.
 - .6 Seat: regrindable.
- .8 Ball Valves:
 - .1 NPS 2 and under:
 - .1 Body and cap: cast high tensile bronze to ASTM B62.
 - .2 Pressure rating: Class 125, 860 kPa steam.
 - .3 Connections: solder ends to ANSI.
 - .4 Stem: tamperproof ball drive.
 - .5 Stem packing nut: external to body.
 - .6 Ball and seat: replaceable stainless steel solid ball and Teflon seats.
 - .7 Stem seal: TFE with external packing nut.
 - .8 Operator: removable lever handle.
- .9 Butterfly Valves:
 - .1 NPS 2 1/2 through NPS 6, 2068 kPa with grooved ends.
 - .1 Body: cast bronze, with copper-tube dimensioned grooved ends.
 - .2 Disc: elastomer coated ductile iron with integrally cast stem.
 - .3 Operator: handwheel.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: Examine all existing site conditions prior to commencing any work. Inform DCC Representative of any and all unacceptable conditions or deviations from the contract documents immediately upon discovery. Proceed with installation only after unacceptable conditions have been remedied or deviations have been addressed following receipt of written approval to proceed from DCC Representative.

3.2 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and data sheet.

3.3 INSTALLATION

- .1 Install rising stem valves in upright position with stem above horizontal.
- .2 Remove internal parts before soldering.
- .3 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

3.4 CLEANING

- .1 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

3.5 PROTECTION

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Vibration isolation materials and components, seismic control measures and their installation.

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS)
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.
- .3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Shop drawings: Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
 - .2 Provide separate shop drawings for each isolated system complete with performance and product data.
 - .3 Provide detailed drawings of seismic control measures for equipment and piping.
- .3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .1 DCC Representative will make available 1 copy of systems supplier's installation instructions.
 - .3 Manufacturer's Field Reports: manufacturer's field reports specified.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:

- .1 Do construction occupational health and safety.

1.5 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products

2.1 GENERAL

- .1 Size and shape of bases type and performance of vibration isolation as indicated.
- .2 Colour code springs for load carrying capacity – colour stripping is not acceptable.
- .3 Outdoor springs and housings to be corrosion resistant.
- .4 It shall be understood that the requirements of this section are in addition to other requirements as specified elsewhere for the support and attachment of equipment and mechanical services, and for the vibration isolation of the same equipment. Nothing on the project drawings or specifications shall be interpreted as justification to waive the requirements of this section.

2.2 ELASTOMERIC PADS

- .1 Type EP1 - neoprene waffle or ribbed; 9 mm minimum thick; 50 durometer; maximum loading 350 kPa.
- .2 Type EP2 - rubber waffle or ribbed; 9 mm minimum thick; 30 durometer natural rubber; maximum loading 415 kPa.
- .3 Type EP3 - neoprene-steel-neoprene; 9 mm minimum thick neoprene bonded to 1.71 mm steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa.
- .4 Type EP4 - rubber-steel-rubber; 9 mm minimum thick rubber bonded to 1.71 mm steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa.

2.3 ELASTOMERIC MOUNTS

- .1 Type M1 - colour coded; neoprene in shear; maximum durometer of 60 ; threaded insert and two bolt-down holes; ribbed top and bottom surfaces.

2.4 SPRINGS

- .1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with levelling devices.
- .2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.
- .3 Cadmium plate for outdoor and 100% relative humidity installations.

- .4 Colour code springs.

2.5 SPRING MOUNT

- .1 Zinc or cadmium plated hardware; housings coated with rust resistant paint.
- .2 Type M2 - stable open spring: support on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad.
- .3 Type M3 - stable open spring: 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad, bonded under isolator and on isolator top plate; levelling bolt for rigidly mounting to equipment.
- .4 Type M4 - restrained stable open spring: supported on bonded 6 mm minimum thick ribbed neoprene or rubber friction and acoustic pad; built-in resilient limit stops, removable spacer plates.
- .5 Type M5 - enclosed spring mounts with snubbers for isolation up to 950 kg maximum.

2.6 ACOUSTIC BARRIERS FOR ANCHORS AND GUIDES

- .1 Acoustic barriers: between pipe and support, consisting of 25 mm minimum thick heavy duty duck and neoprene isolation material.

2.7 HORIZONTAL THRUST RESTRAINT

- .1 Spring and elastomeric element housed in box frame; assembly complete with rods and angle brackets for equipment and ductwork attachment; provision for adjustment to limit maximum start and stop movement to 9 mm.
- .2 Arrange restraints symmetrically on either side of unit and attach at centerline of thrust.

2.8 ROOF CURB ISOLATION RAILS

- .1 General: complete factory assembled without need for sub-base.
- .2 Lower member: continuous extruded aluminum channel.
- .3 Upper member: continuous extruded aluminum channel to provide continuous support for equipment, complete with all-directional neoprene snubber bushings 6 mm thick to resist wind and seismic forces.
- .4 Springs: steel, adjustable, removable, selected for 25 mm maximum static deflection plus 50% additional travel to solid, cadmium plated, sized and positioned to ensure uniform deflection.
- .5 High frequency isolation: 6 mm minimum thick continuous gasket on top and bottom of complete assembly. Material: closed cell neoprene.
- .6 Weatherproofing: continuous flexible counterflashing to curb and providing access to springs. Material: neoprene.
- .7 Hardware: cadmium plated or galvanized.

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 datasheet.

3.2 INSTALLATION

- .1 Seismic control measures to meet requirements of NBC.
- .2 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.
- .3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.
- .4 Unless indicated otherwise, support piping connected to isolated equipment with spring mounts or spring hangers with 25 mm minimum static deflection as follows:
 - .1 Up to NPS4: first 3 points of support. NPS5 to NPS8: first 4 points of support. NPS10 and Over: first 6 points of support.
 - .2 First point of support: static deflection of twice deflection of isolated equipment, but not more than 50 mm.
- .5 Where isolation is bolted to floor use vibration isolation rubber washers.
- .6 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

3.3 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services:
 - .1 Arrange with manufacturer's representative to review work of this Section and submit written reports to verify compliance with Contract Documents.
 - .2 Manufacturer's Field Services: consisting of product use recommendations and periodic site visits to review installation, scheduled as follows:
 - .1 After delivery and storage of Products.
 - .2 After preparatory work is complete but before installation commences.
 - .3 Twice during the installation, at 25 % and 60 % completion stages.
 - .4 Upon completion of installation.
 - .3 Submit manufacturer's reports to DCC Representative within 3 days of manufacturer representative's review.
 - .4 Make adjustments and corrections in accordance with written report.
- .2 Inspection and Certification:
 - .1 Experienced and competent sound and vibration testing professional engineer to take vibration measurement for HVAC systems after start up and TAB of systems to Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

- .2 Take vibration measurements for equipment for all rotating equipment.
- .3 Provide DCC Representative with notice 24 hours in advance of commencement of tests.
- .4 Establish adequacy of equipment isolation and acceptability of noise levels in occupied areas and where appropriate, remedial recommendations (including sound curves).
- .5 Submit complete report of test results (including sound curves).

3.4**CLEANING**

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and requirements for the identification of piping systems, duct work, valves and controllers, including the installation and location of identification systems.

1.2 REFERENCE STANDARDS

.1 Canadian Gas Association (CGA)

- .1 CSA/CGA B149.1-05, Natural Gas and Propane Installation Code.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.
- .2 CAN/CGSB-24.3-92, Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)

- .1 NFPA 13-2002, Standard for the Installation of Sprinkler Systems.
- .2 NFPA 14-2003, Standard for the Installation of Standpipe and Hose Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.2 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.

.3 Product data to include paint colour chips, other products specified in this section.

.4 Samples:

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 QUALITY ASSURANCE

.1 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

Part 2 Products

2.1 MANUFACTURER'S EQUIPMENT NAMEPLATES

- .1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.
- .2 Lettering and numbers raised or recessed.
- .3 Information to include, as appropriate:
 - .1 Equipment: manufacturer's name, model, size, serial number, capacity.
 - .2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 SYSTEM NAMEPLATES

- .1 Colours:
 - .1 Hazardous: red letters, white background.
 - .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).
- .2 Construction:
 - .1 3 mm thick white anodized aluminum, matte finish, with square corners, letters accurately aligned and machine engraved into core.
- .3 Sizes:
 - .1 Conform to following table:

Size # mm	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	13 x 75	2	3
4	20 x 100	1	8
5	20 x 100	2	5
6	20 x 200	1	8
7	25 x 125	1	12
8	25 x 125	2	8
9	35 x 200	1	20

- .2 Use maximum of 25 letters/numbers per line.
- .4 Locations:
 - .1 Terminal cabinets, control panels: use size # 5.
 - .2 Equipment in Mechanical Rooms: use size # 9.
- .5 Identification for PSPC Preventive Maintenance Support System (PMSS):
 - .1 Use arrangement of Main identifier, Source identifier, Destination identifier.
 - .2 Equipment in Mechanical Room:
 - .1 Main identifier: size #9.
 - .2 Source and Destination identifiers: size #6.
 - .3 Terminal cabinets, control panels: size #5.
 - .3 Equipment elsewhere: sizes as appropriate.

2.3 EXISTING IDENTIFICATION SYSTEMS

- .1 Apply existing identification system to new work.
- .2 Where existing identification system does not cover for new work, use identification system specified this section.
- .3 Before starting work, obtain written approval of identification system from DCC Representative.

2.4 PIPING SYSTEMS GOVERNED BY CODES

- .1 Identification:
 - .1 Natural gas: to CSA/CGA B149.1.

2.5 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
 - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
 - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
 - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
 - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
 - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
 - .2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.
- .7 Colours and Legends:
 - .1 Where not listed, obtain direction from DCC Representative.

.2 Colours for legends, arrows: to following table:

Background colour:	Legend, arrows:
Yellow	BLACK
Green	WHITE
Red	WHITE

.3 Background colour marking and legends for piping systems:

Contents	Background colour marking	Legend
Refrigeration suction	Yellow	REF. SUCTION
Refrigeration liquid	Yellow	REF. LIQUID
Natural gas	to Codes	

2.6 IDENTIFICATION DUCTWORK SYSTEMS

- .1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.
- .2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.7 VALVES, CONTROLLERS

- .1 Brass tags with 12 mm stamped identification data filled with black paint.
- .2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.8 CONTROLS COMPONENTS IDENTIFICATION

- .1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.
- .2 Inscriptions to include function and (where appropriate) fail-safe position.

2.9 LANGUAGE

- .1 Identification in French and English.
- .2 Use one nameplate and label for both languages.

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 datasheet.

3.2 INSTALLATION

- .1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.
- .2 Provide ULC/CSA registration plates as required by respective agency.

3.3 NAMEPLATES

- .1 Locations:

- .1 In conspicuous location to facilitate easy reading and identification while on roof.
- .2 Standoffs:
 - .1 Provide for nameplates on hot and/or insulated surfaces.
- .3 Protection:
 - .1 Do not paint, insulate or cover.

3.4 LOCATION OF IDENTIFICATION ON PIPING AND DUCTWORK SYSTEMS

- .1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.
- .2 Adjacent to each change in direction.
- .3 At least once in each small room through which piping or ductwork passes.
- .4 On both sides of visual obstruction or where run is difficult to follow.
- .5 On both sides of separations such as walls, floors, partitions.
- .6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.
- .7 At beginning and end points of each run and at each piece of equipment in run.
- .8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.
- .9 Identification easily and accurately readable from usual operating areas and from access points.
 - .1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.5 VALVES, CONTROLLERS

- .1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.
- .2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by DCC Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.
- .3 Number valves in each system consecutively.

3.6 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.
- .2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 QUALIFICATIONS OF TAB PERSONNEL

- .1 Submit names of personnel to perform TAB to DCC Representative within 30 days of award of contract.
- .2 Provide documentation confirming qualifications, successful experience.
- .3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:
 - .1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002.
 - .2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.
 - .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.
- .4 Recommendations and suggested practices contained in the TAB Standard: mandatory.
- .5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.
- .6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.
- .7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.
- .8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.
 - .1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.
 - .2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 PURPOSE OF TAB

- .1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

- .2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.
- .3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 EXCEPTIONS

- .1 TAB of systems and equipment regulated by codes, standards to satisfaction of authority having jurisdiction.

1.5 CO-ORDINATION

- .1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.
- .2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 PRE-TAB REVIEW

- .1 Review Contract Documents before project construction is started confirm in writing to DCC Representative adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
- .2 Review specified standards and report to DCC Representative in writing proposed procedures which vary from standard.
- .3 During construction, co-ordinate location and installation of TAB devices, equipment, accessories, measurement ports and fittings.

1.7 START-UP

- .1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.
- .2 Follow special start-up procedures specified elsewhere in Division 23.

1.8 OPERATION OF SYSTEMS DURING TAB

- .1 Operate systems for length of time required for TAB and as required by DCC Representative for verification of TAB reports.

1.9 START OF TAB

- .1 Notify DCC Representative 7 days prior to start of TAB.
- .2 Start TAB when building is essentially completed, including:
- .3 Installation of ceilings, doors, windows, other construction affecting TAB.
- .4 Application of weatherstripping, sealing, and caulking.
- .5 Pressure, leakage, other tests specified elsewhere Division 23.
- .6 Provisions for TAB installed and operational.

- .7 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:
 - .1 Proper thermal overload protection in place for electrical equipment.
 - .2 Air systems:
 - .1 Filters in place, clean.
 - .2 Duct systems clean.
 - .3 Correct fan rotation.
 - .4 Fire, smoke, volume control dampers installed and open.
 - .5 Coil fins combed, clean.
 - .6 Equipment Access doors, installed, closed.
 - .7 Outlets installed, volume control dampers open.
 - .3 Liquid systems:
 - .1 Flushed, filled, vented.
 - .2 Correct pump rotation.
 - .3 Strainers in place, baskets clean.
 - .4 Isolating and balancing valves installed, open.
 - .5 Calibrated balancing valves installed, at factory settings.
 - .6 Chemical treatment systems complete, operational.

1.10 APPLICATION TOLERANCES

- .1 Do TAB to following tolerances of design values:
 - .1 HVAC systems: plus 5 %, minus 5 %.
 - .2 Glycol systems: plus or minus 5 %.

1.11 ACCURACY TOLERANCES

- .1 Measured values accurate to within plus or minus 2 % of actual values.

1.12 INSTRUMENTS

- .1 Prior to TAB, submit to DCC Representative list of instruments used together with serial numbers.
- .2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .3 Calibrate within 3 months of TAB. Provide certificate of calibration to DCC Representative.

1.13 SUBMITTALS

- .1 Submit, prior to commencement of TAB:
- .2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 PRELIMINARY TAB REPORT

- .1 Submit for checking and approval of DCC Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:
 - .1 Details of instruments used.
 - .2 Details of TAB procedures employed.
 - .3 Calculations procedures.
 - .4 Summaries.

1.15 TAB REPORT

- .1 Format in accordance with referenced standard.
- .2 TAB report to show results in SI units and to include:
 - .1 Project record drawings.
 - .2 System schematics.
- .3 Submit 6 copies of TAB Report to DCC Representative for verification and approval, in English in D-ring binders, complete with index tabs.

1.16 VERIFICATION

- .1 Reported results subject to verification by DCC Representative.
- .2 Provide personnel and instrumentation to verify up to 30 % of reported results.
- .3 Number and location of verified results as directed by DCC Representative.
- .4 Pay costs to repeat TAB as required to satisfaction of DCC Representative.
- .5 Provide minimum two (2) weeks' notice to DCC Representative of schedule for 30 % verifications. Provide schedule details and timings.

1.17 SETTINGS

- .1 After TAB is completed to satisfaction of DCC Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.
- .2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.18 COMPLETION OF TAB

- .1 TAB considered complete when final TAB Report received and approved by DCC Representative.

1.19 AIR SYSTEMS

- .1 Standard: TAB to most stringent of this section or TAB standards of NEBB or AABC.
- .2 Do TAB of systems, equipment, components, controls specified Division 23.
- .3 Qualifications: personnel performing TAB current member in good standing of NEBB or AABC.

- .4 Quality assurance: perform TAB under direction of supervisor qualified by NEBB or AABC.
- .5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.
- .6 Locations of equipment measurements: to include as appropriate:
 - .1 Inlet and outlet of dampers, filter, coil, fan, other equipment causing changes in conditions.
 - .2 At controllers, controlled device.

1.20 OTHER TAB REQUIREMENTS

- .1 General requirements applicable to work specified this paragraph:
 - .1 Qualifications of TAB personnel: as for air systems specified this section.
 - .2 Quality assurance: as for air systems specified this section.
- .2 Smoke management systems:
 - .1 Test for proper operation of all smoke and fire dampers, sensors, installed as component parts of air systems specified Division 23.
 - .2 Emergency evacuation: see post-occupancy TAB activities specified below.

1.21 POST-OCCUPANCY TAB

- .1 Measure DBT, WBT, air velocity, air flow patterns, NC levels in occupied areas as designated by the DCC Representative.
- .2 Emergency evacuation: participate in full scale emergency evacuation exercises. Repeat smoke management tests at this time.
- .3 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 1 month of termination of Warranty Period.

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 SUMMARY

.1 Section Includes:

- .1 Materials and methods for pressure testing ducts over 5 m in length, forming part of a supply, return or exhaust ductwork system directly or indirectly connected to air handling equipment.

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .2 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)
 - .1 SMACNA HVAC Air Duct Leakage Test Manual, 1985.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties. Include pressure test information and results as follows:
 - .1 Submit proposed report form and test report format to DCC Representative for approval at least one month before proposed date of first series of tests. Do not start tests until approval received in writing from DCC Representative.
 - .2 Prepare report of results and submit to DCC Representative within 24 hours of completion of tests. Include:
 - .1 Schematic of entire system.
 - .2 Schematic of section under test showing test site.
 - .3 Required and achieved static pressures.
 - .4 Orifice differential pressure at test sites.
 - .5 Permissible and actual leakage flow rate (L/s) for test sites.
 - .6 Witnessed certification of results.
 - .3 Include test reports in final TAB report.
 - .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .5 Instructions: submit manufacturer's installation instructions.
 - .6 Manufacturer's field reports specified.

Part 2 Products

2.1 TEST INSTRUMENTS

- .1 Test apparatus to include:
 - .1 Fan capable of producing required static pressure.
 - .2 Duct section with calibrated orifice plate mounted and accurately located pressure taps.
 - .3 Flow measuring instrument compatible with the orifice plate.
 - .4 Calibration curves for orifice plates used.
 - .5 Flexible duct for connecting to ductwork under test.
 - .6 Smoke bombs for visual inspections.
- .2 Test apparatus: accurate to within +/- 3 % of flow rate and pressure.
- .3 Submit details of test instruments to be used to DCC Representative at least one month before anticipated start date.
- .4 Test instruments: calibrated and certificate of calibration deposited with DCC Representative no more than 15 days before start of tests.
- .5 Re-calibrated every six months thereafter.

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 datasheet.

3.2 TEST PROCEDURES

- .1 Maximum lengths of ducts to be tested consistent with capacity of test equipment.
- .2 Section of duct to be tested to include:
 - .1 Fittings, branch ducts, tap-ins.
- .3 Repeat tests until specified pressures are attained. Bear costs for repairs and repetition to tests.
- .4 Base partial system leakage calculations on SMACNA HVAC Air Duct Leakage Test Manual.
- .5 Seal leaks that can be heard or felt, regardless of their contribution to total leakage.

3.3 SITE TOLERANCES

- .1 System leakage tolerances specified are stated as percentage of total flow rate handled by system. Pro-rate specified system leakage tolerances. Leakage for sections of duct systems: not to exceed total allowable leakage.

- .2 Leakage tests on following systems not to exceed specified leakage rates.
 - .1 Small duct systems up to 250 Pa: leakage 2 %.
 - .2 Large low pressure duct systems up to 500 Pa: leakage 2 %.
- .3 Evaluation of test results to use surface area of duct and pressure in duct as basic parameters.

3.4 TESTING

- .1 Test ducts before installation of insulation or other forms of concealment.
- .2 Test after seals have cured.
- .3 Test when ambient temperature will not affect effectiveness of seals, and gaskets.
- .4 Flexible connections to VAV boxes.

3.5 FIELD QUALITY CONTROL

- .1 Manufacturer's Field Services.
 - .1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - .2 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - .3 Schedule site visits, to review Work, at stages listed:
 - .1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - .2 Twice during progress of Work at 25% and 60% complete.
 - .3 Upon completion of the Work, after cleaning is carried out.
 - .4 Obtain reports, within 3 days of review, and submit, immediately, to DCC Representative.
- .2 Performance Verification:
 - .1 DCC Representative to witness tests and to verify reported results.
 - .2 To be certified by same TAB agency approved by DCC Representative to undertake TAB on this project.

3.6 CLEANING

- .1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ANSI/ASHRAE/IESNA 90.1-04, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.
- .2 ASTM International (ASTM)
 - .1 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 - .2 ASTM C335-05ae1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
 - .3 ASTM C411-05, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C547-07e1, Standard Specification for Mineral Fiber Pipe Insulation.
 - .6 ASTM C553-02e1, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .7 ASTM C612-04e1, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .8 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .9 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .4 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36-00, Commercial Adhesives.
- .5 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.
- .6 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).
- .7 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - means "not concealed" as previously defined.
 - .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.
- .2 TIAC Codes:
 - .1 CRD: Code Round Ductwork,
 - .2 CRF: Code Rectangular Finish.

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 and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.
 - .1 Description of equipment giving manufacturer's name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .4 Samples:
 - .1 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed.
 - .2 Mount sample on 12 mm plywood board.
 - .3 Affix typewritten label beneath sample indicating service.
- .5 Manufacturers' Instructions:
 - .1 Provide manufacture's written duct insulation jointing recommendations, and special handling criteria, installation sequence, and cleaning procedure.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: specialist in performing work of this section.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address and ULC markings.

Part 2 Products

2.1 FIRE AND SMOKE RATING

- .1 To CAN/ULC-S102:
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).
- .4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to ASTM C553.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to ASTM C553.

2.3 JACKETS

- .1 Canvas:
 - .1 220 gm/m²cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
- .2 Lagging adhesive: compatible with insulation.
- .3 Aluminum:
 - .1 To ASTM B209 with moisture barrier as scheduled in PART 3 of this section.
 - .2 Thickness: 0.50 mm sheet.
 - .3 Finish: Smooth.
 - .4 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.
 - .1 Stainless steel:
 - .5 Type: 316.
 - .6 Thickness: 0.25 mm sheet.
 - .7 Finish: Smooth.
 - .8 Jacket banding and mechanical seals: 12 mm wide, 0.5 mm thick stainless steel.

2.4 ACCESSORIES

- .1 Vapour retarder lap adhesive:
 - .1 Water based, fire retardant type, compatible with insulation.
- .2 Indoor Vapour Retarder Finish:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
- .3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.
- .4 ULC Listed Canvas Jacket:
 - .1 220 gm/m²cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
- .5 Outdoor Vapour Retarder Mastic:
 - .1 Vinyl emulsion type acrylic, compatible with insulation.
 - .2 Reinforcing fabric: Fibrous glass, untreated 305 g/m².
- .6 Tape: self-adhesive, aluminum, plain, 50 mm wide minimum.
- .7 Contact adhesive: quick-setting
- .8 Canvas adhesive: washable.
- .9 Tie wire: 1.5 mm stainless steel.
- .10 Banding: 12 mm wide, 0.5 mm thick stainless steel.
- .11 Facing: 25 mm stainless steel hexagonal wire mesh stitched on one face.
- .12 Fasteners: 2 mm diameter pins with 35 mm square clips, length to suit thickness of insulation.

Part 3 Execution

3.1 APPLICATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 PRE-INSTALLATION REQUIREMENTS

- .1 Pressure test ductwork systems complete, witness and certify.
- .2 Ensure surfaces are clean, dry, and free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers' instructions and as indicated.
- .3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

- .1 Ensure hangers, and supports are outside vapour retarder jacket.
- .5 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 DUCTWORK INSULATION SCHEDULE

- .1 Insulation types and thicknesses: conform to following table:

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts	C-1	yes	50
Rectangular warm air ducts	C-1	no	25
Supply, return and exhaust ducts exposed in space being served	none		
Outside air ducts to mixing plenum	C-1	yes	25
Mixing plenums	C-1	yes	25
Exhaust duct between dampers and louvres	C-1	no	25
Rectangular ducts outside	C-1	yes	50

- .2 Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:
 - .1 Use TIAC code C-1 insulation, scored to suit diameter of duct.
 - .1 Finishes: conform to following table:

TIAC Code		
Rectangular	Round	
Indoor, concealed	none	none
Indoor, exposed within mechanical room	CRF/1	CRD/2
Indoor, exposed elsewhere	CRF/2	CRD/3
Outdoor, exposed to precipitation	CRF/3	CRD/4
Outdoor, elsewhere	CRF/4	CRD/5

3.5 CLEANING

- .1 Clean in accordance with Section 01 74 11 - Cleaning.
 - .1 Remove surplus materials, excess materials, rubbish, tools and equipment.
- .2 Waste Management: in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Thermal insulation for piping and piping accessories in commercial type applications.

1.2 REFERENCE STANDARDS

- .1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 90.1-01, Energy Standard for Buildings Except Low-Rise Residential Buildings (IESNA co-sponsored; ANSI approved; Continuous Maintenance Standard).
- .2 ASTM International (ASTM)
 - .1 ASTM B209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
 - .2 ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C533-2004, Calcium Silicate Block and Pipe Thermal Insulation.
 - .6 ASTM C547-2003, Mineral Fiber Pipe Insulation.
 - .7 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketting Sheet, for Insulated Pipes, Vessels and Round Ducts
- .4 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Assessment Act (CEAA), 1995, c. 37.
 - .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
 - .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).
- .6 Manufacturer's Trade Associations

- .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .7 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings
 - .4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.3 DEFINITIONS

- .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - will mean "not concealed" as specified.
- .2 TIAC ss:
 - .1 CRF: Code Rectangular Finish.
 - .2 CPF: Code Piping Finish.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
 - .1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Safety Data Sheets (SDS) in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Shop drawings: Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.
- .4 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed. Mount sample on 12 mm plywood board. Affix label beneath sample indicating service.
- .5 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.

- .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .2 Instructions: submit manufacturer's installation instructions.
 - .1 DCC Representative will make available 1 copy of systems supplier's installation instructions.

1.5 QUALITY ASSURANCE

- .1 Installer: specialist in performing work of this Section, member of TIAC.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
 - .1 Protect from weather, construction traffic.
 - .2 Protect against damage.
 - .3 Store at temperatures and conditions required by manufacturer.
- .3 Waste Management and Disposal:
 - .1 Waste Management and Disposal: separate waste materials for recycling in accordance with Section 01 74 21 - Waste Management and Disposal.
 - .2 Place excess or unused insulation and insulation accessory materials in designated containers.

Part 2 Products

2.1 FIRE AND SMOKE RATING

- .1 In accordance with CAN/ULC-S102.
 - .1 Maximum flame spread rating: 25.
 - .2 Maximum smoke developed rating: 50.

2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

- .3 TIAC Code C-2: mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).
 - .1 Mineral fibre: to CAN/ULC-S702.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to CAN/ULC-S702.

2.3 INSULATION SECUREMENT

- .1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .2 Contact adhesive: quick setting.
- .3 Canvas adhesive: washable.
- .4 Tie wire: 1.5 mm diameter stainless steel.
- .5 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

- .1 Thermal insulating and finishing cement:
 - .1 Air drying on mineral wool, to ASTM C449/C449M.

2.5 VAPOUR RETARDER LAP ADHESIVE

- .1 Water based, fire retardant type, compatible with insulation.

2.6 INDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 OUTDOOR VAPOUR RETARDER FINISH

- .1 Vinyl emulsion type acrylic, compatible with insulation.
- .2 Reinforcing fabric: fibrous glass, untreated 305 g/m².

2.8 JACKETS

- .1 Stainless steel:
 - .1 Type: 304.
 - .2 Thickness: 0.25 mm.
 - .3 Finish: smooth.
 - .4 Joining: longitudinal and circumferential slip joints with 50 mm laps.
 - .5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.
 - .6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

2.9 WEATHERPROOF CAULKING FOR JACKETS INSTALLED OUTDOORS

- .1 Caulking to: Section 07 92 00 - Joint Sealants.

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 datasheet.

3.2 PRE-INSTALLATION REQUIREMENT

- .1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.
- .2 Surfaces clean, dry, free from foreign material.

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturers' instructions and this specification.
- .3 Use two layers with staggered joints when required nominal wall thickness exceeds 75 mm.
- .4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Install hangers, supports outside vapour retarder jacket.
- .5 Supports, Hangers:
 - .1 Apply high compressive strength insulation, suitable for service, at oversized saddles and shoes where insulation saddles have not been provided.

3.4 INSTALLATION OF ELASTOMERIC INSULATION

- .1 Insulation to remain dry. Overlaps to manufacturers' instructions. Ensure tight joints.
- .2 Provide vapour retarder as recommended by manufacturer.

3.5 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM E202-04, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

1.2 CLEANING AND START-UP OF MECHANICAL PIPING SYSTEMS

- .1 In accordance with Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems.

1.3 GLYCOL SYSTEMS

- .1 Test to prove concentration will prevent freezing to minus 40 degrees C Test inhibitor strength and include in procedural report. Refer to ASTM E202.

1.4 REPORTS

- .1 In accordance with Section 01 91 00 - Commissioning: Reports, supplemented as specified herein.

1.5 TRAINING

- .1 In accordance with Section 01 91 00 - Commissioning: Training of O&M Personnel, supplemented as specified herein.

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 SUMMARY

- .1 Section Includes:
 - .1 Procedures and cleaning solutions for cleaning mechanical piping systems.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM E202-00, Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Safety Data Sheets (SDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.
- .2 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Instructions: submit manufacturer's installation instructions.
 - .1 DCC Representative will make available 1 copy of systems supplier's installation instructions.

1.4 QUALITY ASSURANCE

- .1 Health and Safety:
 - .1 Do construction occupational health and safety.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Waste Management and Disposal: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.

Part 2 Products

2.1 CLEANING SOLUTIONS

- .1 Tri-sodium phosphate: 0.40 kg per 100 L water in system.
- .2 Sodium carbonate: 0.40 kg per 100 L water in system.
- .3 Low-foaming detergent: 0.01 kg per 100 L water in system.

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 datasheet.

3.2 CLEANING

- .1 Glycol Systems:
 - .1 In addition to procedures specified above perform specified procedures.
 - .2 Test to prove concentration will prevent freezing to minus 40 degrees C. Test inhibitor strength and include in procedural report. Refer to ASTM E202.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and installation for piping, valves and fittings for gas fired equipment.

1.2 REFERENCE STANDARDS

.1 American Society of Mechanical Engineers (ASME)

- .1 ASME B16.5-03, Pipe Flanges and Flanged Fittings.
- .2 ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ASME B16.22-01, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.
- .4 ASME B18.2.1-96, Square and Hex Bolts and Screws Inch Series.

.2 ASTM International (ASTM)

- .1 ASTM A47/A47M-99 (2004), Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M-04, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
- .3 ASTM B75M-99, Standard Specification for Seamless Copper Tube Metric.
- .4 ASTM B837-01, Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum (LP) Gas Fuel Distribution Systems.

.3 CSA Group (CSA)

- .1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.4 CSA Group (CSA)/Canadian Gas Association (CGA)

- .1 CAN/CSA B149.1HB-00, Natural Gas and Propane Installation Code Handbook.
- .2 CAN/CSA B149.2-00, Propane Storage and Handling Code.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

- .1 Safety Data Sheets (SDS).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet for piping, fittings and equipment.
- .2 Indicate on manufacturers catalogue literature following: valves.
- .3 Submit WHMIS SDS in accordance with Section 02 81 00 - Hazardous Materials. Indicate VOC's for adhesive and solvents during application and curing.

- .3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- .4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .5 Instructions: submit manufacturer's installation instructions.
- .6 Closeout Submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

- .1 Pre-Installation Meeting:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section.
 - .1 Verify project requirements.
 - .2 Review installation conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .2 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 70 03 - Safety Requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Separate waste materials for reuse, and recycling in accordance with Section 01 74 11 – Cleaning.
 - .2 Remove from site and dispose of packaging materials at appropriate recycling facilities.
- .2 Storage and Handling Requirements:
 - .1 Store materials in accordance with manufacturer's recommendations in clean, dry, and well-ventilated area.
 - .2 Store and protect air duct accessories from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 PIPE

- .1 Steel pipe: to ASTM A53/A53M, Schedule 40, seamless as follows:
 - .1 NPS 1/2 to 2, screwed.
 - .2 NPS 2 1/2 and over, plain end.
- .2 Copper tube: to ASTM B837.

2.2 JOINTING MATERIAL

- .1 Screwed fittings: pulverized lead paste.
- .2 Welded fittings: to CSA W47.1.
- .3 Flange gaskets: non-metallic flat.
- .4 Brazing: to ASTM B837.

2.3 FITTINGS

- .1 Steel pipe fittings, screwed, flanged or welded:
 - .1 Malleable iron: screwed, banded, Class 150.
 - .2 Steel pipe flanges and flanged fittings: to ASME B16.5.
 - .3 Welding: butt-welding fittings.
 - .4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47/A47M.
 - .5 Bolts and nuts: to ASME B18.2.1.
 - .6 Nipples: schedule 40, to ASTM A53/A53M.
- .2 Copper pipe fittings, screwed, flanged or soldered:
 - .1 Cast copper fittings: to ASME B16.18.
 - .2 Wrought copper fittings: to ASME B16.22.

2.4 VALVES

- .1 Provincial Code approved, lubricated ball type.

2.5 FLEXIBLE CONNECTORS

- .1 Application: To suit motion resulting from system thermal expansion and contraction.
- .2 Live length: To manufacturer's recommendations to suit axial and lateral movements due to thermal expansion.
- .3 Inner hose: In accordance with ASTM A20/A240M T21 stainless steel corrugated flexible metal hose assembly.
- .4 Braided wire mesh Series 3000 stainless steel outer jacket.
- .5 Diameter: same size as connecting pipe.
- .6 Operating Conditions:
 - .1 Working temperature: -30 C to 50 C
 - .2 To match system requirements
 - .3 Maximum forces for minimum 50 mm deflection shall be 1.0 kN.
 - .4 End connections: Straight to weld neck flange or elbow to weld neck.
 - .5 CGA approved and tagged assembled product, including flanges.
- .7 Install flexible connections to manufacturer's recommendations to cold sprung deflections.

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 datasheet.

3.2 PIPING

- .1 Install in accordance with Section CAN/CSA B149.1, and Section 23 05 05 - Installation of Pipework, supplemented as specified.
- .2 Install drip points:
 - .1 At low points in piping system.
 - .2 At connections to equipment.

3.3 VALVES

- .1 Install valves with stems upright or horizontal unless otherwise approved by DCC Representative.
- .2 Install valves at branch take-offs to isolate pieces of equipment, and as indicated.

3.4 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.

3.5 CLEARANCES

- .1 Provide clearances around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer.
- .2 Provide space for disassembly, removal of equipment and components as indicated by manufacturer without interrupting operation of other system, equipment, and components.

3.6 FIELD QUALITY CONTROL

- .1 Site Tests/Inspection:
 - .1 Test system in accordance with CAN/CSA B149.1 and requirements of authorities having jurisdiction.
 - .2 Obtain reports within 3 days of review and submit immediately to DCC Representative.

- .2 Performance Verification:
 - .1 Operations tests:
 - .1 Measure gas pressure at gas meter outlet and at burner manifold.
 - .2 Verify details of temperature and pressure compensation at meter.
 - .3 Verify settings, operation, venting of high and low pressure cut-outs, alarms.
 - .4 Check terminals of vents for gas pressure regulators.

3.7 ADJUSTING

- .1 Purging: purge after pressure test in accordance with CAN/CSA B149.1.
- .2 Pre-Start-Up Inspections:
 - .1 Check vents from regulators, control valves, terminate outside building in approved location, protected against blockage, damage.
 - .2 Check gas trains, entire installation is approved by authority having jurisdiction.

3.8 CLEANING

- .1 Cleaning: in accordance with Section CAN/CSA B149.1, and Section 23 08 16 - Cleaning and Start-Up of HVAC Piping Systems, supplemented as specified.
- .2 Perform cleaning operations as specified in Section 01 74 11 and in accordance with manufacturer's recommendations.
- .3 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 All of Division 01
- .2 All Mechanical Division 23

1.2 REFERENCE STANDARDS

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- .2 ASTM International (ASTM)
 - .1 ASTM A480/A480M-12, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - .2 ASTM A635/A635M-09b, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Hot-Rolled, Alloy, Carbon, Structural, High-Strength Low-Alloy, and High-Strength Low-Alloy with Improved Formability, General Requirements for.
 - .3 ASTM A653/A653M-11, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Green Seal Environmental Standards (GS)
 - .1 GS-36-11, Standard for Adhesives for Commercial Use.
- .4 National Fire Protection Association (NFPA)
 - .1 NFPA 90A-12, Standard for the Installation of Air-Conditioning and Ventilating Systems.
 - .2 NFPA 90B-12, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
 - .3 NFPA 96-11, Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations.
- .5 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)
 - .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2005.
 - .2 SMACNA HVAC Air Duct Leakage Test Manual, 2012.
 - .3 IAQ Guideline for Occupied Buildings Under Construction 2007.
- .6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
 - .1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

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 metal ducts and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

- .1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province of Ontario, Canada.

.4 Test and Evaluation Reports:

.1 Certification of Ratings:

- .1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
- .1 Store materials in dry location, indoors, off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Store and protect metal ducts from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SEAL CLASSIFICATION

- .1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	A

- .2 Seal classification:

- .1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

2.2 SEALANT

- .1 Sealant: oil resistant, water borne, polymer type flame resistant duct sealant. Temperature range of minus 30 degrees C to plus 93 degrees C.

2.3 TAPE

- .1 Tape: polyvinyl treated, open weave fiberglass tape, 50 mm wide.

2.4 DUCT LEAKAGE

- .1 In accordance with SMACNA HVAC Air Duct Leakage Test Manual.

2.5 FITTINGS

- .1 Fabrication: to SMACNA.

- .2 Radiused elbows:
 - .1 Rectangular: standard radius.
 - .2 Round: five piece, centreline radius: 1.5 times diameter.
- .3 Mitred elbows, rectangular:
 - .1 To 407 mm: with single thickness turning vanes.
 - .2 Over 407 mm: with double thickness turning vanes.
- .4 Branches:
 - .1 Rectangular main and branch: with 45 degrees entry on branch.
 - .2 Round main and branch: enter main duct at 45 degrees with conical connection.
 - .3 Provide volume control damper in branch duct near connection to main duct.
 - .4 Main duct branches: with splitter damper.
- .5 Transitions:
 - .1 Diverging: 20 degrees maximum included angle.
 - .2 Converging: 30 degrees maximum included angle.
- .6 Offsets:
 - .1 As indicated.
- .7 Obstruction deflectors: maintain full cross-sectional area.
 - .1 Maximum included angles: as for transitions.

2.6 FIRE STOPPING

- .1 Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 - Fire Stopping.
- .2 Coordinate with 07 84 00 - Fire Stopping to ensure fire stopping materials and installation does not distort duct.

2.7 GALVANIZED STEEL

- .1 Lock forming quality: to ASTM A653/A653M, Z90 zinc coating.
- .2 Thickness, fabrication and reinforcement: to SMACNA.
- .3 Joints: to SMACNA.

2.8 HANGERS AND SUPPORTS

- .1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
 - .1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.
 - .1 Maximum size duct supported by strap hanger: 500.
 - .2 Hanger configuration: to SMACNA.
 - .3 Hangers: galvanized steel angle with galvanized steel rods to following table:

Duct Size (mm)	Angle Size (mm)	Rod Size (mm)
up to 750	25 x 25 x 3	6
751 to 1050	40 x 40 x 3	6
1051 to 1500	40 x 40 x 3	10
1501 to 2100	50 x 50 x 3	10
2101 to 2400	50 x 50 x 5	10
2401 and over	50 x 50 x 6	10

- .4 Upper hanger attachments:
 - .1 For concrete: manufactured concrete inserts.

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 metal duct installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

3.2 GENERAL

- .1 Do work in accordance with NFPA 90A, NFPA 90B, and SMACNA.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods.
 - .1 Insulate strap hangers 100 mm beyond insulated duct.
- .3 Support risers in accordance with SMACNA.
- .4 Install breakaway joints in ductwork on sides of fire separation.
- .5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

3.3 HANGERS

- .1 Strap hangers: install in accordance with SMACNA.
- .2 Angle hangers: complete with locking nuts and washers.
- .3 Hanger spacing: in accordance with as follows:

Duct Size (mm)	Spacing (mm)
to 1500	3000
1501 and over	2500

3.4 WATERTIGHT DUCT

- .1 Provide watertight duct for:
 - .1 Dishwasher exhaust.
 - .2 Fresh air intake.
 - .3 Minimum 3000 mm from duct mounted humidifier in all directions.
 - .4 As indicated.
- .2 Form bottom of horizontal duct without longitudinal seams.
 - .1 Weld joints of bottom and side sheets.
 - .2 Seal other joints with duct sealer.

3.5 SEALING AND TAPING

- .1 Apply sealant in accordance with to manufacturer's recommendations.
- .2 Bed tape in sealant and recoat with minimum of 1 coat of sealant to manufacturers recommendations.

3.6 LEAKAGE TESTS

- .1 Refer to Section 23 05 94 - Pressure Testing of Ducted Air Systems.
- .2 In accordance with SMACNA HVAC Duct Leakage Test Manual.
- .3 Do leakage tests in sections.
- .4 Make trial leakage tests as instructed to demonstrate workmanship.
- .5 Do not install additional ductwork until trial test has been passed.
- .6 Complete test before performance insulation or concealment Work.

3.7 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 All division 26 and associated applicable sections.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CAN/CSA C22.1-18 - Canadian Electrical Code (CEC), Part 1, Safety Standard for Electrical Installations
 - .2 CAN3-C235-83(R2010) - Preferred Voltage levels for AC Systems, 0 to 50,000V.
 - .3 CSA C22.2, General requirements- Canadian Electrical Code Part II.
 - .4 CSA Z462-15. Workplace Electrical Safety
- .2 C-98-007-000/AF-Z01 Universal Design and Barrier-Free Access Guidelines and Standards for DND/CF Facilities (UDBFAR)
- .3 Electrical and Electronic Manufacturer's Association of Canada (EEMAC)
 - .1 EEMAC 2Y-1-1958, Standard for CEMA Light Gray Colour for Indoor Switch Gear
- .4 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)
 - .1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th edition.

1.3 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 DCC Representative: Defence Construction Canada (1951)

1.4 DESIGN REQUIREMENTS

- .1 Operating voltages: to CAN3-C235 (R2010) - Preferred Voltage Levels for AC Systems, 0 to 50,000 V.
- .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 control items in English and French.
- .4 Use one nameplate or label for both languages.

1.5 SUBMITTALS

- .1 Product Data: submit manufactures instructions, printed product literature and data sheets for, panel boards and circuit breakers, wiring and wiring devices, light fixtures.
- .2 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Submit for review single line electrical diagrams covered by 3mm transparent thermoplastic and locate at electrical panel.
- .4 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 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.
 - .3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.
 - .4 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.
 - .5 Submit 5 copies of full size drawings and product data to DCC Representative.
 - .6 If changes are required, notify DCC Representative of these changes before they are made.
- .5 Quality Control: in accordance with Section 01 45 00 - Quality Control.
 - .1 Provide CSA and/or ULC certified equipment and material.
 - .2 Where CSA certified equipment and material is not available, submit such equipment and material to Electrical Safety Authority for special field 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 Electrical Safety Authority upon completion of Work to DCC Representative.
- .6 Manufacturer's Field Reports: submit to DCC 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.

1.6 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Qualifications: electrical Work to be carried out by qualified, licensed (Province of Ontario or Red Seal) electricians or registered apprentices in accordance with the conditions of Provincial Act respecting manpower vocational training and qualification.
 - .1 Employees registered in Ontario apprenticeship program: permitted, under direct supervision of qualified licensed electrician, to perform specific tasks.
- .3 Site Meetings: as directed by DCC Representative.

- .4 Health and Safety Requirements: in accordance with Section 01 70 03 - Safety Requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.8 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 11 - Cleaning.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate all material for disposal or for recycling in accordance with Waste Management Plan.

1.9 SYSTEM STARTUP

- .1 Instruct DCC 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 representative 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 all aspects of its care and operation.

1.10 OPERATING INSTRUCTIONS

- .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.

1.11 Warranty

- .1 warranty duration: Two ((2)) years from the time of commissioning.
- .2 Coverage: warrant against failure to perform to characteristics as specified.
- 3. Manufacturer's warranty: submit notarized manufacturers' warranty, for DCC Representatives acceptance.

Part 2 Products

2.1 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 ESA before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.
- .3 Factory assemble control panels and component assemblies.

2.2 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

- .1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, for Laboratory Exhaust Unit (EF-1) and Makeup Air Unit (MAU-1)
- .2 Control wiring and conduit: in accordance with CEC and as detailed in Manufacturers Instructions, as specified in mechanical sections and as shown on mechanical drawings.
- .3 Supply and install all manufacturers' special/extra bonding conductors as requirement including bonding bare conductors to field installed sheet metal type ductwork.
- .4 Operating voltages: CAN3-C235.
- .5 Motors, control and distribution devices and equipment to operate satisfactory at 60 HZ within normal operating limits established by above standard.

2.3 WARNING SIGNS

- .1 Warning Signs: in accordance with requirements of CEC.
- .2 Bilingual English and French, Lamicoid signs, minimum size 175 x 250 mm.

2.4 WIRING TERMINATIONS

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

2.5 EQUIPMENT IDENTIFICATION

- .1 Identify electrical equipment with nameplates and labels as follows:
 - .1 Nameplates: lamicoid 3mm, black face, white core, lettering accurately aligned and engraved into core and mechanically attached with self tapping screws.
 - .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 6mm high letters unless specified otherwise.
- .3 Wording on nameplates and labels to be approved by DCC Representative prior to manufacture.
- .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 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .7 Terminal cabinets and pull boxes: indicate system and voltage.
- .8 Transformers: indicate capacity, primary and secondary voltages.

2.6 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, 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 (CEC).
- .4 Use colour coded wires in cables, matched throughout system.

2.7 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.

	Prime	Auxiliary
Up to 250 V	Yellow	
Up to 600V	Yellow	Green
HVAC	White	
Fire Alarm	Red	

2.8 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 outdoor electrical equipment "equipment green" finish.
- .2 Paint indoor switchgear and distribution enclosures light gray to EEMAC 2Y-1.

Part 3 Execution

3.1 INSTALLATION

- .1 Do complete installation in accordance with CSA C22.1 (CEC) except where specified otherwise.

3.2 NAMEPLATES AND LABELS

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

3.3 CONDUIT AND CABLE INSTALLATION

- .1 Install conduit and sleeves prior to pouring of concrete.
- .1 Sleeves through concrete: schedule 40 steel pipe sized for free passage of conduit, and protruding 50mm.
- .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.

3.4 LOCATION OF OUTLETS

- .1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.
- .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 3000mm, and information is given before installation.
- .4 Locate weatherproof 20A GFCI outlet within 3m of rooftop mechanical units (MAU and EF) which require service work.

- .5 Locate light switches on latch side of doors.

3.5 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 as per C98-007-000/AF-Z01UDBFAR unless indicated otherwise.
 - .1 Receptacles: 300mm.
 - .2 Switches: 1100mm.
 - .3 Remote emergency fixtures: 2300mm.
 - .4 Panel Boards: as required by Code or as indicated on drawings.
 - .5 HVAC controls: 1200mm

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.7 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 - SUBMITTALS: phase and neutral currents on panelboards and dry-core transformers, 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 distribution system including phasing, voltage, grounding and load balancing.
 - .2 Circuits originating from branch distribution panels.
 - .3 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.
 - .4 Systems: Fire Alarm system verification and start-up by qualified Fire Alarm Panel Manufacturers Representative.
 - .5 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 Carry out tests in presence of, and supply reports to, DCC Representative.
- .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 - 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.

3.8 CLEANING

- .1 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.
- .2 Clean and prime exposed non-galvanized hangers, racks and fastenings to prevent rusting.
- .3 Leave work area clean at end of each day.
- .4 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section includes requirements for selective demolition and removal of electrical safety components, including removal of conduit, junction boxes, and panels to source (home run removal) and incidentals required to complete work described in this Section ready for new construction. Fire Alarm to have duct detectors removed and replaced. The Fire Alarm fan shutdown is to have conduits, and wire removed and replaced. The HVAC controls to have all conduits and wire removed and replaced. The motor center is to have EF-1, EF-2, EF-3, MUA-1, MUA-2, and MUA-3 conduits and wires removed and new conduits/wires/fuses installed.

1.2 RELATED REQUIREMENTS

- .1 Section 02 and all related sections.

1.3 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA S350 M1980 (R2003), Code of Practice for Safety in Demolition of Structures

1.4 DEFINITIONS

- .1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.
- .3 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- .4 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.
- .5 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Action Submittals: Provide in accordance with Section 01 33 00- Submittal Procedures before starting work of this Section:
 - .1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19- Waste Management and Disposal.

- .2 Landfill Records: Indicate receipt and acceptance of selective demolition waste and hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.6 ADMINISTRATIVE REQUIREMENTS

- .1 Coordination: Coordinate work of this Section to avoid interference with work by other Sections.

1.7 QUALITY ASSURANCE

- .1 Regulatory Requirements: Perform work of this Section in accordance with:
 - .1 Provincial/Territorial Workers' Compensation Boards/Commissions
 - .2 Provincial/Territorial Occupational Health and Safety Standards and Programs and Government of Canada, Labour Program: Workplace Safety

1.8 SITE CONDITIONS

- .1 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in Work; immediately notify DCC Representative if materials suspected of containing hazardous substances are encountered and perform following activities:
 - .1 Refer to Section 01 41 00 - Regulatory Requirements for directives associated with specific material types.
 - .2 Hazardous substances will be as defined in Hazardous Products Act.
 - .3 Stop work in area of suspected hazardous substances.
 - .4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.
 - .5 Hazardous substances will be removed by DCC Representative under a separate contract or as a change to Work.
 - .6 Proceed only after written instructions have been received from DCC Representative.

1.9 SALVAGE AND DEBRIS MATERIALS

- .1 Demolished items become Contractor 's property and will be removed from Project site; except for items indicated as being reused, salvaged, or otherwise indicated to remain Owner 's property.

Part 2 Products

2.1 MATERIALS

- .1 Electrical Repair Materials: Use only new materials, CSA or ULC labelled as appropriate and matching components remaining after work associated with components identified for removal or demolition are completed.

- .2 Fire stopping Repair Materials: Use fire stopping materials compatible with existing fire stopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

Part 3 Execution

3.1 EXAMINATION

- .1 (NOT IN USE)

3.2 PREPARATION

- .1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:
 - .1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.
 - .2 Notify DCC Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.
 - .3 Prevent debris from blocking drainage inlets.
 - .4 Protect mechanical systems that will remain in operation.
- .2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and Owner and DCC Representative and users is minimized and as follows:
 - .1 Prevent debris from endangering safe access to and egress from occupied buildings.
 - .2 Notify DCC Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 EXECUTION

- .1 Demolition and Removal: Coordinate requirements of this Section with information contained in Section 02 41 19.16 - Selective Interior Demolition and Section 02 41 19.13 - Selective Building Demolition and as follows:
 - .1 Disconnect electrical circuits and panel feeders; maintain electrical service and main distribution panel as is, ready for subsequent Work.
 - .2 Remove existing electrical devices and equipment including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 - .3 Disconnect and remove existing fire alarm system including associated conduits, boxes, wiring, and similar items unless specifically noted otherwise.
 - .4 Disconnect and remove communication systems including associated conduits, boxes, cabling, and similar items unless specifically noted otherwise.
 - .5 Disconnect and remove telephone outlets, associated conduit, cabling and sub terminal backboards and related accessories; maintain telephone service and main terminal backboard as is.
 - .6 Perform demolition work in a neat and workmanlike manner:

- .1 Remove tools or equipment after completion of work, and leave site clean and ready for subsequent renovation work.
- .2 Repair and restore damages caused as a result of work of this Section to match existing materials and finishes.
- .7 Disconnect panel feeders back to main distribution panel and re label respective circuit breaker as "SPARE".
- .8 Place weatherproof blank cover plates on exterior outlet boxes remaining after demolition and removal activities.
- .9 Remove existing conduits, boxes, cabling and wiring associated with removed luminaires, electrical devices and equipment.
- .10 Grind off conduits and make flush with surface of concrete where conduits are cast into concrete; seal open ends of conduit with silicone sealant and leave in place.
- .11 Seal open ends of conduit with silicone sealant and leave in place where they are inaccessible or cannot be removed without damaging adjacent construction.

3.4

CLOSEOUT ACTIVITIES

- .1 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 81 00- Hazardous Materials.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Division 26, 28 and all other associated Divisions.

1.2 REFERENCE STANDARDS

- .1 CAN/CSA-C22.2 No.18-98 (R2003), Outlet Boxes, Conduit Boxes and Fittings.
- .2 CAN/CSA-C22.2 No.65-03 (R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMJ-J-543-ANCE-03).
- .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 National Electrical Manufacturers Association (NEMA)

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 wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 11 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements, 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 indoors in dry location and off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect wire and box connectors from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

- .2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper to fit copper conductors 10 AWG or less.
- .3 Bushing stud connectors: to EEMAC 1Y-2, NEMA to consist of:
 - .1 Connector body and stud clamp for round copper.
 - .2 Clamp for stranded copper conductors.
 - .3 Stud clamp bolts.
 - .4 Bolts for copper bar.
 - .5 Bolts for aluminum conductors.
 - .6 Sized for bars conductors as required.
- .4 Clamps or connectors for armoured cable, TECK cable non-metallic sheathed cable, flexible conduit, as required to: CAN/CSA-C22.2 No.18.

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 wire and box connectors' installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

3.2 INSTALLATION

- .1 Remove insulation carefully from ends of conductors, cables and:
 - .1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.
 - .2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.
 - .3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.
 - .4 Install bushing stud connectors in accordance with EEMAC 1Y-2.

3.3 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.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 61 00 – Common Product Requirements
- .2 Section 01 70 03 – Safety Requirements
- .3 Section 01 74 11 – Cleaning.
- .4 Section 26 05 00 – Common work results for Electrical
- .5 Section 26 05 32 – Outlet Boxes, Conduit Boxes and Fittings
- .6 Section 26 05 34 – Conduit, Conduit Fastenings and Conduit Fittings
- .7 Section 28 46 00 – Fire Detection and Alarm

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-18 - Canadian electrical code (CEC), Part 1, Safety Standard for Electrical Installations.
 - .2 CSA C22.2 General Requirements – Canadian Electrical Code Part II.
 - .3 CSA C22.2 No. 38 Thermoset Insulated Wires and Cables.
 - .4 CSA C68.3 Power Cables with Thermoset Insulation.
 - .5 CSA C21.1 600 V Control Cable.
 - .6 CSA C21.2 300 V Control Cable.
 - .7 ICEA S-66-524.
 - .8 IEEE 848 Standard Procedure for the Determination of the Ampacity Derating of Fire-Protected Cables.
 - .9 All power cables must be CSA approved for application.

1.3 PRODUCT DATA

- .1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Until submission is reviewed, work involving relevant product may not proceed.
- .3 Coordination of submissions:
 - .1 Supplier's responsibility for errors and omissions in submission is not relieved by the DCC representative's review of the submittals.
 - .2 Supplier's responsibility for the deviations in submission from the requirements for contract documents is not relieved by the DCC Representatives review of the submission unless the DCC Representative gives written acceptance of the specified deviation.

- .3 Notify the DCC Representative, in writing at time of submission, of deviations from the requirements of contract documents.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Replace defective or damaged equipment with new.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 11 - Cleaning.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.
- .3 Collect and separate all material for disposal or for recycling in accordance with Waste Management Plan.

Part 2 Products

2.1 BUILDING WIRES

- .1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.
- .2 Copper conductors: size as indicated, with 1000V insulation of cross-linked thermosetting polyethylene material rated RW90 or RW90U.
- .3 Branch Circuit wiring: Conductors smaller than 12 awg not permitted.
- .4 Wire for 120 volt circuits using separate neutrals, minimum sizes for the phase conductor shall be as follows: 12 awg for runs up to 20 m, 10 awg for runs of 20m to 35 m.
- .5 Runs in excess of 35m shall use a wire size that complies with the requirements of the CEC for voltage drop.

2.2 ARMOURED CABLES

- .1 Conductors: insulated, copper, size as indicated.
- .2 Type: AC90.
- .3 Armour: interlocking type fabricated from aluminum strip.
- .4 Connectors: anti short connectors.
- .5 Shall be provided with intergral insulated ground wire.

2.3 CONTROL CABLES

- .1 Type: LVT: soft annealed copper conductors, number and size as indicated by manufacturer:
 - .1 Insulation: thermoplastic.
 - .2 Sheath: thermoplastic jacket.

2.4 FIRE ALARM CABLES

- .1 Type: see section 28 46 00.2.4.1.2 Fire Alarm for approved types.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Perform tests using method appropriate to site conditions and to approval of DCC Representative.
- .3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

- .1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).
- .2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.
- .3 Conductor length for parallel feeders to be identical.
- .4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.
- .5 Provide numbered wire collars for control wiring. Provide wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

- .1 Install wiring as follows:
 - .1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

3.4 INSTALLATION OF ARMoured CABLES

- .1 Group cables wherever possible on channels.
- .2 Maximum 1.5m for all lighting drops.
- .3 Terminate cables in accordance with Section 26 05 20.

- .4 Shall only be permitted for the final connection to light fixture and the length of the drop shall not exceed 1.5 meters. Armoured Cable commonly known as BX shall not be permitted for any or use on this contract.

3.5 INSTALLATION OF CONTROL CABLES

- .1 Install control cables in conduit.
- .2 Ground control cable shield.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 All division 26.

1.2 REFERENCE STANDARDS

- .1 CSA C22.1-18, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).
- .3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .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, in dry location, indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect connectors and terminations from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

- .1 Copper compression connectors to CSA C22.2 No.65 as required sized for conductors.

Part 3 Execution

- .1 Install terminations, and splices in accordance with manufacturer's instructions.
- .2 Bond and ground as required to CSA C22.2No.41.

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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 All division 26.

1.2 REFERENCE STANDARDS

- .1 CSA C22.1-18, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
- .2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).
- .3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .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, in dry location, indoors, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect connectors and terminations from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

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- .1 Copper compression connectors to CSA C22.2 No.65 as required sized for conductors.

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- .1 Install terminations, and splices in accordance with manufacturer's instructions.
- .2 Bond and ground as required to CSA C22.2No.41.

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.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 All Division 26 AND associated Divisions.

1.2 REFERENCE STANDARDS

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-18 - Canadian electrical code (CEC), Part 1, Safety Standard for Electrical Installations.
 - .2 CSA C22.2 General Requirements – Canadian Electrical Code Part II.
- .2 Submit in accordance with Section 01 33 00 - Submittal Procedures.

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 SUPPORT CHANNELS

- .1 U shape, size 41 x 41 mm, 12 gauge Steel with mounting screws for supporting conduits 50 mm and larger.
- .2 General: Malleable iron two-hole conduit straps where exposed to weather. Stamped steel two-hole straps indoors.
- .3 Masonry, concrete, stone, etc.: Anchors.
- .4 Title Toggle bolts.
- .5 Metal studs, ceiling hangers, etc.:
 - 1. Clips made of spring steel, rated for indoor use in non-corrosive environments.
 - 2. UL listed.
 - 3. Vertical load limit of 45 kg and horizontal load limit of 11 kg.
 - 4. Capable of accommodating 9.5 mm through 51 mm EMT, rigid, and aluminum conduit.
 - 5. Pre-assembled with manufacturer's speciality fasteners for connection to building structures like beam, flange, drop wire/rod, wood structure, and concrete and acoustical tee grid.

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 hangers and supports installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

3.2 INSTALLATION

- .1 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .2 Secure equipment to poured concrete with expandable inserts.
- .3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.
- .4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.
- .5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.
- .6 Fasten exposed conduit or cables to building construction or support system using straps.
 - .1 One-hole malleable iron or 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.
- .7 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.
- .8 For surface mounting of two or more conduits use channels at 1.5m on centre spacing.
- .9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .11 Do not use wire lashing (ceiling pencil rods) or perforated strap to support or secure raceways or cables.
- .12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of DCC Representative.

- .13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Section 01 74 11 - Cleaning.
- .2 Section 01 31 00 - Submittals.
- .3 Section 26 05 00 - Common Work Results for Electrical.
- .4 Section 28 46 00 – Fire Detection and Alarm
- .5 Conform to relevant sections of specifications and this and other Divisions.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA C22.1-18 Canadian Electrical Code (CEC), Part 1 – 23th Safety Standard for Electrical Installations

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit Product sheets 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.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 11 - Cleaning.
- .2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1 and electrical code.
- .2 All sheet steel boxes shall have pre-punched 19mm knockouts.
- .3 Do not use boxes with cable clamps.

- .4 Boxes shall be minimum size 75 mm x 50 mm deep. Provide 100 mm square or larger outlet boxes as required for special devices. Add extension rings as required.
- .5 102mm square or larger outlet boxes as required.
- .6 Provide 100 mm square or octagonal outlet boxes for luminaire outlets.
- .7 Gang boxes where wiring devices are grouped; suitability supported.
- .8 Blank cover plates for boxes without wiring devices. Section 26 27 26.
- .9 Weatherproof boxes and gasketed covers for exterior use shall be used.
- .10 Unused conduits to be capped at both ends.

2.2 SHEEL STEEL OUTLET BOXES

- .1 One-piece electro-galvanized construction.
- .2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48mm.
- .4 102mm square or octagonal outlet boxes for lighting fixture outlets or junctions.
- .5 Boxes for door switch and pushbuttons shall be sized as required.
- .6 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished plaster or tile walls.

2.3 MASONRY BOXES

- .1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 CONDUIT BOXES

- .1 Cast FS or FD boxes with factory-threaded hubs and mounting feet for surface wiring where allowed in public areas and 1110 utility boxes in all service rooms.

2.5 FITTINGS - GENERAL

- .1 Bushing and connectors with nylon insulated throats.
- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35m and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits. . All boxes to be hung independently of ducts, pipes, etc.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.
- .4 Size boxes in accordance with latest revision of the Canadian Electrical Code.
- .5 Gang boxes together where wiring devices are grouped.
- .6 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.
- .7 Vacuum clean interior of outlet boxes before installation of wiring devices.
- .8 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 All Division 26 and related Sections.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 C22.1-18, Canadian Electrical Code (CEC), Part 1, Safety Standard for Electrical Installations
 - .2 C22.2 No. 18.3-04 (R2009), Conduit, Tubing and Cable fittings
 - .3 C22.2 No. 18.4-04 (R2009), Hardware for the support of Conduit, Tubing and Cable
 - .4 C22.2 No. 56-04 (R2009), Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit
 - .5 C22.2 No. 83-M1985 (R2008), Electrical Metallic Tubing (EMT)
 - .6 C22.2 No. 211.2-06 (R2011), Rigid PVC (NON-Plasticized) Conduit

1.3 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.
- .3 Quality assurance submittals:
 - .1 Test reports: submit certified test reports.
 - .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .3 Instructions: submit manufacturer's installation instructions.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials in accordance with Section 01 74 11 - Cleaning.
- .2 Place materials defined as hazardous or toxic waste in designated containers.
- .3 Ensure emptied containers are sealed and stored safely for disposal away from children.

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.

2.2 CONDUITS

- .1 Electrical metallic tubing (EMT): to C22.2 No. 83.
- .2 Rigid Metal conduit: to C22.2 No 45. Hot dipped galvanized steel threaded.
- .3 Flexible metal conduit and Liquid- Tight flexible metal conduit: to C22.2 No. 56
- .4 Rigid PVC conduit: to CSA C22.2 No. 211.2.

2.3 CONDUIT FASTENINGS

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

2.4 CONDUIT FITTINGS

- .1 Fittings: to C22.2 No. 18, manufactured for use with conduit specified.
- .2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.
- .3 Set-screw connectors and couplings for EMT conduit.

2.5 EXPANSION FITTINGS FOR RIGID PVC CONDUIT

- .1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.
- .2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.
- .3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 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 all new construction except in mechanical and electrical service rooms. Run parallel or perpendicular to building lines.
- .3 Use rigid galvanized steel threaded conduit or electrical metallic tubing (EMT) except where specified otherwise.
 - .1 EMT conduits to be used in concealed locations (drywall partitions) and all ceiling spaces above 2.8 m in office areas.
 - .2 Rigid galvanized steel conduit for exposed wiring up to 2.8 m AFF.
 - .3 EMT conduit for exposed wiring above 2.8 m AFF.
 - .4 Run parallel or perpendicular to building lines.
- .4 Use Rigid PVC conduit for all exterior installations, with expansion joints.
- .5 Use liquid-tight flexible metal conduit for connection to motors or vibrating equipment, maximum length 1.5M.
- .6 Minimum conduit size for lighting and power circuits: 21 mm.
- .7 Bend conduit cold:
 - .1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.
- .8 Mechanically bend steel conduit over 27 mm diameter.
- .9 Install fish cord in empty conduits.
- .10 Remove and replace blocked conduit sections.
 - .1 Do not use liquids to clean out conduits.
- .11 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

- .1 Run parallel or perpendicular to building lines.
- .2 Run conduits in flanged portion of structural steel.
- .3 Group conduits where ever possible on channels.
- .4 Do not pass conduits through structural members except as indicated.

- .5 Do not install horizontal runs in masonry walls.
- .6 Do not install conduits in terrazzo or concrete toppings.

3.4 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

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 26 and all related sections.

1.2 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CSA C22.2 No. 100-04, Motors and Generators.
 - .2 CSA C22.2 No. 145-M1986 (R2004), Motors and Generators for Use in Hazardous Locations.
- .2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)
 - .1 EEMAC M1-7-1992, Standard for Motors and Generators.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data: submit WHMIS SDS - Safety Data Sheets in accordance with Section 01 47 15 - Sustainable Requirements: Construction and Section 02 81 00 - Hazardous Materials and include: product characteristics, performance criteria, physical size, horsepower, watt rating, limitations and finish.
- .3 Shop drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in ONTARIO, Canada.
 - .2 Indicate dimensions, recommended installation procedure, wiring diagrams, sizes and location of mounting bolt holes and recommended support method.
- .4 Quality Assurance Submittals:
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Manufacturer's Instructions: submit manufacturer's installation instructions.
- .5 Closeout Submittals:
 - .1 Provide maintenance data for fractional horsepower motors for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
- .2 Collect, package and store expired motors for either recycling or rebuilding and return to recycler or rebuilder.

Part 2 Products

2.1 FRACTIONAL HORSEPOWER MOTOR

- .1 Non-hazardous locations: to EEMAC M1-7, CSA C22.2 No. 100.
- .2 Hazardous locations: to CSA C22.2 No. 145.
 - .1 Rating: 600V. 3 phase
 - .2 Type/size: To be determined by electrical/mechanical contractor in conjunction with other trades if necessary..
- .3 Motor with inherent overheating protectors.

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 wiring, flexible connections and grounding.
- .2 Check rotation before coupling to driven equipment.

3.3 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

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 260500.

1.2 REFERENCE STANDARDS

- .1 Division 26 and all Related Divisions.

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 service equipment and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Sustainable Design Submittal
- .4 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .5 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .6 Storage and Handling Requirements:
 - .1 Store materials in dry location and off ground and indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect service equipment from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 EQUIPMENT

- .1 Fused disconnect switch: in accordance with Section 26 28 23 - Disconnect Switches - Fused and Non-Fused, rating as indicated
- .2 Ground fault equipment: in accordance with Section 26 28 20 - Ground Fault Circuit Interrupters - Class "A".

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 service equipment installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representation.
 - .2 Inform DCC 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 DCC Representative.

3.2 INSTALLATION

- .1 Install service equipment.
- .2 Connect to incoming service.
- .3 Connect to outgoing load circuits.
- .4 Install ground fault equipment.
- .5 Make grounding connections in accordance with current Canadian electrical code.
- .6 Make provision for power supply authority's metering.

3.3 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.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - 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 RELATED REQUIREMENTS

- .1 Comply with the requirements of Section 26 05 00 Common Work Results for Electrical.
- .2 Section 26 05 21 – Wires and Cables.
- .3 References
- .4 CSA Group (CSA)
 - .1 CSA C22.2 No.42-10, General Use Receptacles, Attachment Plugs and Similar Devices.
 - .2 CAN/CSA C22.2 No.42.1-00 (R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
 - .3 CSA C22.2 No.55-M1986 (R2008), Special Use Switches.
 - .4 CSA C22.2 No.111-10, fourth edition General-Use Snap Switches (Bi-national standard, with UL 20).
 - .5 CSA C22.2 No.144-M91 (2011), Ground Fault Circuit Interrupters.
 - .6 CSA C22.2 No.182.3-M1987 (R2014), Special Use Attachment Plugs, Receptacles and Connectors.
 - .7 CSA C22.1-15, Canadian Electrical Code, Part 1 (23th Edition), Safety Standard for Electrical Installations.
 - .8 CSA C22.2, General Requirements-Canadian Electrical Code Part II.
 - .9 Can3-C235-83(R2010), Preferred Voltage Levels for AC systems, 0 to 50,000 V.
 - .10 CSA Z462-15, Work Place electrical Safety.

1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 Submit shop drawings and Product Data in accordance with section 26 05 00.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 11 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions, 01 61 00 - Common Product Requirements.
- .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 indoors and in dry location and off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Store and protect wiring devices from nicks, scratches, and blemishes
- .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SWITCHES

- .1 15 A, 120 V, single pole, specification grade switches to: CSA C22.2 No.55, CSA C22.2 No.111.
- .2 Manually-operated general purpose AC switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine moulding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Ivory toggle.
- .3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads heating loads.
- .4 Switches of one manufacturer throughout project.
- .5 Extra heavy duty specification grade type.
- .6 Acceptable materials:
 - .1 Hubbell Incorporated.
 - .2 Leviton Manufacturing Co. Inc.
 - .3 Pass & Seymour supplied by numerous suppliers.

2.2 RECEPTACLES

- .1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:
 - .1 Ivory urea moulded housing.
 - .2 Suitable for No. 10 AWG for back and side wiring.
 - .3 Break-off links for use as split receptacles.
 - .4 Eight back wired entrances, four side wiring screws.
 - .5 Triple wipe contacts and riveted grounding contacts.
 - .6 Manufacturer's specification grade.
- .2 Other receptacles with ampacity and voltage as indicated.
- .3 Receptacles of one manufacturer throughout project.
- .4 Extra heavy duty specification grade type.
- .5 Ground fault circuit interrupter receptacle
 - 1. Ivory high strength nylon
 - 2. Suitable for No. 10 AWG for back and side wiring.
 - 3. 20 AMP feed through rating.

- .7 Acceptable Products
 - 1. Hubbell Incorporated.
 - 2. Leviton Manufacturing Co. Inc.
 - 3. Pass and Seymour.

2.3 COVER PLATES

- .1 Cover plates for wiring devices to: CSA C22.2 No.42.1.
- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Stainless steel cover plates, thickness 2.5mm thick cover plates for wiring devices mounted in flush-mounted outlet box.
- .4 Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.
- .5 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.
- .6 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.
- .7 Outside/inside air handling units; light switches, GFI receptacles to have quality use covers installed with all gaskets.
- .8 One piece gang plates shall be used at locations where more than one device is to be mounted adjacent to each other.

2.4 SOURCE QUALITY CONTROL

- .1 Cover plates from one manufacturer throughout project.
- .2 Cover plates shall be provided for all blanked off outlets

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 wiring devices installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

3.2 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.

- .3 Install weatherproof cover inside unit for all switches.
- .4 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
- .2 Receptacles:
 - .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results for Electrical.
 - .3 Where split receptacle has one portion switched, mount vertically and switch upper portion.
 - .4 Install GFI type receptacles as indicated.
- .3 Cover plates:
 - .1 Install suitable common cover plates where wiring devices are grouped.
 - .2 Protect cover plate finish with paper or plastic film until painting and all other work is finished.
 - .3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 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 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
- .3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Division 26 and all other Related Divisions.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide fuse performance data characteristics for each fuse type and size above 30A. Performance data to include: average melting time-current characteristics.
- .3 Shop Drawings:
 - .1 Provide shop drawings in accordance with Section 01 33 00 - Submittal Procedures
 - .2 Submit drawings stamped and signed by professional engineer registered or licensed in Ontario, Canada.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Ship fuses in original containers.
- .2 Do not ship fuses installed in switchboard.
- .3 Store fuses in original containers in moisture free location or storage cabinet.

1.4 EXTRA MATERIALS

- .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Three spare fuses of each type and size installed above 100 A.
- .3 Three spare fuses of each type and size installed up to and including 60A.

Part 2 Products

2.1 FUSES - GENERAL

- .1 Fuse type references L1, L2, J1, R1, etc. have been adopted for use in this specification.
- .2 Fuses: product of one manufacturer.

2.2 FUSE TYPES

- .1 Class L fuses.
 - .1 Type L1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .2 Type L2, fast acting.

- .2 Class J fuses.
 - .1 Type J1, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .2 Type J2, fast acting.
- .3 Class R -R fuses.
 - .1 Type R1, (UL Class RK1), time delay, capable of carrying 500% of its rated current for 10 s minimum, to meet UL Class RK1 maximum let-through limits.
 - .2 Type R2, time delay, capable of carrying 500% of its rated current for 10 s minimum.
 - .3 Type R3, (UL Class RK1), fast acting Class R, to meet UL Class RK1 maximum let-through limits.
- .4 Class C fuses.

2.3 INSTALLATION

- .1 Install fuses in mounting devices immediately before energizing circuit.
- .2 Ensure correct fuses fitted to physically matched mounting devices.
 - .1 Install rejection clips for Class R fuses.
- .3 Ensure correct fuses fitted to assigned electrical circuit.
- .4 Where UL Class RK1 fuses are specified, install warning label "Use only UL Class RK1 fuses for replacement" on equipment.
- .5 Install spare fuses in fuse storage cabinet.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Division 26 and all Related Divisions.

1.2 PAYMENT

- .1 Payment for field testing of ground fault equipment performed by Contractor in accordance with Section 01 29 83 - Payment Procedures: Testing Laboratory Services.

1.3 REFERENCE STANDARDS

- .1 CSA Group (CSA)
 - .1 CAN/CSA C22.2 No.144-M91 (R2006), Ground Fault Circuit Interrupters.
- .2 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA PG 2.2-1999 (R2009), Application Guide for Ground Fault Protection Devices for Equipment.

1.4 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 ground fault circuit interrupters and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Test and Evaluation Reports: submit test report for field testing of ground fault equipment to DCC Representative and certificate that system as installed meets criteria specified.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 11 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for ground fault circuit interrupters for incorporation into manual.

1.6 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 indoors and off ground and in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

- .2 Store and protect ground fault circuit interrupters from nicks, scratches, and blemishes.
- .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

- .1 Equipment and components for ground fault circuit interrupters (GFCI): to NEMA PG 2.2 CAN/CSA C22.2 No.144.
- .2 Components comprising ground fault protective system to be of same manufacturer.

2.2 BREAKER TYPE GROUND FAULT INTERRUPTER

- .1 Single pole ground fault circuit interrupter for 15a,20A, 125V, 1 phase circuit c/w test and reset facilities.

2.3 GROUND FAULT PROTECTOR UNIT

- .1 Self-contained with 15 A, 120 V circuit interrupter and duplex receptacle complete with:
 - .1 Solid state ground sensing device.
 - .2 Facility for testing and reset.
 - .3 CSA Enclosure 1, flush mounted with suitable outdoor inuse/weatherproof cover.

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 ground fault circuit interrupters installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

3.2 INSTALLATION

- .1 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

- .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and co-ordinate with Section 01 45 00 - Quality Control if required.
- .2 Arrange for field testing of ground fault equipment by Contractor before commissioning service.

- .3 Demonstrate simulated ground fault tests.

3.4 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 00 - Cleaning.
- .3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 19 - 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 RELATED REQUIREMENTS

- .1 All Division 26 and related Divisions.

1.2 REFERENCE STANDARDS

- .1 CSA Group
 - .1 CAN/CSA-C22.2 No.4-04 (R2014), Enclosed and Dead-Front Switches (Tri-National Standard, with ANCE NMX-J-162-2004 and UL 98).
 - .2 CAN C22.2, General Requirements – Canadian Electrical Code Part II
 - .3 CSA C22.1-18, Canadian Electrical Code, Part 1, Safety Standard for Electrical Installations.
 - .4 Submit manufacturer's instructions, printed product literature and data sheets for disconnect switches - fused and non-fused and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section with manufacturer's written instructions or 01 61 00 - Common Product Requirements.
- .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 and in dry location and indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect disconnect switches - fused and non-fused from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DISCONNECT SWITCHES

- .1 Non-fusible, Fusible, Horsepower rated disconnect switch in CSA enclosure to CAN/CSA-C22.2 No.4 size as required.
- .2 Provision for padlocking in on-off switch position by locks.
- .3 Mechanically interlocked door to prevent opening when handle in ON position.
- .4 Fuses: size as indicated, in accordance with Section 26 28 13.01 - Fuses - Low Voltage.
- .5 Fuse holders: relocate able and to CSA C22.2 No.39 suitable without adaptors, for type and size of fuse indicated.
- .6 Quick-make, quick-break action.

.7 ON-OFF switch position indication on switch enclosure cover.

.8 Acceptable Manufacturer's:

1. Eaton Canada
2. Schneider Electric.
3. Siemens Canada.

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Indicate name of load controlled on size 4 nameplate.

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 disconnect switches - fused and non-fused installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of DCC Representative.
- .2 Inform DCC 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 DCC Representative.

3.2 INSTALLATION

- .1 Install disconnect switches complete with fuses if applicable.
- .2 Install proper sized fuses in motor center.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Government of Canada
 - .1 TB OSH, Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire protection Electronic Data Processing Equipment.
 - .2 TB OSH Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-06, Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525-07, Audible Signal Device for Fire Alarm Systems.
 - .3 CAN/ULC-S526-07, Visual Signal Devices for Fire Alarm Systems.
 - .4 CAN/ULC-S527-11, Control Units.
 - .5 CAN/ULC-S528-05, Manual Pull Stations for Fire Alarm Systems.
 - .6 CAN/ULC-S536-04, Standard for the Inspection and Testing of Fire Alarm Systems.
 - .7 CAN/ULC-S537-04, Standard for the Verification of Fire Alarm Systems.
- .4 National Fire Protection Agency
 - .1 NFPA 72-2016, National Fire Alarm Code or most recent addition.
- .5 National Building Code of Canada (2015) or most recent addition.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Shop drawings: stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
 - .2 Include:
 - .1 Layout of equipment.
 - .2 Zoning.
 - .3 Complete wiring diagram, including schematics of modules.

- .4 Details and performance specifications for control, annunciation and peripherals with item by item.
- .3 Quality assurance submittals: submit following in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .2 Instructions: submit manufacturer's installation instructions.
 - .3 Manufacturer's Field Reports: manufacturer's field reports specified.
- .4 Closeout Submittals:
 - .1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.
 - .2 Authority of Jurisdiction will delegate authority for review and approval of submittals required by this Section.
 - .3 Submit to Authority of Jurisdiction 2 sets of approved submittals and drawings after approval but no later than 15 working days to prior to final inspection.
 - .4 Submit following:
 - .1 Manufacturer's Data for:
 - .1 Duct Detectors.
 - .2 Wiring.
 - .3 Mark data which describe more than one type of item to indicate which type will be provided.
 - .4 Submit 1 original for each item and clear, legible, first-generation photocopies for remainder of specified copies.
 - .2 System wiring diagrams:
 - .1 Submit complete wiring diagrams of system showing points of connection and terminals used for electrical connections in the system.
 - .3 Schedules:
 - .1 Conductor wire marker schedule.
 - .4 Test Reports:
 - .1 Preliminary testing:
 - .1 Final acceptance testing.
 - .2 Submit for inspections and tests specified under Field Quality Control.

1.3 QUALITY ASSURANCE

- .1 Provide services of representative or technician from manufacturer of system, experienced in installation and operation of type of system being provided, to supervise installation, adjustment, preliminary testing, and final testing of system and to provide instruction to project personnel.
- .2 System:

- .1 To TBS OSH.
- .2 Subject to Fire Commissioner of Canada FC approval.
- .3 Subject to FC inspection for final acceptance.
- .4 To Canadian Forces Fire Marshal approval.
- .3 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 11 - Closeout Submittals. Include:
 - .1 5 spare glass rods for manual pull box stations if applicable.
- .4 Maintenance Service:
 - .1 Provide one year's free maintenance with two inspections by manufacturer during warranty period. Inspection tests to conform to CAN/ULC-S536. Submit inspection report to DCC Representative.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements
 - .2 Deliver and store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .3 Store and protect materials from nicks, scratches, and blemishes.
 - .4 Replace defective or damaged materials with new.
- .2 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance local regulations and base requirements.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

- .1 New Duct Detectors to be compatible with existing system. Existing system is an Edwards system Model Quick Start # QS Type

2.2 MATERIALS

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 Power supply: to CAN/ULC-S524.
- .3 Audible signal devices: to CAN/ULC-S525.
- .4 Visual signal devices: to CAN/ULC-S526.
- .5 Control unit: to CAN/ULC-S527.

- .6 Manual pull stations: to CAN/ULC-S528.
- .7 Thermal detectors: to CAN/ULC-S530.
- .8 Smoke detectors: to CAN/ULC-S529.
- .9 Smoke alarms: to CAN/ULC-S531.

2.3 SYSTEM OPERATION

- .1 Provide complete, electrically supervised, code 3 temporal common coded, manual and automatic, zoned, annunciated, fire alarm system.
- .2 Provide separate circuits from control panel to each zone of initiating devices. Transmission of signals from more than one zone over common circuit to control panel is prohibited.
- .3 Single stage operation. Operation to actuation following:
 - .1 Manual station.
 - .2 Automatic fire sprinkler system.
- .4 Actuation of single operation device to initiate following:
 - .1 Building evacuation alarm devices to operate continuously.
 - .2 Transmit signal to fire department via fire alarm transmitter.
 - .3 Zone of alarm device to be indicated on control panel
 - .4 Air conditioning and ventilating fans to shut down or to function so as to provide required control of smoke movement.
 - .5 Fire doors and smoke control doors if normally held open, to close automatically.
 - .6 Electro-magnetic door holders to de-energize.
 - .7 Operations to remain in alarm mode (except alarm notification appliances if manually silenced) until system is manually restored to normal.
- .5 Capability to program smoke detector status change confirmation on any or zones in accordance with CAN/ULC-S527, Appendix C.

2.4 WIRING

- .1 Wire for 120 V circuits: No. 12 AWG minimum solid copper conductor.
- .2 FAS 105 C wire for low voltage DC circuits:
 - .1 Alarm initiating circuits minimum #18 AWG.
 - .2 Audible signal circuits minimum #14 AWG.
 - .3 Visual signal circuits minimum #12 AWG.
- .3 Wire for connection to base telegraphic alarm loop: No. 10 AWG minimum solid copper conductor.
- .4 Insulation to be 105 degrees.

- .5 For underground or wet allocations cable from control panel auxiliary transmitter and to telegraphic loop: type UF.
- .6 Colour code wiring.

2.5 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.
- .2 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of DCC Representative.
 - .2 Inform DCC 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 DCC Representative.

2.6 INSTALLATION

- .1 Install systems in accordance with CAN/ULC-S524 and TB Fire Protection Standard.
- .2 Connect alarm circuits to main fire alarm control panel.
- .3 Locate and connect to existing remote relay units to control fan shut down in alarm panel.
- .4 Splices are not permitted.
- .5 Sprinkler system: wire alarm and supervisory switches and connect to control panel.
- .6 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and existing main fire alarm control panel as required by equipment manufacturer.
- .7 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

2.7 FIELD QUALITY CONTROL

- .1 Site Tests:
 - .1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.
 - .2 Fire alarm verification will be performed on the new duct detectors and MAU/ERV shut down plus relative circuits – submit documentation to DCC Representative.
 - .3 Fire alarm system:
 - .1 Test each device and alarm circuit to ensure manual stations, transmit alarm to control panel and actuate general alarm.

- .2 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of system.
- .3 Class A circuits
 - .1 Test each conductor on circuits for capability of providing alarm signal on each side of single open-circuit fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
 - .2 Test each conductor on circuits for capability of providing alarm signal during ground-fault condition imposed near midmost point of circuit. Reset control unit after each alarm function and correct imposed fault after completion of each test.
- .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 Provide final PROM program re-burn for system incorporating program changes made during construction.

2.8 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by fire alarm system installation.

2.9 TRAINING

- .1 Arrange and pay for on-site lectures and demonstrations by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

2.10 CLEANING

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

END OF SECTION