PROJECT MANUAL

DRY CELL RELOCATION –
STRUCTURED INTERVENTION UNIT (SIU)
MILLHAVEN INSTITUTION

Bath, Ontario

Project No. : R.106776.001

22 June 2021

Issued for Tender

ARCHITECTURE 49

DISCIPLINE	SIGNATURE	DATE	STAMP
ARCHITECTURAL		June 22, 2021	
STRUCTURAL		June 22, 2021	
MECHANICAL		June 22, 2021	
ELECTRICAL		June 22, 2021	

END OF SECTION

Project Manual for
DRY CELL RELOCATION –
STRUCTURED INTERVENTION UNIT (SIU) BATH, ONTARIO

SPECIFICATIONS

END OF SECTION

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MECHANICAL

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ELECTRICAL

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END OF SECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

.1 Title and description of Work.

.2 Contract Method.

.3 Work by others.

.4 Future work.

.5 Work sequence.

.6 Contractor use of premises.

.7 Partial User occupancy.

.8 User furnished items.

.9 Alterations to existing building.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises renovation of existing office spaces within the Millhaven Institution to accommodate a new dry cell including a holding cell, drug loo, recovery room, inmate shower and search room, and a shower service room. The new configurations for these spaces would be on the ground floor of 'S' Range of the Millhaven Institution located at 5775 Bath Rd., Bath, ON.

1.3 CONTRACT METHOD

.1 Construct Work under a lump sum contract.

.2 Relations and responsibilities between Contractor and subcontractors assigned by Departmental Representative are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:

.1 Furnish to Contractor, bonds covering faithful performance of subcontracted work and payment of obligations thereunder when Contractor is required to furnish such bonds to Departmental Representative.

.2 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to Departmental Representative.

1.4 COST BREAKDOWN

.1 Within 48 hours of notification of acceptance of bid furnish a cost breakdown by Section aggregating contract amount.

.2 Show separately cost of equipment purchased exempt from Ontario Retail Sales Tax under your Ontario Sales Tax licence number.

.3 Submit a list of subcontractors with bid.

1.5 WORK BY OTHERS

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

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

1.6 WORK SEQUENCE

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

.2 Coordinate Progress Schedule and coordinate with User Occupancy during construction.

.3 Maintain fire access/control.

1.7 CONTRACTOR USE OF PREMISES

.1 Contractor shall limit use of premises for Work, for storage, and for access, to allow;
.1 Partial user occupancy.
.2 Work by other contractors.

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

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

1.8 PARTIAL USER OCCUPANCY

.1 Schedule and substantially complete designated portions of Work for User's occupancy prior to Certificate of Substantial Performance of entire Work.

.3 User will occupy designated areas for purpose of general operations of the institution.

.4 On occupancy, Departmental Representative will provide for occupied areas:
.1 Operation of HVAC and electrical systems.
.2 Maintenance.
.3 Security.

.5 Execute Partial Certificate of Substantial Performance for each designated portion of Work prior to User occupancy. Contractor shall allow:
.1 Access for User's personnel.
.2 Use of parking facilities.
.3 Operation of HVAC and electrical systems.

1.9 FURNISHED ITEMS

.1 Departmental Representative Responsibilities:
.1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
.2 Deliver supplier's bill of materials to Contractor.
.3 Arrange and pay for delivery to site in accordance with Progress Schedule.
.4 Inspect deliveries jointly with Contractor.
.5 Submit claims for transportation damage.
.6 Arrange for replacement of damaged, defective or missing items.
.7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor Responsibilities:
.1 Designate submittals and delivery date for each product in progress schedule.
.2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of any observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
.3 Receive and unload products at site.
.4 Inspect deliveries jointly with User; record shortages, and damaged or defective items.
.5 Handle products at site, including uncrating and storage.
.6 Protect products from damage, and from exposure to elements.
.7 Assemble, install, connect, adjust, and finish products.
.8 Provide installation inspections required by public authorities.
.9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).

1.10 ALTERATIONS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to normal use of premises. Arrange with Departmental Representative to facilitate execution of work.
.2 Use only elevators existing in building for moving workers and materials where available.
.1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
.2 Accept liability for damage, safety of equipment and overloading of existing equipment.
.3 Remove all demolished equipment, materials, and unused materials from site on a daily basis. Site to remain clean at all times.

.4 Provide new openings required in existing construction.

.5 Block in openings where items removed with material and finish to match existing adjoining construction.

1.11 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give departmental Representative 72 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance.

.3 Provide alternative routes for personnel and vehicular traffic.

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

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

.6 Provide temporary services when directed by Departmental Representative to maintain critical building and tenant systems.

.7 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.

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

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

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

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

1.12 DOCUMENTS REQUIRED

.1 Maintain at job site, one copy each document as follows:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda and amendments.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.

.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada 2015 (NBC) 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 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Asbestos: demolition of spray or trowel-applied asbestos is hazardous to health. Stop work immediately when material resembling spray or trowel-applied asbestos is encountered during demolition work. Notify Departmental Representative.

.2 PCB: Polychlorinated Biphenyl: stop work immediately when material resembling Polychlorinated Biphenyl is encountered during demolition work. Notify Departmental

.3 Mould: stop work immediately when material resembling mould is encountered during demolition work. Notify Departmental Representative.

.4 Immediately notify Departmental Representative if any other Deleterious Substance or Hazardous Material is identified or suspected in the workplace.

1.3 ACCESS AND EGRESS

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

1.4 USE OF SITE AND FACILITIES

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

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

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

.4 Departmental Representative will assign sanitary facilities for use by Contractor's personnel. Keep facilities clean.

.5 Use only elevators, existing in building for moving workers and material.
.1 Protect walls of passenger elevators, to approval of Departmental Representative prior to use.
.2 Accept liability for damage, safety of equipment and overloading of existing equipment.

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

.7 Construction Manger's personnel/forces shall stay within designed Work Area. Accessing areas outside of Work Area shall be escorted by site security.

1.5 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.6 EXISTING SERVICES

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

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

.3 Provide for pedestrian and vehicular traffic.

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

1.7 SPECIAL REQUIREMENTS

.1 Work shall be preformed from 07:00 to 22:00 hours daily Monday to Saturday. Schedule for work must be approved by Department Representative.

.2 Carry out noise generating Work Monday to Friday from 8:00 to 22:00 hours in accordance with site regulations. Site staff may occasionally issue superseding direction. Abide by this direction and notify Departmental Representative when this constrains the work.

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

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

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

.6 Ingress and egress of Contractor vehicles to the Millhaven Institution is normally limited to the principal facility entrance. When directed by site

staff the Contractor shall use an entrance specifically assigned for this work or a temporary entrance.

.7 Deliver materials are confined to operation of Sallyport hours of 08:15 to 15:45 unless otherwise approved by Departmental Representative. The site may provide alternate access points or times which are less constrictive upon the approval of Departmental Representative.

.1 All delivery and removal of material will be required to be logged as brought and removed from site by the Departmental Representative's on-site resident contract administration personnel.

.8 Prior to cutting or drilling horizontal or vertical surfaces including concrete, concrete block or other structural substrate, determine location of reinforcing, service lines, pipes, conduits or other items by x-ray, ground penetrating radar or other appropriate method. Submit findings to Departmental Representative prior to cutting or drilling.

1.8 SECURITY

.1 Where security has been reduced by Work of Contract, provide temporary means to maintain security.

.2 Security clearances:

.1 Personnel employed on this project will be subject to security check. Obtain clearance, as instructed, for each individual who will require to enter premises.

.2 Obtain requisite clearance, as instructed, for each individual required to enter premises.

.3 Personnel will be checked daily at start of work shift and provided with pass which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

.4 Contractor's personnel will require satisfactory RCMP initiated security screening in order to complete Work in premises and on site.

1.9 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions. Smoking is not permitted.

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 DEFINITIONS

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

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

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

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

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

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

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

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

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

1.2 REQUIREMENTS

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

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

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

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

1.3 SUBMITTALS

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

.2 Submit to Departmental Representative within two (2) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of project progress.

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

1.4 MASTER PLAN

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

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

.3 Revise impractical schedule and resubmit within 5 working days.

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

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
.1 Award.
.2 Shop Drawings, Samples.
.3 Permits.
.4 Mobilization.
.5 Structural Steel.
.6 Interior Architecture (Walls, Floors and Ceiling).
.7 Plumbing.
.8 Lighting.
.9 Electrical.
.10 Piping.
.11 Controls.
.12 Heating, Ventilating, and Air Conditioning.
.13 Fire Systems.
.14 Testing and Commissioning.
.15 Supplied equipment long delivery items.
.16 Departmental Representative supplied equipment required dates.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on daily basis, by 13:00 hrs on each working day to reflect activity changes and completions, as well as activities in progress.

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

1.7 PROJECT MEETINGS

.1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 ADMINISTRATIVE

.1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.

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

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

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

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

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

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

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

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

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

.11 Submit number of hard copies specified for each type and format of submittal and also submit in electronic format as pdf files. Forward pdf, MS Word, MS Excel, MS Project and AutoCAD DWG files on USB compatible with the Institutional encryption requirements or through email.

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

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

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

.4 Allow ten (10) working days for Departmental Representative's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, 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.

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

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

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

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

.12 Submit three hard copies and one electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
.2 Testing must have been within 3 years of date of contract award for project.

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

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

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

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

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

.18 Delete information not applicable to project.

.19 Supplement standard information to provide details applicable to project.
.20 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are

rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.21 The review of shop drawings by Public Works and Government Services Canada (PWGSC) is for sole purpose of ascertaining conformance with general concept.

.1 This review shall not mean that PWGSC approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

.2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

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

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

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

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

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

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

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic and hard copy of colour digital photography in jpg format, fine resolution weekly with progress statement and as directed by Departmental Representative.

.2 Project identification: name and number of project and date of exposure indicated.

.3 Number of viewpoints: two (2) locations.
.1 Viewpoints and their location as determined by Departmental Representative.

.4 Frequency of photographic documentation: weekly as directed by Departmental Representative.
.1 Upon completion of: excavation, foundation, framing and services before concealment, of Work, and as directed by Departmental Representative.

1.6 CERTIFICATES AND TRANSCRIPTS

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

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 PURPOSE

.1 To ensure that both the construction project and the institutional operations may proceed without undue disruption or hindrance and that the security of the Institution is maintained at all times.

1.2 DEFINITIONS

.1 "Contraband" means:
- .1 An intoxicant, including alcoholic beverages, drugs and narcotics.
- .2 Tobacco or associated tobacco products.
- .3 An igniting device, lighter or matches.
- .4 A weapon or a component thereof, ammunition for a weapon, and anything that is designed to kill, injure or disable a person or that is altered so as to be capable of killing, injuring or disabling a person, when possessed without prior authorization.
- .5 An explosive or a bomb or a component thereof.
- .6 Currency over any applicable prescribed limit, $25.00 when possessed by an inmate without prior authorization.
- .7 Any item not described in paragraphs 1.2.1.1 to 1.2.1.6 that could jeopardize the security of a Penitentiary or the safety of persons, when that item is possessed without prior authorization.

.2 "Unauthorized Smoking and related Items" means all smoking items including, but not limited to, cigarettes, cigars, tobacco, chewing tobacco, cigarette making machines, matches and lighters.

.3 "Commercial Vehicle" means any motor vehicle used for the shipment of material, equipment and tools required for the construction project.

.4 "CSC" means Correctional Service Canada.

.5 "Director" means Director, Warden or Superintendent of the Institution as applicable.

.6 "Construction Employees" means persons working for the General Contractor, the sub-contractors, equipment operators, material suppliers, testing and inspection companies and regulatory agencies.

.7 "Departmental Representative" means the project manager from Public Works and Government Services Canada.

.8 "Perimeter" means the fenced or walled area of the Institution that restrains the movement of the inmates.

.9 "Construction Limits" means the area as shown on the contract drawings that the Contractor will be allowed to work. This area may or may not be isolated from the security area of the Institution.

.10 “CPIC” means RCMP Canadian Police Information Centre.

.11 "Commissionaire" means designated representative of Director, to monitor construction related activities including surveillance of inmate labour.

1.3 PRELIMINARY PROCEEDINGS

.1 Prior to the commencement of work, the Contractor shall meet with the Director or his/her representative to:
.1 Discuss the nature and extent of all activities involved in the Project.
.2 Establish mutually acceptable security procedures in accordance with this instruction and the institution's particular requirements.

.2 Contractor shall:
.1 Ensure that all Construction Employees are aware of the security requirements.
.2 Ensure that a copy of the security requirements is always prominently on display at the job site.
.3 Co-operate with institutional personnel in ensuring that security requirements are observed by all Construction Employees.

1.4 CONSTRUCTION EMPLOYEES

.1 Submit to the Director a list of the names with date of birth of all Construction Employees to be employed on the construction site and a security clearance form for each employee.

.2 Allow two (2) weeks for processing of security clearances. Employees will not be admitted to the Institution without a valid security clearance in place and a recent picture identification such as a provincial driver's license. Security clearances obtained from other CSC Institutions are not valid at this Institution.

.3 The Director may require that facial photographs may be taken of Construction Employees and these photographs may be displayed at appropriate locations in the Institution or in an electronic database for identification purposes. The Director may require that Photo ID cards be provided for all Construction Employees. ID cards will then be left at the designated entrance to be picked upon arrival at the institution and shall be displayed prominently on the Construction Employees' clothing at all time while Construction Employees are in the institution.

.4 Entry to Institutional Property will be refused to any person there may be reason to believe may be a security risk.

.5 Any person employed on the construction site will be subject to immediate removal from Institutional Property if they:
.1 Appear to be under the influence of alcohol, drugs or narcotics.
.2 Behave in an unusual or disorderly manner.
.3 Are in possession of contraband.

.6 Smoking is prohibited anywhere on CSC property.

1.5 VEHICLES

.1 All unattended vehicles on CSC property shall have windows closed; doors and trunks shall be locked, and keys removed. The keys shall be securely in the possession of the owner or an employee of the company that owns the vehicle. Failure to comply with the above will result in an immediate shutdown of the job site and stoppage of work for an indefinite period of time at the Contractor’s expense.

.2 The Director may limit at any time the number and type of vehicles allowed within the Institution.

.3 Drivers of delivery vehicles for material required by the project will not require security clearances but must remain with their vehicle the entire time that the vehicle is in the Institution. The Director may require that these vehicles be escorted by Institutional Staff or Commissionaires while in the Institution.

.4 If the Director permits trailers to be left inside the secure perimeter of the Institution, these trailer doors will be locked at all times. All windows will be securely locked when left unoccupied. All trailer windows shall be covered with expanded metal mesh. All storage trailers inside and outside the perimeter shall be locked when not in use. All storage trailers inside and outside the perimeter shall be locked when not in use. Sub-contractors will be responsible for providing locks and keys for their trailers and to supply extra key to the Contractor, in case access is required after work hours.

1.6 PARKING

.1 Parking area(s) to be used by Construction Employees will be designated by the Director. Parking in other locations will be prohibited and vehicles may be subject to removal. All Contractor’s vehicles brought inside the Institution will have to be removed at the end of each day.

1.7 SHIPMENTS

.1 All shipments of project material, equipment and tools shall be addressed in the Contractor's name to avoid confusion with the Institution's own shipments. The Contractor must have his/her own employees on site to receive any deliveries or shipments. CSC staff will NOT accept receipt of deliveries or shipments of any material, equipment or tools.

1.8 TELEPHONES

.1 There will be no installation of telephones, Facsimile machines and computers with Internet connections permitted within the perimeter of the Institution unless prior approval of the Director is received.

.2 The Director will ensure that approved telephones, facsimile machine and computers with internet connections are located where they are not accessible to inmates. All computers will have an approved password protection that will stop an internet connection to unauthorized personnel.

.3 Wireless cellular and digital telephones, including but not limited to devices for telephone messaging, pagers, BlackBerries, telephone used as 2-way radios, are not permitted within the Institution unless approved by the Director. If wireless cellular telephones are permitted, the user will not permit their use by any inmate.

.4 The Director may approve but limit the use of two way radios.

1.9 WORK HOURS

.1 Work hours within the Institution are:
.1 Monday to Friday
.1 Contractor access to work area at approximately 07:00 hrs.
.2 Contractor must exit the work area at 22:00 hrs. and proceed to exit the institution.

.2 Work will not be permitted during weekends and statutory holidays without the permission of the Director. A minimum of seven days advance notice will be required to obtain the required permission. In case of emergencies or other special circumstances, this advance notice may be waived by the Director.

1.10 OVERTIME WORK

.1 No overtime work will be allowed without permission of the Director. Give a minimum forty-eight (48) hours advance notice when overtime work on the construction project is necessary and approved. If overtime work is required because of an emergency such as the completion of a concrete pour or work to make the construction safe and secure, the Contractor shall advise the Director as soon as this condition is known and follow the directions given by the Director. Costs to the Crown for such events may be attributed to the Contractor.

.2 When overtime work, weekend, or statutory holiday work is required and approved by the Director, extra staff members may be posted by the Director or his/her designate, to maintain the security surveillance. The Departmental Representative may post extra staff for inspection of construction activities. The actual cost of this extra staff may be subject to reclamation by the Crown.

1.11 TOOLS AND EQUIPMENT

.1 Maintain a complete list of all tools and equipment to be used during the construction project. Make this inventory available for inspection when required.

.2 Throughout the construction project maintain up-to-date the list of tools and equipment specified above.

.3 Keep all tools and equipment under constant supervision, particularly power-driven and cartridge-driven tools, cartridges, files, saw blades, rod saws, wire, rope, ladders and any sort of jacking device.

.4 Store all tools and equipment in approved secure locations.

.5 Lock all tool boxes when not in use. Keys to remain in the possession of the employees of the Contractor. Scaffolding shall be secured and locked when not erected and when erected, will be secured in a manner agreed upon with the Institutional designate.

.6 All missing or lost tools or equipment shall be reported immediately to the Director.

.7 The Director will ensure that the security staff members carry out checks of the Contractor's tools and equipment against the list provided by the Contractor. These checks may be carried out at the following intervals:
.1 At the beginning and conclusion of every construction project.
.2 Weekly, when the construction project extends longer than a one week period.
.3 The Contractor may be subject to random checks by security staff to ensure proper storage and security of tools throughout the project.

.8 Certain tools/equipment such as cartridges and hacksaw blades are highly controlled items. The Contractor will be given at the beginning of the day, a quantity that will permit one day's work. Used blades/cartridges will be returned to the Director's representative at the end of each day.

.9 If propane or natural gas is used for heating the construction, the Institution will require that an employee of the Contractor supervise the construction site during non-working hours.

.10 If torches or grinders are required tools to perform Work, Contractor must complete a Hot Work Permit as supplied by CSC. Completed original form(s) are copied and posted on the work site in a conspicuous location. Original documents are to remain with the Institutional Fire Chief.

1.12 KEYS

.1 Security Hardware Keys:
.1 The Contractor shall arrange with the security hardware supplier/installer to have the keys for the security hardware to be delivered directly to Institution, specifically the Security Maintenance Officer (SMO).
.2 The Security Maintenance Officer (SMO) will provide a receipt to the Contractor for security hardware keys.
.3 The Contractor will provide a copy of the above-mentioned receipt to the Departmental Representative.

.2 Other Keys:
.1 The Contractor will use standard construction cylinders for locks for his/her use during the construction period.
.2 The Contractor will issue instructions to his/her employees and sub-trades, as necessary, to ensure safe custody of the construction set of keys.

.3 Upon completion of each phase of the construction, the CSC representative will, in conjunction with the lock manufacturer:
.1 Prepare an operational keying schedule.
.2 Accept the operational keys and cylinders directly from the lock manufacturer
.3 Arrange for removal and return of the construction cores and install the operational core in all locks.

.3 Upon putting operational security keys into use, the CSC construction escort shall obtain these keys as they are required from the Security Maintenance Officer (SMO) and open doors as required by the Contractor. The Contractor shall issue instructions to his/her employees advising them that all security keys shall always remain with the CSC construction escort.

1.13 SECURITY HARDWARE

.1 Turn over all removed security hardware to the Director of the Institution for disposal or for safekeeping until required for re-installation.

1.14 PRESCRIPTION DRUGS

.1 Employees of the Contractor who are required to take prescription drugs during the workday shall obtain approval of the Director to bring a one day supply only into the Institution.

1.15 SMOKING RESTRICTIONS

.1 Contractors and construction employees are not permitted to smoke inside correctional facilities or outdoors within the perimeter of a correctional facility and must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Contractors and construction employees who are in violation of this policy will be requested to immediately cease smoking or dispose of any unauthorized smoking items and, if they persist, will be directed to leave the institution.

.3 Smoking is only permitted outside the perimeter of a correctional facility in an area to be designated by the Director.

1.16 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on Institutional Property.

.2 Discovery of Contraband on the construction site and the identification of the person(s) responsible for the Contraband shall be reported immediately to the Director.

.3 Contractors shall be vigilant with both their staff and the staff of their sub-contractors and suppliers that the discovery of Contraband may result in cancellation of the security clearance of the affected employee. Serious infractions may result in the removal of the company from the Institution

for the duration of the construction.

.4 Presence of arms and ammunition in vehicles of Contractors, sub-contractors and suppliers or employees of these will result in the immediate cancellation of security clearances for the driver of the vehicle.

1.17 SEARCHES

.1 All vehicles and persons entering Institutional property may be subject to search.

.2 When the Director suspects, on reasonable grounds, that an employee of the Contractor is in possession of Contraband or unauthorized items, he/she may order that person to be searched.

.3 All employees entering the Institution may be subject to screening of personal effects for traces of Contraband drug residue.

1.18 ACCESS TO AND REMOVAL FROM INSTITUTION PROPERTY

.1 Construction personnel and commercial vehicles will not be admitted to the Institution after normal working hours, unless approved by the Director.

1.19 MOVEMENT OF VEHICLES

.1 Escorted commercial vehicles will be allowed to enter or leave the Institution through the vehicle access gate during the following hours:
.1 07:45 hrs. to 11:00 hrs.
.2 13:00 hrs. to 15:30 hrs.

.2 Construction vehicles shall not leave the Institution until an inmate count is completed.

.3 The Contractor shall advise the Director twenty-four (24) hours in advance to the arrival on the site of heavy equipment such as concrete trucks, cranes, etc.

.4 Vehicles being loaded with soil or other debris, or any vehicle considered impossible to search, must be under continuous supervision by CSC Staff or Commissionaires working under the authority of the Director.

.5 Commercial Vehicles will only be allowed access to Institutional Property when their contents are certified by the Contractor or his/her representative as being strictly necessary to the execution of the construction project.

.6 Vehicles shall be refused access to Institutional Property if, in the opinion of the Director, they contain any article which may jeopardize the security of the Institution.

.7 Private vehicles of Construction Employees will not be allowed within the security wall or fence of medium or maximum-security Institutions without the permission of the Director.

.8 With prior approval of the Director, a vehicle may be used in the morning and evening to transport a group of employees to the work site. This vehicle will not remain within the Institution the remainder of the day.

.9 With the approval of the Director, certain equipment may be permitted to remain on the construction site overnight or over the weekend. This equipment must be securely locked, with the battery removed. The Director may require that the equipment be secured with a chain and padlock to another solid object.

1.20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.1 Subject to the requirements of good security, the Director will permit the Contractor and his/her employees as much freedom of action and movement as is possible.

.2 However, notwithstanding paragraph above, the Director may:
.1 Prohibit or restrict access to any part of the Institution.
.2 Require that in certain areas of the Institution, either during the entire construction project or at certain intervals, Construction Employees only be allowed access when accompanied by a member of the CSC security staff.

.3 During the lunch and coffee/health breaks, all employees will remain within the construction site. Employees are not permitted to eat in the officer's lounge and dining room.

1.21 SURVEILLANCE AND INSPECTION

.1 Construction activities and all related movement of personnel and vehicles will be subject to surveillance and inspection by CSC security staff members to ensure that established security requirements are met.

.2 CSC staff members will ensure that an understanding of the need to carry out surveillance and inspections, as specified above, is established among Construction Employees and maintained throughout the construction project.

1.22 STOPPAGE OF WORK

.1 The Director may request at any time that the Contractor, his/her employees, sub-contractors and their employees not enter or leave the work site immediately due to a security situation occurring within the Institution. The Contractor's site supervisor shall note the name of the staff member making the request and the time of the request and obey the order as quickly as possible.

.2 The Contractor shall advise the Departmental Representative within 24 hours of this delay to the progress of the work.

1.23 CONTACT WITH INMATES

.1 Unless specifically authorized, it is forbidden to come into contact with inmates, to talk with them, to receive objects from them or to give them objects. Any employee doing any of the above will be removed from the site and his/her security clearance revoked.

.2 It is forbidden to take pictures of inmates, of CSC staff members or of any part of the Institution other than those required as part of this Contract.

1.24 COMPLETION OF CONSTRUCTION PROJECT

.1 Upon completion of the construction project or, when applicable, the takeover of a facility, the Contractor shall remove all remaining construction material, tools and equipment that are not specified to remain in the Institution as part of the construction contract.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations.

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

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

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

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

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

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
- .1 Results of site specific safety hazard assessment.
- .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Measures and controls to be implemented to address identified safety hazards and risks.

.3 Provide a Fire Safety Plan, specific to the work location, in accordance with NBC, Division B, Article 8.1.1.1.3 prior to commencement of work. The plan shall be coordinated with, and integrated into, the existing Facility Emergency Procedures and Evacuation Plan in place at the site. Departmental Representative will provide Facility Emergency Procedures and Evacuation Plan. Deliver two copies of the Fire Safety Plan to the Departmental Representative not later than 14 days before commencing work.

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

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

.6 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within three (3) days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within two (2) days after receipt of comments from Departmental Representative.

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

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

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

.10 Submit two 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Departmental Representative.

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

.12 Submit copies of incident and accident reports.

.13 Submit WHMIS Safety Data Sheets (SDS).

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

1.3 FILING OF NOTICE

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

.2 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.4 WORK PERMIT

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

.2 Obtain Hot Work Permit from Departmental Representative.

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

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

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

1.8 GENERAL REQUIREMENTS

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

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

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

1.9 COMPLIANCE REQUIREMENTS

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

1.10 RESPONSIBILITY

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

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

.3 Where applicable the Contractor shall be designated "Constructor", as defined by Occupational Health and Safety Act and Regulations for Construction Projects for the Province of Ontario.

1.11 UNFORSEEN HAZARDS

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

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

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province of Ontario, and in consultation with Departmental Representative.
- .1 Contractor's Safety Policy.
- .2 Constructor's Name.
- .3 Notice of Project.
- .4 Name, trade, and employer of Health and Safety Representative or Joint Health and Safety Committee members (if applicable).
- .5 Ministry of Labour Orders and reports.
- .6 Occupational Health and Safety Act and Regulations for Construction Projects for Province of Ontario.
- .7 Address and phone number of nearest Ministry of Labour office.
- .8 Safety Data Sheets.
- .9 Written Emergency Response Plan.
- .10 Site Specific Safety Plan.
- .11 Valid certificate of first aider on duty.
- .12 WSIB "In Case of Injury At Work" poster.
- .13 Location of toilet and cleanup facilities.

1.13 CORRECTION OF NON-COMPLIANCE

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

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

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

1.14 BLASTING

.1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

1.15 POWDER ACTUATED DEVICES

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

1.16 WORK STOPPAGE

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

.2 Assign responsibility and obligation to Competent Supervisor to stop or start Work when, at Competent Supervisor's discretion, it is necessary or advisable for reasons of health or safety. Departmental Representative may also stop Work for health and safety considerations.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

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

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

1.2 REFERENCE STANDARDS

.1 OPSS.MUNI 506 (Nov 2017) Construction Specifications for Dust Suppressants.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

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

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

.5 Address topics at level of detail commensurate with environmental issue and required construction task(s).

.6 Include in Environmental Protection Plan:
- .1 Name(s) of person(s) responsible for ensuring adherence to Environmental Protection Plan.
- .2 Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from site.
- .3 Name(s) and qualifications of person(s) responsible for training site personnel.
- .4 Descriptions of environmental protection personnel training program.

.5 Erosion and sediment control plan identifying type and location of erosion and sediment controls to be provided including monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.

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

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

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

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

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

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

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

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

.12 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

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

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

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

1.4 FIRES

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

1.5 DRAINAGE

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

1.6 POLLUTION CONTROL

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

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

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

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

1.7 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.
.1 Take action only after receipt of written approval by Departmental Representative.

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

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.1 Leave Work area clean at end of each day.

.2 Bury rubbish and waste materials not accepted on site.

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

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada (NBC) 2015, National Fire Code of Canada (NFC) 2015 and Ontario Building Code (OBC) 2012, including all amendments up to bid closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply as directed by the Departmental Representative.

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

1.2 HAZARDOUS MATERIAL DISCOVERY

.1 Stop work immediately and notify Departmental Representative if materials which may contain any designated substances or PCB's are discovered in course of work.

.2 CSC Designated Substance Report date 1997, 2006, and 2016 confirms the presence of asbestos containing materials in some of the floor tiles and pipe insulation and lead containing paint in areas adjoining the spaces around the area of work. No specific information has been provided for hazardous material within the area of the work. Departmental Representative will provide to the contractor access to these reports on request.
- .1 During demolition and construction these materials shall be considered hazardous by the contractor and sub-contractors unless additional testing indicates otherwise. Contractor will take precautions in handling these three materials as per the survey. Any suspect or confirmed hazardous materials are to be abated as outlined within the Designated Substance Report and disposed of in accordance with current legislation. Designated Representative provided by the Departmental Representative will assist the contractor with testing of any other suspected materials affected by the work.

1.3 IAQ - INDOOR AIR QUALITY

.1 Comply with CSA Z204-94(R1999), Guideline for Managing Indoor Air Quality in Office Buildings and CSA B651-18.

1.4 ACCESSIBLE DESIGN

.1 Comply with CSA B651-18, unless specified otherwise. In any case of conflict or discrepancy between the building codes and CSA B651-18, the requirements of CSA B651-18 shall apply.

1.5 STATISTICAL INFORMATION

.1 Provide statistical information to Departmental Representative:

.1 Within ten working days after March 31 and September 30 occurring between commencement of work and final completion
.2 Within ten working days after final completion.

.2 Include in statistical information:
.1 Statement of total person days of labour used on site in performance of contract, including labour provided under sub-contracts.
.2 Estimate of total value in dollars of material delivered to site and installed, including material provided and installed under sub-contracts.

.3 This information is required by Government of Canada solely to provide statistics that will aid in assessing socio-economic benefits of this project.

1.7 TAXES

.1 Pay applicable Federal, Provincial and Municipal taxes.

1.8 EXAMINATION

.1 Examine existing conditions and determine conditions affecting work.

.2 Conduct concrete floor moisture testing using Calcium Chloride moisture tests.
.1 Submit test results to Departmental Representative for approval prior to installing any flooring. Conduct one test per 100 mm of area being covered.

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 Inspection and testing, administrative and enforcement requirements.

.2 Tests and mix designs.

.3 Mock-ups.

.4 Mill tests.

.5 Equipment and system adjust and balance.

1.2 INSPECTION

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

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

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

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

1.3 INDEPENDENT INSPECTION AGENCIES

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

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

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

.4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental

Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.4 ACCESS TO WORK

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

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

1.5 PROCEDURES

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

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

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

1.6 REJECTED WORK

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

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

.3 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Departmental Representative may deduct from Contract Amount difference in value between Work performed and that called for by Contract Documents, amount of which shall be determined by Departmental Representative.

1.7 REPORTS

.1 Submit 4 copies of inspection and test reports to Departmental Representative.

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

1.8 TESTS AND MIX DESIGNS

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

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

1.9 MOCK-UPS

.1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of all Sections required to provide mock-ups.

.2 Construct in all locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups 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.

.5 If requested, Departmental Representative will assist in preparing a schedule fixing dates for preparation.

.6 Mock-ups may remain as part of Work.

1.10 MILL TESTS

.1 Submit mill test certificates as required of specification Sections.

1.11 EQUIPMENT AND SYSTEMS

.1 Submit testing, adjusting and balancing reports for mechanical, electrical, electronics security systems and building equipment systems.

.2 Refer to Division 21-28 for definitive requirements.

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 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.
- .2 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.

.2 Canadian Standards Association (CSA International)
- .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CSA 0121-17, Douglas Fir Plywood.
- .3 CAN/CSA-Z797-18, Code of Practice for Access Scaffold.
- .4 CAN/CSA-Z321-96(R2006), Signs and Symbols for the Occupational Environment, withdrawn but still available from CSA, CCOHS and Techstreet.

1.3 SUBMITTALS

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

1.4 INSTALLATION AND REMOVAL

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

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

.3 Indicate use of supplemental or other staging area.

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

.5 Remove from site all such work after use.

1.5 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-Z797.

.2 Provide and maintain scaffolding, ramps and ladders

1.6 ELEVATORS

.1 Designated existing elevators may be used by construction personnel and transporting of materials. Co-ordinate use with Departmental Representative.

.2 Provide protective coverings for finish surfaces of cars and entrances.

1.7 SITE STORAGE/LOADING

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

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

1.8 CONSTRUCTION PARKING

.1 Parking will be permitted on site within a designated area for a designated number of vehicles by Departmental Representative.

.2 Provide and maintain adequate access to project site.

.3 Build and maintain temporary roads where indicated [or directed by Departmental Representative] and provide snow removal during period of Work.

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

.5 Clean construction runways and taxi areas where used by Contractor's equipment.

1.9 SECURITY

.1 Contractor is responsible for the security and protection of the construction materials and contents stored on site during holidays and after working hours. If construction materials and contents are stolen from the Work Area and the exterior laydown area, the Departmental Representative is not responsible for the cost to replace the materials and contents.

1.10 OFFICES

.1 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.

1.11 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.

1.12 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.

.3 When permanent water and drain connections are completed, provide temporary water closets and urinals complete with temporary enclosures, inside building. Permanent facilities may be used on approval of Departmental Representative.

1.13 CONSTRUCTION SIGNAGE

.1 No construction signage is permitted, except signs required under health and safety regulations.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

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

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

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

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

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

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Construct access and haul roads necessary.

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

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

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

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

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

.13 Provide snow removal during period of Work.

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

1.15 CLEAN-UP

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

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

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

.4 Stack stored new or salvaged material.

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 Barriers.

.2 Environmental Controls.

.3 Traffic Controls.

.4 Fire Routes.

1.2 RELATED SECTIONS

.1 Section 01 52 00 - Construction Facilities.

1.3 REFERENCE STANDARDS

.1 Canadian General Standards Board (CGSB):
  .1 CAN/CGSB-1.189-2000, Exterior Alkyd Primer for Wood.
  .2 CAN/CGSB-1.59-97, Alkyd Exterior Gloss Enamel.

.2 Canadian Standards Association (CSA):
  .1 CSA O121-17, Douglas Fir Plywood.

1.4 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.5 HOARDING

.1 Erect temporary site enclosures using 38 x 89 mm construction grade lumber framing at 600 mm o.c. and 1200 x 2400 x 13 mm exterior grade fir plywood to CSA O121.

.2 Apply plywood panels vertically flush and butt jointed.

.3 Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.

.4 Erect and maintain pedestrian walkways including roof and side covers, complete with signs and electrical lighting as required by law.

.5 Paint public side of site enclosure in selected colours with one coat primer to CAN/CGSB-1.189 and one coat exterior paint to CAN/CGSB-1.59. Maintain public side of enclosure in clean condition.

1.6 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 Provide as required by governing authorities.

1.7 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.

1.8 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.

1.9 ACCESS TO SITE

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

1.10 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.

1.11 FIRE ROUTES

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

1.12 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.

1.13 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

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

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END 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 RELATED SECTIONS

.1 Section 01 45 00 - Quality Control.

1.3 REFERENCE STANDARDS

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

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

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

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

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

.6 OPSS Ontario Provincial Standard Specifications and OPSD Ontario Provincial Standard Drawings quoted in these specifications are available online at https://www.library.mto.gov.on.ca/SydneyPLUS/TechPubs/Portal/tp/opsViews.aspx.

1.4 QUALITY

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

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

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

.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.

1.5 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for any items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.6 METRIC SIZED MATERIALS

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

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

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

.4 Difficulties caused by the Contractor's lack of planning and effort to obtain modular metric sized products which are available on the Canadian market will not be considered sufficient reasons for claiming that they cannot be provided.

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

1.7 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

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

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

1.8 TRANSPORTATION

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

1.9 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.10 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.

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

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

1.11 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.

1.12 CONCEALMENT

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

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

1.13 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.

1.14 LOCATION OF FIXTURES

.1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.

.2 Inform Departmental Representative of conflicting installation. Install as directed.

1.15 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.

1.16 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.

1.17 PROTECTION OF WORK IN PROGRESS

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

1.18 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.

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 PROJECT CLEANLINESS

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

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

.3 Clear snow and ice from access to building, bank/pile snow in designated areas only.

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

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

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

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

.8 Dispose of waste materials and debris off site.

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

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

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

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

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

1.2 FINAL CLEANING

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

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

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

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

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

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

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

.8 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.

.9 Clean lighting reflectors, lenses, and other lighting surfaces.

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

.11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.

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

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

.14 Remove dirt and other disfiguration from exterior surfaces.

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

.16 Sweep and wash clean paved areas.

.17 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.

.18 Clean roofs, downspouts, and drainage systems.

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

.20 Remove snow and ice from access to building.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

.2 Prior to removal from site, any unused or new material brought to site but not incorporated into the work shall by logged off of the site through the Departmental Representative's on-site resident contract administration personnel.

.3 Potential salvage material is to be identified to the Departmental Representative prior to removal from site by the Contractor.

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 & DEMOLITION WASTE

.1 Carefully deconstruct and source separate materials/equipment and divert, from D&C waste destined for landfill to maximum extent possible. Target for this project is 75% diversion from landfill. Reuse, recycle, compost, anaerobic digest or sell material for reuse except where indicated otherwise. On site sales are not permitted.

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

.3 Submit a waste reduction workplan indicating the materials and quantities of material that will be recycled and diverted from landfill.

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

1.2 WASTE PROCESSING SITES

.1 Province of: Ontario.
- .1 Ministry of Environment, Conservation and Parks, 135 St. Clair Avenue West, Toronto, ON, M4V 1P5.
- .2 Telephone: 1-800-565-4923 or 416-323-4321.
- .3 Fax: 416-314-6713.

.2 Recycling Council of Ontario: 55 University Avenue, #1500, Toronto, ON, M5J 2H7.
- .1 Telephone: 416-657-2797 or 1-888-501-9637.
- .2 Fax: 416-960-8053.
- .3 Email: rco@rco.on.ca.
- .4 Internet: http://www.rco.on.ca/.

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 CANADIAN GOVERNMENTAL DEPARTMENTS CHIEF RESPONSIBILITY FOR THE ENVIRONMENT

.1 Government Chief Responsibility for the Environment.

Province	Address	General Inquiries	Fax
Ontario	Ministry of Environment, Conservation And Parks 135 St Clair Avenue West Toronto, ON M4V 1P5	(416) 323-4321 (800) 565-4923	(416) 314-6713
	Environment And Climate Change Canada Toronto, ON	(416) 734-4494	

END OF SECTION

PART 1 - GENERAL

1.1 INSPECTION AND DECLARATION

.1 Contractor's Inspection: Contractor and all Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
  .1 Notify Departmental Representative in writing of satisfactory completion of Contractor's Inspection and that corrections have been made.
  .2 Request Departmental Representative's Inspection.

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

.3 Completion: submit written certificate that following have been performed:
  .1 Work has been completed and inspected for compliance with Contract Documents.
  .2 Defects have been corrected and deficiencies have been completed.
  .3 Equipment and systems have been tested, adjusted and balanced and are fully operational.
  .4 Certificates required by Boiler Inspection Branch, PSPC Fire Protection Engineer and Utility companies have been submitted.
  .5 Operation of systems have been demonstrated to Owner's personnel.
  .6 Work is complete and ready for final inspection.

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

1.2 CLEANING

.1 In accordance with Section 01 74 00.

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

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

.1 Not Used.

END OF SECTION

PART 1 - GENERAL

1.1 DEFINITIONS

.1 As-Built Drawings are those prepared by the Contractor as it constructs the project and upon which it documents the actual locations of the building components and site components and changes to the original contract. As-Built Drawings will also refer to the term 'Redline Drawings'.

.2 Record Drawings are those drawings prepared by the Departmental Representative. These are a compendium of the original drawings, site changes and information taken from the Contractors As-Built Drawings.

.3 The above definitions are founded on OAA Joint Best Pratice Statement As-Built and Record Drawings dated October 21 2010 and issues jointly by the OAA and the Ontario General Contractors Association.

1.2 GENERAL

.1 The following shall be submitted in the close out package for approval in folders described in this divisional section.

.1 Scanned Redline Drawings
.2 Record Drawings and Field Survey Data
.3 O&M Manual
.4 Approved Shop Drawings
.5 Warranty Information and if available;
.6 Reports
.7 Photos

1.3 FORMAT

.1 The main folder structure for the closeout package submittal is to be organized as follows;

.1 Redline Drawings
.2 Record Drawings
.3 Field Survey Data
.4 O&M Manual
.5 Approved Shop Drawings
.6 Warranty Information
.7 Reports
.8 Photos

.2 Only electronic format is to be submitted.

.3 Allow 10 working days for closeout package to be reviewed by Departmental Representative.

.4 All Cover Sheets: Project Title, Drawing Number, Project Number, and identify subject matter of contents.

.5 Arrange content by Specification Section numbers and sequence of Table of Contents.

.6 Provide separate sections for each separate product and system, with typed description of product and major component parts of equipment.

.7 Submission is to provide on CD/DVD or USB.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Three weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, an electronic copy of operating and maintenance manuals in English.

.3 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.

.4 Provide evidence, if requested, for type, source and quality of products supplied.

1.5 REDLINE DRAWINGS

.1 As-Builts, Field Record Drawings and Redlines are interchangeable terms meaning Redlines.

.2 Contractor is to provide a printed copy of the drawing set for the intended purpose of creating redline drawings with the words "Redlines" in red written on each page.

.3 Contractor to record changes in red as made and authorized on one set of prints referred to as "Redline Drawings" and at substantial completion of project and prior to final inspection scan and submit drawings to Departmental Representative.

.4 All Site Instruction Numbers and Change Order Numbers are to be annotated on the Redline Drawing set.

.5 Contractor to maintain information on project site drawings and record accurately, deviations of newly installed or existing plant works from Contract documents during construction.

.6 Contractor to maintain record documents in clean, dry and legible condition. Do not use record drawings for construction purposes.

.7 Keep record documents and samples available for inspection by Department Representative.

.8 Contractor will submit for record drawings and specifications purposes the original set of redline drawings and specifications from construction site used for keeping track of contract design and site condition changes.

.1 Submission to be one set of paper copy and electronic copy labeled as AS-BUILT drawings to Departmental Representative on the completion of the work. Submit files on USB compatible with PWGSC encryption requirements or through email or alternative electronic file sharing service such as FTP, as directed by Departmental Representative.

.9 The Contractor shall ensure but not limit to the recording of the following information on the original Redline drawings:

.1 Locations of internal utilities and appurtenance concealed in construction, referenced to visible and accessible features of structure.

.2 Field changes of dimension and detail, such as but not limited to:

.1 For Buildings: Door locations, duct sizes, piping valve, and equipment layout, cable tray alignment.

.10 Changes made by Change Order of Field Order.

.11 Utilities shall be identified as abandoned, existing or new.

1.6 O&M MANUALS

.1 Electronic files are to be arranged and indexes into the same numerical order as the contract Specification Section. A maximum of 300 pages per file.

.2 The use of Bookmarks within PDF is an acceptable practice.

.3 Warranties are to remain in the Manual under each section.

.4 Table of Contents for Each Volume: provide Project Title, Drawing Number, Project Number;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Contractor with name of responsible parties.

.3 Schedule of products and systems indexed to content of volume.

.5 For each product or system:

.1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

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

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

.8 Text: as required to supplement product data.

.1 Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

1.7 APPROVED SHOP DRAWINGS

.1 Only copies of approved shop drawings and product data are to be submitted. Rejected and non-approved shop drawings and product data are not to be included.

.2 Approved shop drawings for temporary works required to facilitate construction and that will be removed during or at the completion of construction are not required to be submitted in the closeout package.

1.8 WARRANTY

.1 A Cover Sheet and Table of Contents containing all project related warranties with each items expiry date is to be created.

.2 All project related warranties are to be copied into this folder listed by specification section.

.3 Submit a summary of warranty information to Departmental Representative.

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

.5 Names, addresses and telephone numbers of sources of spare parts.

.6 Warranties and terms of warranty: include one-year overall warranty of construction. Indicate items that have extended warranties and show separate warranty expiration dates.

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

.9 Summary of maintenance procedures required to continue warranty in force.

.10 Cross-Reference to specific pertinent Operation and Maintenance manuals.

.11 Organization, names and phone numbers of persons to call for warranty service.

.12 Typical response time and repair time expected for various warranted equipment.

.4 Respond in timely manner to oral or written notification of required construction warranty in the closeout package.

1.9 EQUIPMENT AND SYSTEMS

.1 For each item of equipment and each system include description of unit or system, and component parts.

.1 Give function, normal operation characteristics and limiting conditions.

.2 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.

.1 Include regulation, control, stopping, shut-down, and emergency instructions.

.2 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 co-ordination 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.

1.10 MATERIALS AND FINISHES

.1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

.2 Provide information for re-ordering custom manufactured products.

.3 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

.4 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.

.5 Additional requirements: as specified in individual specifications sections.

1.11 MAINTENANCE MATERIALS

.1 Spare Parts:

.1 Provide spare parts, in quantities specified in individual specification sections to Departmental Representative.

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

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

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.2 Extra Stock Materials:

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

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

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.3 Special Tools:

.1 Provide special tools, in quantities specified in individual specification section to Departmental Representative.

.2 Provide items with tags identifying their associated function and equipment.

.3 Deliver to location as directed; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.12 DELIVERY, STORAGE AND HANDLING

.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 for review by Departmental Representative.

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: Labour, Products, equipment and services necessary to complete the work of this Section in accordance with the Contract Documents.

1.2 WORK INCLUDED

.1 This section of the work covers the requirements for demolishing, salvaging and removing wholly or in part the various items designated on the drawings or required to be removed or partially removed for the receipt of the work of this contract.

.2 Demolition and preparatory work includes, but is not necessarily limited to:

.1 Alteration and renovations to existing buildings: S-Range, Millhaven Institution.

.2 Cutting and removing of windows, siding, walls, floors, ceilings, roofs, etc., in the existing buildings for installation of the work of the mechanical, fire protection and electrical trades.

.3 Patching, making good openings and chases in windows, exterior finishes, walls, floors, ceilings, roofs, etc., after the installation of the work of the mechanical, fire protection and electrical trades, including the supply and installation of lintels, channels and painting.

.4 Removal of rubbish, debris, demolished fixtures, fitments and items not scheduled to remain within the property, resulting from the demolition and preparatory work.

.5 Dust Control during the operations of the work of this section.

1.3 WORKS UNDER OTHER SECTIONS

.1 Temporary dustproof and security enclosures - under Division 01 Sections.

.2 Capping, diverting, cutting-off or removal of water, gas, electricity and other services in areas being altered which are affected by the changes - under Mechanical and Electrical Divisions.

1.4 SUBMITTALS

.1 Submit demolition, cutting, patching and finishing schedule to Departmental Representative for review. Schedule to show timing and phasing of the work in the various areas of the existing building. Deviation from schedule will not be permitted without approval.

1.5 QUALITY ASSURANCE

.1 Comply with pertinent codes, regulations and insurance carriers providing coverage for this work.

.2 Execute the work in strict accordance with 'The Occupational Health and Safety Act and Regulations for Construction Projects' latest addition. Keep copy of the Act and regulations at the place of the Work at all times.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Not Use Materials arising from the demolition and preparatory work become the property of the Contractor unless indicated otherwise; remove such materials from site daily, do not store or sell from site.

.2 Carefully remove, handle and store materials to be reused or turned over to Departmental Representative to prevent damage. Materials that are damaged during removal will be inspected by Departmental Representative. Departmental Representative will determine extent of damage and accept or reject materials for reuse. Provide new materials to match existing materials rejected by the Departmental Representative at no additional cost to the Departmental Representative.

PART 3 – EXECUTION

3.1 PREPARATION

.1 Notify the Departmental Representative at least two (2) full working days prior to commencing of the work.

.2 The drawings do not purport to show all objects existing on the site.

.3 Before commencing the work, carefully check drawings and verify with the Departmental Representative regarding all objects to be removed and all objects to be preserved.

.4 Schedule all work in a careful manner with all necessary consideration for the requirements of the Departmental Representative, his employees and the public.

.5 Avoid interference with the use of, and passage to and from, adjacent buildings and facilities.

.6 Before starting the operations, arrange with the appropriate trade concerned for the disconnection of all utility services, affecting the work.

.7 Preserve in operating condition all active utilities to remain.

3.2 DEMOLITION AND PREPARATORY WORK

.1 Ensure that demolished materials are continuously removed from the buildings and grounds as they accumulate, that no hazard condition is left during non-working hours and that full measures are taken by sprinkling and other means to keep dust to a minimum and to confine what dust there is within the working area.

.2 Maintain proper and safe means of fire exit from all zones of the existing building to the approval of the authorities having jurisdiction.

.3 Confine operation to those parts of the buildings which are to be altered or renovated. Do not damage existing construction beyond that necessary for performance of new work and repair such damage as required.

.4 Materials and equipment to be relocated for reuse in the new work shall be carefully removed in re-usable condition, transported and stored on the site where directed by the Departmental Representative and protected against damage.

.5 Do not undermine, damage, or endanger by digging, cutting or any other operation in the performance of the work existing footings, foundations, pipe lines, electrical conduit and wiring. Undermined, damaged or endangered work to be made good at no additional cost to the Departmental Representative.

.6 Cut openings through existing walls, partitions, roofs and floors. Establish exact location of steel reinforcing in existing concrete slabs or walls before holes are made. Be responsible for damage to existing steel reinforcing and be liable for structural failure. Make good surfaces disturbed with materials to match existing.

.7 Cut to accommodate new structural steel members.

.8 Cut existing lath and plaster, gypsum board and drywall to expose existing masonry, studs or other rough wall face to accommodate new work.

.9 Saw cut floors, walls, ceiling and roof before demolition is started, where necessary to minimize damage. Make cuts with clean, true, smooth edges.

.10 Where items are to be removed from existing structure or surfaces that are to remain in place, remove those items complete with hangers, brackets and other readily removable supports and fastenings:

.1 Remove bolts, but not inserts embedded in concrete or masonry.

.2 Remove bolt and rivet fastenings from steel structure.

.11 Demolish work into sections of practical size for removal without alteration or damage to the existing building remaining in place.

.12 New openings required in existing walls and partitions shall be carefully cut and formed to blend into existing work. Provide lintels to new openings. New masonry used to close off openings shall be toothed into existing masonry.

.13 Join and make good new work to existing in such a manner that the joint is structurally sound and inconspicuous.

.14 Cuts, breaks and other temporary openings into existing surfaces, which are required for installation or application of new fixtures, fitments, materials or services shall be, at completion of work, patched and/or made good and finished to blend with surrounding finishes. Openings to allow passage of ducts shall be closed tight to perimeters of duct at all locations where fire dampers are required.

.15 In areas where work is required to be performed over acoustic ceilings composed of lay-in panels in a supporting grid, panels shall be carefully removed to avoid damage and replaced when the work is completed. If existing lay-in panels in a room are damaged and cannot be matched with new panels, then all the panels in that room shall be replaced with new units to the Departmental Representative's approval at no additional expense to the Departmental Representative.

.16 Where resilient floor finishes are scheduled to be removed, include stripping of all adhesive, underlayment or other cleavage membranes and leave sub-base, flush, smooth and level suitable for new floor finish.

.17 Where carpet is scheduled to be removed, include:

.1 Removal of underpad, if any.

.2 Removal of carpet edging and grippers at walls and vertical surfaces.

.3 Stripping of all adhesive, underlayment or other cleavage membranes and leave sub-base suitable for new floor finish.

.18 Where ceramic and quarry tile is scheduled to be removed, include:

.1 Removal of mortar setting bed.

.2 Stripping of all adhesive, underlayment or other cleavage membranes and leave sub-base suitable for new floor finish and underlayment.

.19 Where fireproofing membranes or coverings to existing structural steel members and open web steel joists are disturbed, restore the fire protection with materials and methods acceptable by the authorities having jurisdiction.

.20 Burning of materials on site is prohibited.

.21 Upon completion of demolition, leave interior surfaces broom clean and exterior surface rake clean.

.22 Maintain the existing building in a weather and watertight condition at all times.

.23 Maintain security of existing building.

3.3 PROTECTION

.1 Use all means necessary to protect existing objects designated to remain and in the event of damage, immediately make all repairs and replacements necessary to the approval of the Departmental Representative and at no additional cost to the Departmental Representative.

.2 Provide protection required to enable existing building and equipment to remain in continuous and normal operations, and maintain construction schedule.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 20 00: Concrete Reinforcing.

.2 Section 03 30 00: Cast-in-Place Concrete.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA O86:19, Engineering Design in Wood.

.3 CSA O121-17, Douglas Fir Plywood.

.4 CSA O141-05 (R2019), Softwood Lumber.

.5 CSA O151-17, Canadian Softwood Plywood.

.6 CSA O153:19, Poplar Plywood.

.7 CSA O325-16, Construction Sheathing.

.8 CSA O437 Series-93 (R2011), Standards for OSB and Waferboard.

.9 CSA S269.1-16, Falsework and Formwork.

.10 CAN/CSA S269.3-M92 (R2013), Concrete Formwork.

.2 American Concrete Institute (ACI)

.1 ACI 347R-14, Guide to Formwork for Concrete.

1.3 QUALITY ASSURANCE

.1 In accordance with Section 01 45 00.

.2 Qualifications

.1 Engage a Professional Engineer licensed in the place where the project is located to be responsible for design and installation of all formwork, falsework and re-shoring.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings

.1 Provide shop drawings for formwork and falsework stamped and signed by the Professional Engineer responsible for their design.

.2 Show on drawings:

.1 Formwork design data: permissible rate of concrete placement and temperature of concrete in forms.

.2 Erection sequence.

.3 Stripping procedure.

.4 Locations of all construction joints in slabs and walls.

.5 Shoring of existing construction where required to carry construction loads.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Design in accordance with CSA S269.1 and CSA S269.3.

.2 Structural design of formwork, falsework and re-shoring will not be reviewed by the Departmental Representative.

2.2 MATERIALS

.1 Formwork materials: to CSA S269.1

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA O12, CSA O437 Series or CSA O153.

.2 Form ties:

.1 Form ties to be designed to act as ties and spreaders and to have a minimum working strength of 13 kN (3000 pounds).

.2 Snap ties to snap cleanly at least 25mm (1") from concrete surface without damage to the concrete.

.3 Cone ties to be internal disconnecting type which snaps cleanly at least 38mm (1½") from concrete surface without damage to the concrete.

.3 Plate dowels: diamond shaped steel plates, min. fy=300 MPa, in prefabricated plastic pockets with internal collapsible fins allowing min. 10mm (¾") movements in the direction of the joint.

.4 Form release agent: non-toxic, low VOC, chemically active agent containing compounds that react with free lime in concrete resulting in water insoluble soaps

.5 Form stripping agent: colourless mineral oil, non-toxic, low VOC, free of kerosene, with viscosity between 15 to 24 mm^2/s (70 and 110s Saybolt Universal) at 40°C, flashpoint minimum 150°C, open cup.

.6 Grooves, reglets and chamfers: White pine selected for straightness and accurately dressed to size.

.2 Falsework materials: to CSA S269.1.

2.3 ACCESSORIES

.1 Dovetail anchor slots: minimum 0.6 mm thick galvanized steel with insulation filled slots.

.2 Weep hole tubes: plastic.

.3 Bentonite Geotextile Waterproofing: two interlocked polypropylene geotextile sheets encapsulating a layer of bentonite.

PART 3 EXECUTION

3.1 Fabrication and Erection

.1 Conform to CSA A23.1/A23.2.

.2 Fabricate and erect falsework in accordance with CSA S269.1.

.3 Fabricate and erect formwork in accordance with CSA S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA A23.1/A23.2.

.4 Make formwork tight and flush faced to prevent the leakage of concrete and the creation of unspecified fins or panel outlines.

.5 Obtain Departmental Representative's approval for formed openings not indicated on Structural Drawings.

.6 Apply a form coating and release agent uniformly to the contact surface of formwork panels before reuse.

.7 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated on Architectural and Structural drawings.

.8 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.9 Anchors and inserts not to protrude beyond surfaces designated to receive applied finishes, including painting.

.10 Clean formwork in accordance with CSA A23.1/A23.2, before placing concrete.

.11 Do not close wall forms before reinforcing steel has been reviewed.

3.2 JOINTS

.1 Refer to Section 03 30 00 for construction joints, sawcut joints and isolation joints in slab on grade and concrete toppings.

3.3 REMOVAL

.1 Conform to CSA A23.1/A23.2 and to ACI 347R.

.2 Use on-site cured cylinders (kept beside and treated as the concrete in the structure they represent) or maturity tests to determine in-situ strength of concrete prior to removal of falsework.

.3 Maintain falsework until concrete has reached at least 75% of its specified 28-day strength.

.4 Re-use formwork and falsework subject to requirements of CSA A23.1/A23.2.

3.4 FIELD QUALITY CONTROL

.1 Refer to Section 01 45 00.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00: Concrete Forming and Accessories.

.2 Section 03 30 00: Cast-in-Place Concrete.

1.2 REFERENCES

.1 All referenced standards shall be the current edition or the edition referenced by the applicable Building Code in force at the time of building permit application, as noted on Structural Drawings.

.2 Canadian Standards Association (CSA International)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CSA G30.18-09 (R2019), Carbon Steel Bars for Concrete Reinforcement.

.3 CSA G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.4 CSA W186:21, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)

.1 Reinforcing Steel Manual of Standard Practice.

.4 American Concrete Institute (ACI)

.1 SP-66, ACI Detailing Manual.

.5 ASTM International Inc.

.1 ASTM A1064/A1064M-18A, Standard Specification for Carbon Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

.2 ASTM A1044/A1044M-16AE1, Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete.

1.3 QUALITY ASSURANCE

.1 Qualifications

.1 Welding of reinforcing steel to be performed by welders certified under CSA W186.

1.4 QUALITY CONTROL

.1 Submit in accordance with Section 01 45 00.

.2 Source Quality Control Submittals:

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

.2 Upon request, inform Departmental Representative of proposed source of reinforcement material to be supplied.

.3 Upon request, provide the Departmental Representative with a copy of plant certificate by the Concrete Reinforcing Steel Institute for epoxy coating of reinforcement.

.4 Upon request, provide the Departmental Representative with a copy of manufacturer's instructions for patching factory applied epoxy coating.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's data sheets for mechanical rebar splices.

.3 Shop Drawings:

.1 Prepare shop drawings in accordance with RSIC Manual of Standard Practice unless the Contract Documents contain a more stringent requirement. Conform to ACI SP 66 Detailing Manual whenever a detail condition is not covered by any of the above.

.2 Submit plans, elevations, sections and details necessary to fabricate, place and review reinforcement without reference to structural drawings, including masonry wall reinforcement. Draw to scale not smaller than 1:50 (¼" = 1'-0").

.3 Show on drawings:

.1 Sizes, spacings and locations of reinforcement, with identifying labels.

.2 Bar bending details.

.3 Lengths and locations of all lap splices.

.4 Types and locations of mechanical splices.

.5 Placing sequence.

.6 Large scale details at areas of steel concentrations (such as column/beam/wall intersections), and around cast-ins.

.7 Bar lists.

.8 Quantities of reinforcement (including all rebars added to accommodate installation).

.9 Construction joint, control joint and pour gap locations.

.10 Concrete cover.

.4 Do not release for fabrication reinforcing bars whose length may be affected by field conditions until obtaining the required field measurements.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Reinforcing steel: carbon steel, deformed bars to CSA G30.18, unless indicated otherwise.

.2 Weldable Reinforcing steel: weldable low alloy steel deformed bars to CSA G30.18.

.3 Welded steel wire fabric: to ASTM A1064/A1064M. Provide in flat sheets only.

.4 Chairs, bolsters, bar supports, spacers: to CSA A23.1/A23.2.

.5 Mechanical splices: to develop 125% of specified rebar yield strength.

.6 Plain round bars: to CSA G40.20/G40.21.

PART 3 EXECUTION

3.1 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice.

.2 Stagger mechanical splices 750mm (2’-6”) unless otherwise noted on drawings.

.3 Weld reinforcement in accordance with CSA W186 where indicated.

.4 Ship bundles of bar reinforcement, clearly identified in accordance with bar lists.

.5 Provide standard hooks at ends of all hooked bars.

.6 Substitute different size bars only if permitted in writing by the Departmental Representative.

3.2 FIELD BENDING

.1 Do not field bend or field weld reinforcement except where indicated or authorized by Departmental Representative.

.2 When field bending is authorized, bend without heat, applying slow and steady pressure.

.3 Where key-creating stay form with pre-installed blind dowels is used, bend the dowels out using special tools approved by the stay form manufacturer.

.4 Replace bars which develop cracks or splits.

3.3 PLACING REINFORCEMENT

.1 Place reinforcing steel as indicated on reviewed placing drawings and in accordance with CSA A23.1/A23.2.

.2 Remove all loose scale, dirt, oil or other coatings which would reduce bond.

.3 Ensure cover to reinforcement is maintained during concrete pour.

.4 Turn ends of tie wire towards the interior of concrete.

.5 Use bar supports for beams and slabs.

.6 Use precast concrete chairs where supports rest on the ground. Where welded wire fabric is used in slabs-on- grade, place precast concrete chairs at 600 mm (2’-0”) on centre each way. Do not attempt to position welded wire fabric by lifting it after concrete is poured.

.7 Do not cut reinforcement without Departmental Representative’s written approval.

.8 Exposed concrete surfaces:

.1 Use plastic or plastic tipped bar supports and spacer with colour to match concrete.

.9 Use plastic bar supports, epoxy coated support bars and plastic coated tie wire for epoxy coated reinforcement.

.10 Do not field weld reinforcement except where indicated or authorized by the Departmental Representative.

.11 Do not weld epoxy coated reinforcement.

3.4 INSPECTION AND TESTING

.1 An independent Inspection and Testing Agency will be appointed to carry out inspection and testing of concrete reinforcing as required. The cost of the inspection will be borne by the owner.

.2 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required.

.3 When requested, the Agency will review mill test reports and correlate reinforcing steel supplied with mill test reports provided.

.4 If reinforcing steel cannot be correlated to mill test reports, the Agency will conduct a sufficient number of tests to determine the yield strength of the reinforcing steel supplied.

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 03 10 00: Concrete Forming and Accessories.

.2 Section 03 20 00: Concrete Reinforcing.

1.2 REFERENCES

.1 All referenced standards shall be the current edition or the edition referenced by the applicable Building Code in force at the time of building permit application, as noted on Structural Drawings.

.2 Canadian Standards Association (CSA International)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283:19, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-18, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 ASTM International Inc.

.1 ASTM C309-19, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.2 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.

.3 ASTM D1751-18, Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

1.3 QUALITY ASSURANCE

.1 Qualifications

.1 Concrete supplier to have a valid “Certificate of Ready Mixed Concrete Production Facilities” issued by the relevant Ready Mixed Concrete Association.

1.4 QUALITY CONTROL

.1 Submit in accordance with Section 01 45 00.

.2 Minimum two weeks prior to starting concrete work, provide valid certificate from plant delivering concrete.

.1 Provide test data and certification by qualified independent inspection and testing laboratory that materials and mix designs used in concrete mixture will meet specified requirements.

.3 Minimum four weeks prior to starting concrete work, provide proposed quality control procedures on following items.

.1 Hot weather concrete.

.2 Cold weather concrete.

.3 Curing.

.4 Finishing.

.5 Protection.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Batch Logs: keep record of each batch delivered to site.

.2 Concrete Delivery Slips: Keep all concrete delivery slips ("driver's tickets") on site until building is completed. Record on delivery slip where concrete was placed, including time and date.

.3 Record Drawings: Record on a set of Structural Drawings extent of each pour including pour date and falsework removal date. Also record all field changes.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Minimum 2 weeks prior to starting concrete work, submit all concrete mix designs, and indicate where each concrete mix is to be used.

.3 Minimum 2 weeks prior to placing concrete, submit drawings showing locations of all construction joints.

.4 Minimum submission requirements for each concrete mix design shall include the following:

.1 Minimum specified compressive strength at 28-day.

.2 Maximum aggregate size.

.3 Aggregate type (if not normal density).

.4 Concrete density range, wet and dry (if not normal density).

.5 CSA exposure class.

.6 Cement type (if not type GU).

.7 Percentage and type of supplemental cementing materials.

.8 Maximum water/cementitious materials ratio.

.9 Assumed method of placement of concrete.

.10 Plastic or steel fibres (type, name and quantity, if applicable).

.11 Alkali-aggregate resistance.

.12 Maximum time from batching to placing concrete (if retarding admixtures are used).

.5 Concrete pours: provide accurate records of poured concrete items indicating date and location of pour, concrete mix used, ambient air temperature and test samples taken.

.6 On completion of the works, provide written report to Departmental Representative certifying that the concrete in place meets performance requirements established in PART 2 - PRODUCTS

PART 2 PRODUCTS

2.1 DESIGN CRITERIA

.1 To CSA A23.1/A23.2, Alternative 1 – Performance, and as described under Mixes and on Structural Drawings.

2.2 PERFORMANCE CRITERIA

.1 Concrete supplier to meet the concrete performance criteria established by the Departmental Representative and to provide verification of compliance.

2.3 MATERIAL

.1 Portland Cement: to CSA A3001.

.2 Cementitious hydraulic slag: to CSA A3000.

.3 Fly ash: to CSA A3001, Type CI.

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

.5 Aggregates: to CSA A23.1/A23.2. Do not use recycled concrete as aggregate.

.6 Admixtures: not to contain chlorides.

.7 Plastic fibre additive: fibrillated polypropylene fibres at least 19mm (3/4”) in length.

.8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2. Minimum compressive strength: 40 MPa at 28 days.

.9 Non- premixed dry pack grout: composition of non-metallic aggregate and Portland cement with sufficient water for mixture to retain its shape when made into ball by hand and capable of developing compressive strength of 40 MPa at 28 days.

.10 Curing/sealing compound: to CSA A23.1/A23.2 and ASTM C309, Type 1, Class B, water based acrylic.

.11 Joint Sealants: to AST C920, class 100/50.

.12 Evaporation reducer: water based polymer liquid forming continuous monomolecular temporary film on fresh concrete surface.

.13 Crack Filler: low viscosity epoxy resin.

2.4 MIXES

.1 Use ready-mix concrete. Proportion concrete in accordance with CSA A23.1/A23.2, Alternative 1 - Performance Method for Specifying Concrete.

.2 Set performance characteristics of concrete in plastic state in coordination with all trades involved.

.3 Meet performance criteria of concrete in hardened state as shown on Structural Drawings and provide verification of compliance.

.4 Use water-reducing agent in all concrete.

.5 Do not use admixtures containing chlorides.

.6 Supplementary cementing materials (SCM):

.1 Conform to CSA A23.1/A23.2.

.2 Follow slag and fly ash manufacturers' directions for proportioning and mixing of concrete.

.3 Do not use SCM in architecturally exposed concrete.

.4 Fly ash not to exceed 15% of total cementitious material.

.5 Do not use concrete with more than 40% of SCM when ambient temperature is forecast to be below +10°C at the time of concrete pour and during the seven days after the pour, except for footings, walls and columns.

.6 Reduce W/C ratio to 0.45 where using more than 40% of SCM in concrete for slabs and other horizontal finished surfaces, in order to reduce bleed water and to increase rate or strength gain.

PART 3 EXECUTION

3.1 PREPARATION

.1 Provide minimum 24 hours notice prior to placing of concrete/closing of forms.

.2 Place concrete reinforcing in accordance with Section 03 20 00.

3.2 PLACING CONCRETE

.1 Place concrete in accordance with CSA A23.1/A23.2

.2 Delivery and place concrete with minimum re-handling.

.3 If concrete is pumped or placed pneumatically, control discharge velocity to prevent separation or scattering of concrete mix ingredients.

.4 Do not overload forms.

.5 Concrete exposed to view:

.1 Exposed surfaces to be dense, even, uniform in colour, texture and distribution of exposed aggregate.

.2 Defects such as honeycombing, voids, loss of fines, visible flow lines, cold joints or excessive bug holes may be cause for rejection at the discretion of the Departmental Representative.

.6 Maintain accurate records of poured concrete items to indicate date, location of pour, quality, air temperature and test samples taken.

3.3 FINISHING CONCRETE

.1 Finish concrete to CSA A23.1/A23.2.

.2 Cooperate with any trade applying finishes to concrete surfaces and provide surfaces which will ensure adequate bond. Provide chases and reglets where required.

.3 Finishing Flatwork:

.1 See Section 03 35 00.

.2 Protect concrete during finishing process. Use evaporation reducer during severe drying conditions.

.3 Provide final finish in accordance with proposed use and as follows:

.1 Steel trowel exposed interior concrete floors at least twice. Surface Tolerances:

.2 Concrete surface tolerance to CSA A23.1/A23.2, F-Number method.

.3 Unless otherwise noted, conform to finish tolerance Class A as defined in CSA A23.1/A23.2 Table 21 – Slab and floor finish classifications.

.4 Finishing Formed Surfaces:

.1 Completely fill holes left by through-bolts with grout.

.2 Do not patch surfaces until notified in writing by Departmental Representative.

.3 Concrete exposed to view:

.1 Provide smooth-form finish.

.2 Rub exposed sharp edges with carborundum to produce 3 mm (1/8") radius edges unless otherwise indicated.

3.4 CONCRETE CURING AND PROTECTION

.1 At a minimum cure and protect concrete in accordance with CSA A23.1/A23.2

.2 Extend curing and protection period until concrete has reached following strength levels for structural safety: 75% of specified 28-day strength.

.3 For concrete containing supplementary cementing materials, curing and protection times may need to be extended beyond those outlined by CSA A23.1/A23.2 to achieve the required structural properties.

.4 Cure slab surfaces immediately after finishing is completed. Unless otherwise noted, use a curing compound compatible with applied finishes.

.5 Concrete exposed to view:

.1 Protect during construction period from wear, damage, marking, discolouration, staining and becoming coated with concrete leakage.

.2 Unless rejected, repair damage and remove marks and stains to the approval of the Departmental Representative.

3.5 INSPECTION AND TESTING

.1 An independent Inspection and Testing Agency (certified under CSA A283 with category to suit testing provided) will be appointed by Departmental Representative to carry out inspection and testing of concrete and concrete materials and check conformance with applicable Standards and Contract documents. The cost of the inspection will be borne by the Contractor.

.2 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required. Provide concrete samples

.3 The Agency will submit reports to the Departmental Representative. Reports will include the Supplier’s mix design numbers, locations in

structure to which the tests relate and comments on abnormal results and conditions. The reports will be provided to the Departmental Representative not later than five working days after the testing is completed.

.4 Sampling, storing, curing and testing of concrete will be in accordance with CSA A23.1/A23.2.

.5 The Agency will review all submittals pertaining to concrete mix designs and certification of plant, equipment and materials.

.6 Compressive Strength Testing:

.1 One test is required for each 100 cubic meters of placed concrete, but not less than one test for each concrete mix placed each day. At least 3 tests are required for each class of concrete used.

.2 A group of three cylinders for each test will be provided, One specimens will be tested at 7 and one at 28 days. The third specimen will be tested at 56 days if the required strength at 28 days is not achieved.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 05 13 – Masonry Mortaring and Grouting

.2 Section 04 05 19 – Masonry Anchorage and Reinforcing

.3 Section 04 22 00 – Concrete Unit Masonry

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)
- .1 CSA A165 Series-14(R2019), CSA Standards on Concrete Masonry Units (Consists of A165.1, A165.2 and A165.3).
- .2 CAN/CSA-A371-14(R2019), Masonry Construction for Buildings.

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

1.3 ADMINISTRATIVE REQUIREMENTS

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

.2 Sequencing: sequence with other work in accordance with Section 01 32 16. Comply with manufacturer's written recommendations for sequencing construction operations.

.3 Scheduling: schedule with other work in accordance with Section 01 32 16.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for masonry and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29 and Section 01 35 43.

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

.4 Samples:
.1 Provide samples as follows:
.1 6 of each type of concrete masonry unit specified, including special shapes, supplemented with specific requirements in Sections.
.2 2 of each type of masonry anchorage, reinforcement and connector proposed for use, supplemented by specific requirements in Section 04 05 19.
.3 Samples: used for testing and when accepted become standard for material used.

.5 Test and Evaluation Reports:
.1 Submit certified test reports in accordance with Section 01 33 00 and 01 45 00.
.2 Test reports to certify compliance of masonry units and mortar ingredients with specified performance characteristics and physical properties.
.3 Submit data for masonry units, in addition to requirements set out in referenced CSA Standards, indicating initial rates of absorption.

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

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

1.5 CLOSEOUT SUBMITTALS

.1 Submit manufacturer's instructions for care, cleaning and maintenance of prefaced masonry units for incorporation into manual specified in Section 01 77 00.

1.6 QUALITY ASSURANCE

.1 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00.
.2 Construct mock-up panel of interior masonry wall construction 1200 x 1800 mm showing masonry colours and textures, use of reinforcement, ties, jointing, pointing, coursing, mortar and quality of work.
.3 Mock-up used:

.1 To judge quality of work, substrate preparation, operation of equipment and material application.
.2 For testing to determine compliance with performance requirements. Perform following tests.

.4 Construct mock-up where directed by Departmental Representative.
.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with work.
.6 When accepted by Departmental Representative, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.
.7 Start work only upon receipt of written approval mock-up by Departmental Representative.

1.7 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.4 Packaging Waste Management: remove for reuse by manufacturer of pallets, crates, padding and packaging materials as specified in Section 01 74 20.

1.8 SITE CONDITIONS

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

.2 Interior requirements:
.1 To CAN/CSA-A371 with following requirements.

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

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Masonry materials are specified elsewhere in related Sections:
- .1 Section 04 05 13 Masonry Mortar and Grout.
- .2 Section 04 05 19 Masonry Anchorage and Reinforcing.
- .3 Section 04 22 00 Concrete Unit Masonry.

PART 3 - EXECUTION

3.1 INSTALLERS

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

3.2 EXAMINATION

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

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

.3 Verification of Conditions:
- .1 Verify that:
  - .1 Substrate conditions which have been previously installed under other sections or contracts, are acceptable for product installation in accordance with manufacturer's instructions prior to installation of concrete block.
  - .2 Field conditions are acceptable and are ready to receive work.
  - .3 Built-in items are in proper location, and ready for roughing into masonry work.
- .2 Commencing installation means acceptance of existing substrate.

3.3 PREPARATION

.1 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations and co-ordinate with Section 01 71 00.

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

.3 Protect adjacent materials from damage and disfiguration.

3.4 INSTALLATION

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

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

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

3.5 CONSTRUCTION

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

.2 Jointing:
- .1 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

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

.4 Building-In:
- .1 Build in items required to be built into masonry.
- .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Provision for movement:
- .1 Leave 3 mm space below shelf angles.
- .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
- .3 Built masonry to tie in with stabilizers, with provisions for vertical movement.

.6 Loose steel lintels:
- .1 Install loose steel lintels. Center over opening width.

.7 Control joints:

- .1 Construct continuous control joints as indicated.

.8 Movement joints:

.1 Build-in continuous movement joints as indicated.

.9 Interface with other work:
.1 Cut openings in existing work as indicated.
.2 Openings in walls: approved by Departmental Representative.
.3 Make good existing work. Use materials to match existing.

3.6 SITE TOLERANCES

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

3.7 FIELD QUALITY CONTROL

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

.2 Manufacturer's Services:
.1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, and protection of its products, and submit written reports in acceptable format to verify compliance of work with Contract.
.2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.

.3 Schedule site visits to review work at stages listed:
.1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.
.2 Twice during progress of work at 25% and 60% complete.
.3 Upon completion of work, after cleaning is carried out.
.4 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
.1 Leave Work area clean at end of each day.

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

3.9 PROTECTION

.1 Temporary Bracing:
  .1 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.
  .2 Bracing approved by Departmental Representative.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 04 05 00 – Common Work Results for Masonry
.2 Section 04 05 13 – Masonry Mortaring and Grouting
.3 Section 04 22 00 – Concrete Unit Masonry

1.2 REFERENCE STANDARDS

.1 CSA Group (CSA)

.1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.

.2 CAN/CSA-A179-14(R2019), Mortar and Grout for Unit Masonry.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for masonry mortar and grout and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS SDS in accordance with Section 01 35 29 and 01 35 43. Indicate VOC's mortar, grout, parging, colour additives and admixtures. Expressed as grams per litre (g/L).

.3 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 45 00 and requirements of Section 04 05 00.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect masonry mortar and grout packages from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 10 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Mortar and grout: in compliance with CAN/CSA-A179.

.3 Mortar: Type S, proportioned by volume.

.4 Grout: proportioned by volume - coarse grout, 1:3:2 - cement: sand: max 9.5 (3/8”) aggregate, or fine grout, 1:3 – cement: sand, or approved pre-bagged material

.5 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.

.6 Non-staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.

2.2 GROUT

.1 Grout to CAN/CSA-A179, Table 3.

.2 Colour: natural grey.

.3 Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with CAN/CSA-A179 for dimensions of grout spaces and pour height.

2.4 MORTAR MIXES

.1 Pointing Mortar: CAN/CSA-A179, Type S using property specification with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

.2 Stain Resistant Pointing Mortar: one part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate to 2 percent of Portland cement by weight.

2.5 MORTAR MIXING

.1 Mix mortar ingredients in accordance with CAN/CSA-A179 in quantities needed for immediate use.

.2 Maintain sand uniformly damp immediately before mixing process.

.3 Add mortar colour and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and colouration.

.4 Using anti-freeze compounds including calcium chloride or chloride based compounds is prohibited.

.5 Adding air entraining admixture to mortar mix is prohibited.

.6 Use a batch type mixer in accordance with CAN/CSA-A179.

.7 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour no more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

.8 Re-temper mortar only within two hours of mixing, when water is lost by evaporation.

.9 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 10 degrees C.

2.6 GROUT MIXES

.1 Grout: Minimum compressive strength of 12.5 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA-A179.

2.7 GROUT MIXING

.1 Mix batched and delivered grout in accordance with CSA A23.1/A23.2 transit mixed.

.2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA-A179, coarse grout.

.3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.

.4 Using calcium chloride or chloride based admixtures is prohibited.

2.8 MIX TESTS

.1 Testing Mortar Mix:

.1 Test mortar to requirements of Section 01 45 00, and in accordance with CAN/CSA-A179, for proportion specification. Test prior to construction and during construction for:

.1 Compressive strength.

.2 Consistency.

.3 Mortar aggregate ratio.

.4 Sand/cement ratio.

.5 Water content and water/cement ratio.

.6 Air content.

.7 Splitting tensile strength.

.2 Testing Grout Mix:

.1 Test grout to requirements of Section 01 45 00, and in accordance with CAN/CSA-A179, for proportion specification. Test prior to construction and during construction for:

.1 Compressive strength.

.2 Sand/cement ratio.

.3 Water content and water/cement ratio.

.4 Slump.

PART 3 - EXECUTION

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 PREPARATION

.1 Apply bonding agent to existing surfaces.

.2 Plug clean-out holes with block masonry units. Brace masonry for wet grout pressure.

3.3 CONSTRUCTION

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

3.4 MIXING

.1 Pointing mortar can be mixed using a regular paddle mixer. Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes. Mixing by hand is not permitted.

.2 Clean mixing boards and mechanical mixing machine between batches.

.3 Mortar: weaker than units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In event that this individual is changed, mortar mixing must cease until new individual is trained, and mortar mix is tested.

3.5 MORTAR PLACEMENT

.1 Install mortar to manufacturer's instructions.

.2 Install mortar to requirements of CAN/CSA-A179.

.3 Remove excess mortar from grout spaces.

3.6 GROUT PLACEMENT

.1 Install grout in accordance with manufacturer's instructions.

.2 Install grout in accordance with CAN/CSA-A179.

.3 Work grout into masonry cores and cavities to eliminate voids.

.4 Installing grout in lifts greater than 400 mm, without consolidating grout by rodding is prohibited.

.5 Displacing reinforcement while placing grout is prohibited.

3.7 FIELD QUALITY CONTROL

.1 Site Tests, Inspection: in accordance with Section 04 05 00 supplemented as follows:

.1 Test and evaluate mortar prior to construction in accordance with CAN/CSA-A179.

.2 Test and evaluate grout prior to construction to CAN/CSA-A179; test in conjunction with masonry unit sections specified.

.2 Manufacturer's Field Services: in accordance with Section 04 05 00.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.1 Leave Work area clean at end of each day.

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

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

.5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

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

.2 Section 04 05 13 – Masonry Mortaring and Grouting

.3 Section 04 22 00 – Concrete Unit Masonry

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA)
- .1 CSA A23.1:19/A23.2:19, Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete.
- .2 CAN/CSA-A179-14(R2019), Mortar and Grout for Unit Masonry.
- .3 CSA-A370-14(R2018), Connectors for Masonry.
- .4 CAN/CSA-A371-14(R2019), Masonry Construction for Buildings.
- .5 CSA S304-14(R2019), Design of Masonry Structures.
- .6 CSA W186:21, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.2 National Building Code of Canada (NBC) 2015.

.3 Reinforcing Steel Institute of Canada (RSIC)
- .1 Reinforcing Steel Manual of Standard Practice, 2004.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for anchorage and reinforcing materials and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two 2 copies of WHMIS SDS in accordance with Section 01 35 29 and 01 35 43.

.3 Shop Drawings:
- .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
- .2 Submit drawings detailing bar bending details, anchorage details, lists and placement drawings
- .3 On placement drawings, indicate sizes, spacing, location and quantities of reinforcement and connectors.

.4 Manufacturers' Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 and requirements of Section 04 05 00.

1.5 SITE MEASUREMENTS

.1 Make site measurements necessary for proper fit of members.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect anchorage and reinforcing materials from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Refer to Structural drawings for all masonry anchorage and reinforcement along with details.

2.2 FABRICATION

.1 Fabricate reinforcing in accordance with CSA A23.1/A23.2 and Reinforcing Steel Manual of Standard Practice by Reinforcing Steel Institute of Canada.

.2 Fabricate connectors in accordance with CSA-A370.

.3 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on placing drawings.

.4 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.5 Ship reinforcement and connectors clearly identified in accordance with drawings.

2.3 SOURCE QUALITY CONTROL

.1 Provide Departmental Representative with certified copy of mill test report of reinforcement steel and connectors, showing physical and chemical analysis, minimum five 5 weeks prior to commencing reinforcement work.

.2 Inform Departmental Representative of proposed source of supplied material.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for anchorage and reinforcing materials installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Direct and coordinate placement of metal anchors for masonry supplied to other Sections.

3.3 INSTALLATION

.1 Supply and install masonry connectors and reinforcement in accordance with CAN/CSA-A370, CAN/CSA-A371, CSA A23.1/A23.2 and CSA S304.1 unless indicated otherwise.

.2 Prior to placing mortar and grout, obtain Departmental Representative's approval of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

3.4 BONDING AND TYING

.1 Tie masonry veneer to backing in accordance with National Building Code of Canada (NBC), CSA S304.1, CAN/CSA-A371 and as indicated.

.2 Install unit, adjustable, single wythe and multiple wythe joint reinforcement where indicated and in accordance with CAN/CSA-A370 and CAN/CSA-A371.
- .1 Bond walls of two or more wythes using metal connectors in accordance

with CAN/CSA-A371 and as indicated.

.2 Install horizontal joint reinforcement 400 mm on centre.

.3 Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 400 mm each side of opening.

.4 Place joint reinforcement continuous in first and second joint below top of walls.

.5 Lap joint reinforcement ends minimum 150 mm.

.6 Connect stack bonded unit joint corners and intersections with strap anchors 400 mm on centre.

3.5 REINFORCED LINTELS AND BOND BEAMS

.1 Reinforce masonry beams, masonry lintels and bond beams as indicated.

.2 Place and grout reinforcement in accordance with CSA S304.1, CAN/CSA-A371, and CAN/CSA-A179.

.3 Support and position reinforcing bars in accordance with CAN/CSA-A371.

3.6 GROUTING

.1 Grout masonry in accordance with CSA S304.1, CAN/CSA-A371 and CAN/CSA-A179 and as indicated.

3.7 ANCHORS

.1 Supply and install metal anchors in accordance with CAN/CSA-A370 and CAN/CSA-A371 as indicated.

3.8 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA S304.1 and as indicated.

3.9 MOVEMENT JOINTS

.1 Reinforcement not continuous across movement joints unless otherwise indicated.

3.10 FIELD BENDING

.1 Do not field bend reinforcement and connectors except where indicated or authorized by Departmental Representative.

.2 When field bending authorized, bend without heat, applying slow and steady pressure.

.3 Replace bars and connectors with cracks or splits.

3.11 FIELD QUALITY CONTROL

.1 Site inspections in accordance with Section 04 05 00.

.2 Obtain Departmental Representative approval of placement of reinforcement and connectors, prior to placing mortar and grout.

3.12 FIELD TOUCH-UP

.1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel and connectors with compatible finish to provide continuous coating.

3.13 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
.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.

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

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

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

.2 Section 04 05 13 – Masonry Mortaring and Grouting

.3 Section 04 05 19 – Masonry Anchorage and Reinforcing

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)
- .1 ASTM E336-20, Standard Test Method for Measurement of Airborne Sound Attenuation Between Rooms in Buildings.

.2 CSA Group (CSA)
- .1 CSA A165 Series-14(R2019), CSA Standards on Concrete Masonry Units (consists: A165.1, A165.2, A165.3).
- .2 CAN/CSA-A179-14(R2019), Mortar and Grout for Masonry.
- .3 CAN/CSA-A371-14(R2019), Masonry Construction for Buildings.
- .4 CSA S304-14(R2019), Design of Masonry Structures.

.3 South Coast Air Quality Management District (SCAQMD)
- .1 SCAQMD Rule 1168-A2017, Adhesive and Sealant Applications.

.4 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S101-14-REV1, Standard1 Methods of Fire Endurance Tests of Building Construction and Materials.

.5 National Building Code (NBC) 2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports including sand gradation tests in accordance with CAN/CSA-A179 showing compliance with specified performance characteristics and physical properties, and in accordance with Section 04 05 00.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Mock-ups:
.1 Construct mock-ups in accordance with Section 01 45 00 and requirements of Section 04 05 00 supplemented as follows:
.1 Construct mock-up panel of interior concrete unit masonry construction 1200 x 1800 mm.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
.1 Offload concrete unit masonry packages using equipment that will not damage the surfaces.
.2 Do not use brick tongs to move or handle masonry.

.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 Do not double stack cubes of concrete unit masonry.
.3 Cover masonry units with non-staining waterproof membrane covering.
.4 Allow air circulation around units.
.5 Installation of wet or stained masonry units is prohibited.
.6 Keep concrete unit masonry in individual cardboard packaging provided by manufacturer until units are ready to be installed.
.7 Store and protect concrete unit masonry from nicks, scratches, and blemishes.
.8 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Special fire-resistant concrete block units - one (1) hour fire-resistance rating: to CSA-A165 Series:

.1 Classification: H/15/A/M except as modified by fire resistance requirements specified below.
.2 Fire resistant characteristics: aggregate used in units and equivalent thickness of units to the National Building Code of Canada, and in accordance with CAN/ULC-S101, for fire-resistance ratings indicated.
.3 Dimensions Nominal:
.1 190 mm wide x 200 mm high x 400 mm long.
.2 140 mm wide x 200 mm high x 400 mm long.
.4 Existing Narrow Nominal: 140 mm wide x 200 mm high x 400 mm long

.5 Special shapes: provide bull- nosed units for exposed corners. Provide purpose-made shapes for lintels and bond beams. Provide additional shapes as indicated.

2.2 REINFORCEMENT

.1 Reinforcement in accordance with Section 04 05 19.

2.3 CONNECTORS

.1 Connectors in accordance with Section 04 05 19.

2.4 MORTAR MIXES

.1 Mortar and mortar mixes in accordance with Section 04 05 13.

2.5 GROUT MIXES

.1 Grout and grout mixes in accordance with Section 04 05 13.

2.6 CLEANING COMPOUNDS

.1 Use low VOC products in compliance with SCAQMD Rule 1168.

.2 Compatible with substrate and acceptable to masonry manufacturer for use on products.

.3 Cleaning compounds compatible with concrete unit masonry and in accordance with manufacturer's written recommendations and instructions.

2.7 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CSA A165.1, supplemented as follows:
- .1 Maximum variation between units within specific job lot not to exceed 2 mm.
- .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
- .3 Out of square tolerance not to exceed 2 mm.

.2 Tolerances for architectural concrete masonry units in accordance with CSA A165.1, supplemented as follows:
- .1 Maximum variation in length or height between units within specific job lot for specified dimension not to exceed 2 mm.
- .2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.
- .3 Out of square tolerance not to exceed 2 mm.
- .4 Maximum variation in width between units within specific job lot for specified dimension not to exceed 2 mm.

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 concrete unit masonry installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Departmental Representative.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.3 INSTALLATION

.1 Concrete block units:
- .1 Bond: running.
- .2 Coursing height: 200 mm for one block and one joint.
- .3 Jointing: flush where exposed or where paint or other finish coating is specified.

.2 Special Shapes:
- .1 Install special units to form corners, returns, offsets, reveals and indents without cut ends being exposed and without losing bond or module.
- .2 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
- .3 End bearing: not less than 200 mm.

3.4 REINFORCEMENT

.1 Install reinforcing in accordance with Section 04 05 19.

3.5 CONNECTORS

.1 Install connectors in accordance with Section 04 05 19.

3.6 MORTAR PLACEMENT

.1 Place mortar in accordance with Section 04 05 13.

3.7 GROUT PLACEMENT

.1 Place grout in accordance with Section 04 05 13.

3.8 CONSTRUCTION

.1 Cull out masonry units, in accordance with CSA A165 and range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.

.2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.

.3 Construct masonry walls using running bond unless otherwise noted.

.4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.

.6 Install movement joints and keep free of mortar where indicated.

.7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.8 Ensure compacted head joints. Use full or face-shell joint as indicated.

.9 Tamp units firmly into place.

.10 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.

.11 After mortar has achieved initial set up, tool joints.

.12 Do not interrupt bond below or above openings.

.13 Provide minimum 25 mm deflection gap at top of all non-load bearing masonry partition walls. Refer to structural drawings and details for lateral support at the top of all masonry partition walls.

3.9 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.10 FIELD QUALITY CONTROL

.1 Site Tests, Inspection: in accordance with Section 04 05 00 supplemented as follows:
  .1 Concrete masonry units will be sampled and tested by independent testing agency appointed and paid by Departmental Representative in accordance with CSA S304.1.
  .2 Notify inspection agency minimum of twenty-four (24) hours in advance of requirement for tests.

.2 Manufacturer's Field Services: in accordance with Section 04 05 00.

3.11 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
  .1 Leave Work area clean at end of each day.
  .2 Standard Concrete Unit Masonry:
    .1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

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

3.12 PROTECTION

.1 Brace and protect concrete unit masonry in accordance with Section 04 05 00.

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 05 50 00: Metal Fabrications.

.2 Section 03 30 00: Cast in Place Concrete.

1.2 REFERENCES

.1 All referenced standards to be the current edition or the edition referenced by the applicable Building Code in force at the time of building permit application, as noted on Structural Drawings.

.2 Canadian Standards Association (CSA International)

.1 CSA G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA S16:19, Limit States Design of Steel Structures.

.3 CSA W47.1:19, Certification of Companies for Fusion Welding of Steel.

.4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.

.5 CSA W55.3-08(R2018), Certification of Companies for Resistance Welding of Steel and Aluminum.

.6 CSA W59.2-18, Welded Steel Construction (Metal Arc Welding).

.7 CSA W186:21, Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 ASTM International Inc.

.1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot Dip Galvanized) coating on Iron and Steel Products.

.2 ASTM A36/A36M-19, Standard Specification for Carbon Structural Steel.

.3 ASTM F3125/F3125M-19E2, Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPA) Minimum Tensile Strength, Inch and Metric dimensions

.4 ASTM A500/A500M-21, Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

.5 ASTM A53/A53M-20, Standard Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated, Welded and Seamless

.6 ASTM A1011/A1011M-18A, Standard Specifications for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability and Ultra High Strength.

.7 ASTM A1085/A1085M-15, Standard Specification for Cold Formed Welded Carbon Steel Hollow Structural Sections (HSS)

.8 ASTM A992/A992M-20, Standard Specifications for Structural Steel Shapes.

.9 ASTM F1554-20, Standard Specification for Anchor Bolts, Steel 36, 55 and 105 ksi Yield Strength.

.4 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA)

.1 CISC Handbook of Steel Construction.

.2 CISC/CPMA Standard 1-73a, A Quick-drying One-coat Paint for Use on Structural Steel.

.3 CISC/CPMA Standard 2-75, Quick-drying Primer for Use on Structural Steel.

.4 CISC Code of Standard Practice, Appendix I, Architecturally Exposed Structural Steel (AESS).

.5 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

.1 SSPC-SP 1, Solvent Cleaning.

.2 NACE No. 3 / SSPC-SP 6, Commercial Blast Cleaning.

.3 NACE No.4 / SSPC-SP 7, Brush Off Blast Cleaning.

.4 NACE No.2 / SSPC-SP 10, Near White Blast Cleaning.

.5 SSPC Technology Guide No.14 – Guide for the Repair of Imperfections in Galvanized, Organic or Inorganic Zinc-Coated Steel Using Organic Zinc Rich Coating.

.6 SSPC Paint Specification No. 20 – Zinc Rich Coating, Type I – Inorganic and Type II - Organic.

1.3 QUALITY ASSURANCE

.1 Qualifications

.1 Structural steel fabricator to be a member of the Canadian Institute of Steel Construction and to have at least five years experience with structural steel for buildings.

.2 Structural steel fabricator and erector to be certified by the Canadian Welding Bureau under the requirements of CSA W47.1, Division 1 or 2 for fusion welding and/or CSA W55.3 for resistance welding of structural steel components, and to have CWB approved procedure for welding rebar (Grade 400W) to structural steel.

.3 Welders to be CWB approved, working under supervision of a CWB approved firm.

.4 Engage a Professional Engineer licensed in the place where the project is located to be responsible for design, detailing and installation of all connections related to structural steel work.

1.4 QUALITY CONTROL

.1 Submit in accordance with Section 01 45 00.

.2 Source Quality Control Submittals:

.1 Provide all submittals 4 weeks prior to starting fabrication of structural steel.

.1 materials or products to which they pertain

.3 Tolerances

.1 Conform to the fabrication and erection tolerances of CSA S16.

.2 Comply with more stringent tolerances if specified elsewhere to suit interfacing materials or AESS members.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Provide drawings stamped and signed by the Professional Engineer responsible for steel connections.

.2 Before submitting shop drawings, provide a letter signed and sealed by that Engineer stating that he has been engaged to undertake the responsibility for the above. Also submit a copy of that Engineer's Certificate of Authorization, and proof of his liability insurance.

.3 If additional information is required from DEPARTMENTAL REPRESENTATIVE, allow a minimum of five working days for Departmental Representative to review and respond to the request for information.

.4 It is advisable to submit erection diagrams for review before preparing shop details. Copies of plans and section details developed by Departmental Representative will not be accepted as erection diagrams.

.3 Erection drawings:

.1 Submit erection drawings indicating details and information necessary for assembly and erection purposes including:

.1 Description of erection methods.

.2 Sequence of erection.

.3 Temporary bracings.

.4 member sizes (in addition to beam marks).

.5 Connections where threads must be excluded from shear plane.

.6 Details of all field welded connections

.4 Fabrication drawings:

.1 Submit fabrication drawings showing designed assemblies, member sizes, components and connections. Show on drawings:

.1 Material specifications.

.2 Surface preparation.

.3 Shop painting / galvanizing.

.4 Section splices.

.5 Types of shop and field connections.

.6 Net weld lengths.

.7 Precautions which will be taken to exclude threads from shear planes of bearing type bolted connections (where applicable).

.8 Vent holes required for galvanizing process.

.9 Camber.

.10 Architectural clearance lines and finishes where connections could encroach other works.

.5 When requested, submit sketches and design calculations stamped and signed by the Professional Engineer responsible for connection design.

.6 On completion of erection, submit a letter signed and sealed by the Professional Engineer responsible for structural steel connections certifying that the work has been completed in accordance with all contract documents

PART 2 Products

2.1 DESIGN AND DETAILING REQUIREMENTS

.1 Design details and connections in accordance with requirements of CSA S16 to resist forces and to allow for movements indicated. Consider load effects due to fabrication, erection and handling.

.2 Connection design to include consideration of all pass-through forces, including tension, compression, moment and shear. Provide local reinforcement at connection or joint as required.

.3 Follow conceptual connection details if shown on structural drawings. Do not change without Departmental Representative written approval. If welds are defined on drawings, the sizes shown are minimum requirements which might need to be increased to suit connection design.

.4 Increase specified section thickness at no extra cost if required for fabrication (bending) or galvanizing. Alternatively, build up curved sections from plates.

.5 Assume that bolt threads are intercepted by shear plane, unless special measures are indicated on shop drawings to exclude threads from shear plane.

.6 Moment connections:

.1 Provide moment connections at splices to maintain continuity of cranked beams. Provide header plates or stiffener plates to resist unbalanced flange forces at splices.

.2 Where moment connections are called for but values are not indicated, design for moment capacity of the smaller member in the connection.

.7 Holes:

.1 Provide vent holes in HSS sections where required for galvanizing process. Locate so that any water inside HSS will drain away when HSS is in its final position. Maximum size – 16 mm (5/8″) diameter. Fill holes with vent hole plugs after galvanizing.

.8 Do not oversize anchor rod holes for site tolerances. Use hole sizes suggested in the CISC Handbook of Steel Construction.

2.2 MATERIALS

.1 Structural steel:

.1 Rolled shapes: to CSA G40.20/G40.21 or ASTM A992/A992M, refer to drawings.

.2 Hollow structural sections: to ASTM A500/A500M, ASTM A1085 or CSA G40.20/G40.21, refer to drawings.

.2 Anchor rods: CSA G40.20/G40.21 refer to drawings.

.3 Bolts, nuts and washers: to ASTM F3125/F3125M, grade A325.

.4 Welding materials: to CSA W48 and CSA W59.2, certified by Canadian Welding Bureau.

2.3 FABRICATION

.1 Fabricate structural steel in accordance with CSA S16 and with reviewed shop drawings.

.2 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left unpainted, place marking at locations not visible from exterior.

.3 Match marking: shop mark bearing assemblies and splices for fit and match.

2.4 SHOP PAINTING

.1 Clean all members to SSPC-SP 1 – Solvent Cleaning, Remove loose mill scale, rust, oil, dirt and foreign matter using any suitable method.

.2 In addition for members receiving shop primer paint: Clean steel to SSPC-SP 7 Brush-Off Blast Cleaning.

.3 In addition for members receiving intumescent coating: Clean steel to SSPC-SP 6 Commercial Blast Cleaning

.4 In addition for members receiving zinc rich coating: Clean steel to SSPC-SP 10 Near White Blast Cleaning.

.5 Apply one coat of shop paint CISC/CPMA 1 to steelwork in the shop with the exception of:

.1 Surfaces and edges to be field welded for a distance of 50 mm (2") from joints.

.6 Apply one coat of compatible primer paint (CISC/CPMA 2) in the shop to steelwork to receive a finish coat of paint on site.

.7 If more than one type of paint is specified, each paint to be visually identifiable after application.

.8 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5°C.

.9 Maintain dry condition and 5°C minimum temperature until paint is thoroughly dry.

.10 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

PART 3 EXECUTION

3.1 GENERAL

.1 Structural steel work: in accordance with CSA S16.

.2 Welding: in accordance with CSA W59.2-18.

3.2 ERECTION

.1 Erect structural steel in accordance with CSA S16 and reviewed erection drawings.

.2 Do not field cut or alter any members without Departmental Representative approval.

.3 Install bolts which are not pre-tensioned to be snug tight.

.4 Where slotted connections are shown on structural drawings, finger tighten bolts to a snug fit and burr threads to prevent nuts from working loose.

.5 Report ill fitting connections to Departmental Representative before taking corrective measures.

.6 When welding after galvanizing is in place, grind away galvanizing at areas to be welded.

.7 Do not weld in an ambient temperature below 17°C. Preheat material adjacent to welding areas when ambient temperature is between 17°C and +4°C.

.8 Remove slag from all completed welds so that they may be visually inspected.

.9 Seal members by continuous welds where indicated.

.10 Remove field connection aids from all surfaces which will be exposed to view and where interfering with clearances required by other trades.

3.3 FIELD PAINTING

.1 Touch up damaged surfaces with the same paint as the shop coat.

.2 Repair any galvanized or zinc rich painted surfaces which have been damaged or field welded in accordance with SSPC Technology Guide No.14.

.3 Clean and prepare surfaces of bolts, which will receive a finished coat of paint in the same manner as the connected steelwork.

3.4 INSPECTION AND TESTING

.1 An Inspection and Testing Agency (certified to CSA W178.1 & CSA W178.2) will be appointed to carry inspection and testing of all structural steel.

.2 Do not commence fabrication until details of inspection have been worked out with the Agency.

.3 Assist the Inspection and Testing Agency in its work. Notify as to the Work Schedule and provide safe access to the work area as required.

.4 The Inspection Agency will submit reports to Departmental Representative and Contractor covering the Work inspected and provide details of errors or deficiencies observed.

.5 Work will be inspected in shop and when erected. Store fabricated members in shop so that they are accessible for inspection.

.6 Provide Inspection and Testing Agency with a copy of reviewed shop drawings.

.7 Welding inspection:

.1 Welding inspection will be conducted in shop and in field.

.2 The Inspector will check welders' CWB certification.

.3 The Inspector will review welding procedures for conformance with CWB requirements, manufacturers' requirements and standard practice.

.4 Arrange for the Inspector to be present during welding of 10% of moment connections and 10% of butt welds in direct tension.

.5 The inspector will visually check all butt welds (including cranks and splices), all welds in moment connections, and 20% of all other welds for:

.1 Size, length and profile

.2 Joint preparation, including cleaning and removal of any paint.

.3 Fit up and alignment.

.4 Penetration and fusion.

.5 Slag removal.

.6 Distortion.

.7 Porosity.

.8 Cracks.

.6 Non-destructive testing will be conducted on the following connections:

.1 All shop and field welded splices.

.7 Test results will be evaluated in accordance with CSA W59.2.

.8 Shop inspection will include:

.1 Confirming that all materials meet specifications.

.2 Reviewing mill test reports for conformance with specified material grades.

.3 Checking that mill test reports and producer's certificates are properly correlated to materials and products supplied for the project and that legible markings were made on the material and products by the producers in accordance with the applicable standards. Where this is not possible, Departmental Representative may request sample testing to be carried out as described below.

.4 Checking fabricator's qualification under the requirement of CSA W47.

.5 Sampling fabrication procedures for general conformity with Contract requirements.

.6 Reviewing cambering procedure for effect on member capacity.

.7 Checking surface preparation for members to be painted.

.8 Checking shop painting and galvanizing.

.9 General checking:

.1 Dimensions and cross sections in relation to specified member sizes.

.2 Locations of all holes, cuts and fittings.

.3 Reinforcement of openings.

.4 Milling of ends for bearing.

.5 Base plate orientation.

.6 Fabrication tolerances.

.7 Splicing (where indicated on drawings).

.8 Surface preparation prior to shop painting.

.10 Sample testing: When requested, test coupons will be taken and tested in accordance with CSA G40.20/G40.21 to establish identification. Cut samples from member locations selected by Departmental Representative and provide to the Inspection and Testing Agency. Make good the locations if requested, at no extra cost, by adding new plates and welds as directed by Departmental Representative. The Agency will have the samples tested for mechanical properties and for chemical composition and will classify the steel as to specification.

.9 Field inspection:

.1 Arrange for the Inspector to start field inspection as soon as each section of the Work is completed, plumbed, bolts tightened and field welding finished.

.2 The Inspector will sample erection procedures for general conformity with Contract requirements.

.3 The Inspector will check general fit-up and tolerances and report any apparent distortions and misalignments.

.4 Field inspection will include:

.1 Checking individual frame members for twisting, sweep and local damage.

.2 Checking levelness of leveling plates.

.3 Inspection of grouting under base plates and bearing plates.

.4 Checking bearings on steel and masonry.

.5 Inspection of post installed anchors as described below.

.6 Inspection of approved field cutting and reinforcing around openings.

.7 Inspection of field painting.

.8 Inspection of field touch-up.

.5 Post installed anchor inspection:

.1 The Inspector will sample check drilled concrete and masonry anchors.

.2 The Inspector will provide full time inspection during installation of post installed adhesive anchors subject to sustained tension loads.

.3 The Inspector will randomly select and pull test 5% of all types and sizes of post installed anchors installed on a weekly basis, but not less than one anchor of each type, size and orientation. Pull test to twice the allowable tensile load, or 1.5 times the factored resistance of the anchor given by the manufacturer. Chose anchor locations where proximity to concrete edge does not affect anchor capacity, or use reduced anchor loads per manufacturer’s recommendation. Submit reports

to Departmental Representative within one week of testing. Reports to indicate each anchor location, test load and mode of failure, if applicable. Notify Departmental Representative immediately if any anchor fails the pull test.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 21 13 – Board Insulation

.2 Section 07 92 00 – Joint Sealants

.3 Section 09 91 00 - Painting

1.2 REFERENCE STANDARDS

.1 ASTM International (ASTM)
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A240/A240M-20a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- .3 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- .4 ASTM C533-17, Standard Specification for Calcium Silicate Block and Pipe Thermal Insulation
- .5 ASTM E84-21, Standard Test Method for Surface Burning Characteristics of Building Materials
- .6 ASTM E136-19a, Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C.

.2 CSA International (CSA)
- .1 CSA G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding.
- .3 CSA W59-18, Welded Steel Construction (Metal Arc Welding).

.3 Green Seal Environmental Standards (GS)
- .1 GS-11-2015, Edition 3.2, Paints and Coatings.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Safety Data Sheets (SDS).

.5 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - 2020 plus amendments.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, tubing and bolts and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS SDS.
  - .1 For finishes, coatings, primers, and paints applied on site:

indicate VOC concentration in g/L.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Steel sections and plates: to CSA G40.20/G40.21, Grade 350W, minimum 30% recycled content.

.2 Welding materials: to CSA W59.

.3 Welding electrodes: to CSA W48 Series.

.4 Bolts and anchor bolts: to ASTM A307.

.5 Stainless Steel Sheet: ASTM A240/A240M, Type 304 or 316 alloy.
.1 Finish: Unless otherwise indicated, AISI No. 4 Brushed Finish.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with

joints closely fitted and properly secured.

.2 Use flat headed security screws on items requiring assembly by screws or as indicated.

.3 Where possible, fit and shop assemble work, ready for erection.

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

2.3 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m², Coating Grade 85, to ASTM A123/A123M.

.2 Shop coat primer: in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

.3 Zinc primer: zinc rich, ready mix to MPI-EXT 5.2C in accordance with chemical component limits and restrictions requirements and VOC limits of GS-11.

2.4 ISOLATION COATING

.1 Isolate aluminum from following components, by means of bituminous paint:
.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
.2 Concrete, mortar and masonry.
.3 Wood.

2.5 SHOP PAINTING

.1 Primer: VOC limit 250 g/L maximum to GS-11.

.2 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

.3 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7 degrees C.

.4 Clean surfaces to be field welded; do not paint.

2.6 ACCESSORIES

.1 Calcium Silicate Block Insulation: Size to suit cavity between window, bars and metal panel. Type 1A Water resistant non-combustible insulation to ASTM E136 and ASTM C533. Heat resistance to 650 degrees C as per ASTM C447. Fame and Smoke rating of 0/0 to ASTM E84.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal

fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION - GENERAL

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

.6 Provide calcium silicate board insulation for infill between existing windows and new metal plate cover. Tight fit insulation in space prior to welding, see drawings for additional details.

.7 Weld field connection.

.8 Deliver items over for casting into concrete and building into masonry together with setting templates to appropriate location and construction personnel.

.9 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
.1 Primer: maximum VOC limit 250 g/L to GS-11.

.10 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.
.1 Primer: maximum VOC limit 250 g/L to GS-11.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 07 92 00 – Joint Sealants

1.2 REFERENCE STANDARDS

.1 ASTM International
  .1 ASTM F1667-18a, Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.2 CSA International
  .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
  .2 CSA O121-17, Douglas Fir Plywood.
  .3 CSA O141-05(R2019), Softwood Lumber.
  .4 CSA O151-17, Canadian Softwood Plywood.
  .5 CAN/CSA-Z809-16, Sustainable Forest Management
  .6 CAN/CSA-G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 Forest Stewardship Council (FSC)
  .1 FSC Accredited Certified Bodies.

.4 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
  .1 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

.5 Sustainable Forestry Initiative (SFI).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

.3 Shop Drawings:
  .1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

1.4 QUALITY ASSURANCE

.1 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood, particleboard, OSB and wood based composite panels in accordance with CSA standards.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

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

PART 2 - PRODUCTS

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% in accordance with following standards:
.1 CSA O141.
.2 NLGA Standard Grading Rules for Canadian Lumber.
.3 CAN/CSA-Z809 or FSC or SFI certified.

.2 Furring, blocking, nailing strips, grounds, rough bucks, fascia backing and sleepers:

.1 S2S is acceptable for

.2 Board sizes: "Standard" or better grade.

.3 Dimension sizes: "Standard" light framing or better grade.

.4 Post and timbers sizes: "Standard" or better grade.

.3 Panel Materials:

.1 Douglas fir plywood: to CSA O121, standard construction.

.2 Canadian softwood plywood: to CSA O151, standard construction.

.3 Fire retardant Canadian Softwood Plywood to CSA O151.

.4 Use pressure treated lumber materials when in contact with concrete, window framing or roof related work.

.5 Electrical equipment mounting boards: Fire Resistant Plywood, DFP grade, square edge 15.9 mm thick.

2.2 ACCESSORIES

.1 Sealants: in accordance with Section 07 92 00. VOC limit 250 g/L maximum to SCAQMD Rule 1168.

.2 Fasteners: to CAN/CSA-G164.

.3 Nails, spikes and staples: to CSA B111 or ASTM F1667.

.4 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

.1 Treat surfaces of material with wood preservative, before installation.

.2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for minimum 3 minute soak on lumber and one minute soak on plywood.

.3 Re-treat surfaces exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

3.3 INSTALLATION

.1 Apply wood preservative to wood in contact with roofing, concrete and masonry.

.2 Treat surfaces of pressure treated wood and plywood which are cut or bored after pressure treatment with field applied wood preservative.

.3 Install members true to line, levels and elevations, square and plumb to a tolerance of 1:600 and rigidly secure in place.

.4 Construct continuous members from pieces of longest practical length.

.5 Install spanning members with "crown-edge" up.

.6 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding, and other work as required.

.7 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
  .1 Align and plumb faces of furring and blocking to tolerance of 1:600.

.8 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.

.9 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.

.10 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.11 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.12 Countersink bolts where necessary to provide clearance for other work.

.13 Install plywood backboards with countersunk screws.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
  .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.

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 04 22 00 – Concrete Masonry Units

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM)

.1 ASTM E2174-20a, Standard Practice for On-Site Inspection of Installed Firestops

.2 ASTM E2393-20a, Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Safety Data Sheets (SDS).

.3 National Research Council (NRC)
.1 National Building Code (NBC) 2015.

.4 Underwriter's Laboratories of Canada (ULC)
.1 CAN/ULC-S101-14, Standard Methods of for Fire Endurance Tests of Building Construction and Materials.
.2 CAN/ULC-S102(2018-REV1), Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
.3 CAN/ULC-S115-2018, Standard Method of Fire Tests of Firestop Systems.

1.3 DEFINITIONS

.1 Fire Stop Material: device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Continuity of Fire Separations: NBC, Division B, Parts 3.1.8 and 3.1.9.1, 9.10.9):
.1 Wall, partition or floor assemblies required to be a fire separation shall be: constructed as a continuous element; have a fire resistance rating; have openings protected by a closure; and have penetrations sealed by a firestop.

.5 Tightly Fitted; (ref: NBC Division B, Part 3.1.9.1(1) and 9.10.9.6(1)): penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.4 ACTION AND INFORMATION SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit two copies of WHMIS SDS - Safety Data Sheets.

.3 Shop Drawings:

.1 Submit System Design listings, indicating ULC design number and including illustrations, applicable to each firestop configuration. Provide schedule indicating material to be used, building elements to be protected, hourly rating and appropriate references.

.2 Submit shop drawings to show proposed material, reinforcement, anchorage, fastenings and method of installation. Construction details should accurately reflect actual job conditions.

.4 Samples:

.1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00.

.1 Test reports: in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

.4 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

.1 Penetrations: Provide and install firestopping systems produced to resist the spread of fire, and the passage of smoke and other gases according to requirements indicated, including but not limited to the following:

.1 Firestop penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.

.2 Provide and install complete penetration firestopping systems that have been tested and approved by third party testing agency.

.3 Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated, but not less than the fire-resistance rating of the construction in which the joint occurs.

.4 For firestopping exposed to view, traffic, moisture, and physical damage, provide appropriate firestop systems for these conditions.

1.6 QUALITY ASSURANCE

.1 Work is to be undertaken by experienced Site Supervisor in their trade of material or system being used with a minimum of five (5) working years of experience utilizing that material/system, and shall provide a list of not less than five (5) successfully completed projects of similar scale and type.

.2 All workers including the site supervisor shall be certified by the manufacturer of the products and systems proposed for the Installation of this product. Proof of this certification will be required forty-eight (48) hours after award of the project.

.3 Firestop contractor to be a member of the Firestop Contractors International Association (FCIA) and be in good standing with this association. Contractor to provide within 48 hours after award of the project proof of their association of the FCIA.

.4 Notify Departmental Representative when completed installations are ready for inspection prior to concealing or enclosing area containing fire stopping materials. Allow forty-eight (48) hours for site review.

.5 Do not cover up firestopping installations until receipt of written notice from the Departmental Representative.

.6 All firestopping to be a single source and installed by one contractor.

.7 Firestop installation must meet requirements of ASTM E2174 and ASTM E2393 tested assemblies.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
.1 Deliver, store and handle materials in accordance with Section

01 61 00.

.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.

.2 Storage and Protection:

.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.3 Waste Management and Disposal:

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN/ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC-S115 and not to exceed opening sizes for which they are intended.

.2 Colours:

.1 Firestopping: Red

.2 Smoke Seal: Grey

.2 Service penetration assemblies: systems tested to CAN/ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN/ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.4 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Departmental Representative.

.2 Install floor fire stopping before interior partition erections.

.3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

.4 Mechanical pipe insulation: certified fire stop system component.
.1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

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

.2 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 00.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.7 SCHEDULE

.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
.2 Edge of floor slabs at precast concrete panels.
.3 Top of fire-resistance rated masonry and gypsum board partitions.
.4 Intersection of fire-resistance rated masonry and gypsum board partitions.
.5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
.6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
.7 Openings and sleeves installed for future use through fire separations.
.8 Around mechanical and electrical assemblies penetrating fire separations.
.9 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

.1 Section 06 10 00 – Rough Carpentry

.2 Section 04 22 00 – Concrete Masonry

.3 Section 09 67 50 – Epoxy Flooring

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C834-17, Standard Specification for Latex Sealants.
- .2 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.
- .3 ASTM C1330-18, Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

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

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Safety Data Sheets (SDS).

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Manufacturer's product to describe.
- .1 Caulking compound.
- .2 Primers.
- .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit two (2) copies of WHMIS SDS in accordance with Section 01 35 43 and 01 35 29.

.4 Submit two (2) samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00.
- .1 Instructions to include installation instructions for each product used.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.5 QUALITY ASSURANCE/MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00.

.2 Construct mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.

.3 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.

.4 Locate where indicated.

.5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.

.6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work.

1.6 DELIVERY, STORAGE, AND HANDLING

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

.2 Delivery Acceptance Requirements: Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

.3 Storage and Handling Requirements:
.1 Store Materials indoors, off ground, and in dry location 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

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

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.4 Place materials defined as hazardous or toxic in designated containers.

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

.6 Unused sealant material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.7 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Departmental Representative.

.8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.9 Fold up metal banding, flatten, and place in designated area for recycling.

1.8 PROJECT CONDITIONS

.1 Environmental Limitations:

.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.

1.9 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).

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Departmental 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 offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Urethane Sealant:

.1 Multi component, chemically cured polyurethane, gun grade.

.2 Classification:

.1 ASTM C920, Type M, Grade NS, Class 50, use T, NT, M, A and O.

.2 CAN/CSA-19.24 Type 11, Class B.

.3 Colour: As selected by Departmental Representative from manufacturer’s standard colours.

.2 Silicone Sealant:

.1 Low modulus, high performance, SWRI validated one-part moisture curing sealant.

.2 Classification:

.1 ASTM C920, Type S, Grade NS, Class 100/50 use NT, M, G, A, and O.

.3 Colour: As selected by Departmental Representative from manufacturer’s standard colours.

.3 Latex Sealant:

.1 Pure acrylic sealant, fast setting pliable seal, minimum shrinkage.

.2 Classification:

.1 ASTM C834 Type OP.

.4 Epoxy security sealant (Anti-Pick): interior.

.1 Pick-proof gunned flexible epoxy joint filler: two component 100% solids, gun-grade epoxy joint filler with flexible, pick-proof properties for sloped areas.

.1 Shore A hardness: 90±5.

.2 Shore D hardness: 50.

.3 Elongation: 50%.

.4 Tensile Strength: 6.2 MPa ±0.07 MPa (900 pounds per square inch ±10 pounds per square inch).

.5 Slant shear strength: 6.0 MPa (865 pounds per square inch) to ASTM C882.

.6 Mixing ratio: 1 to 1 by volume.

.7 Pot Life: 40 to 55 minutes at 24°C (75°F).

.8 Cure time foot traffic: 4 hours.

.9 Cure time vehicular traffic: 24 hours.

.10 Application temperature: minimum 13°C (55°F).

2.3 ACCESSORIES

.1 Primer: Type recommended by the sealant manufacturer and compatible with joint forming materials.

.2 Joint Cleaner: Non-corrosive and non-staining type recommended by sealant manufacturer and compatible with joint forming materials.

.3 Non-gassing Polyolefin Backer Rod: designed for use with cold-applied joint sealants.

.1 Comply with ASTM C1330.

.2 Size required for joint design to allow for 25% compression.

.4 Closed-Cell Polyethylene or Open Cell Polyurethane, Backer Rod: backer rod designed for use with cold-applied joint sealants for on-grade or below-grade applications.

.1 Comply with ASTM C1330.

.2 Size required for joint design to allow for 25% compression.

.5 Joint Filler: closed-cell polyethylene joint filler designed for use in cold joints, construction joints, or isolation joints wider than 6mm. Size required for joint design.

.6 Bond Breaker: Pressure-sensitive tape recommended by sealant manufacturer to suit application.

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 Departmental Representative.

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

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

3.2 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 00.

.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 00.

.3 Waste Management: separate waste materials for recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.8 PROTECTION

.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 REFERENCE STANDARDS

.1 American Architectural Manufacturer's Association (AAMA)
- .1 AAMA 800-16, Voluntary Specifications and Test Methods for Sealants

.2 ASTM International
- .1 ASTM C864-05(2019), Standard Specifications for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
- .2 ASTM D790-17, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- .3 ASTM D1003-13, Standard Test Method for Haze and Luminous Transmittance of Plastics.
- .4 ASTM D1929-20, Standard Test Method for Determining Ignition Temperature of Plastics.
- .5 ASTM D2240-15e1, Standard Test Method for Rubber Property - Durometer Hardness.
- .6 ASTM E84-20, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .7 ASTM F1915-05(2019), Standard Test Methods for Security Glazing for Detention Facilities
- .8 ASTM F1233-08(2019), Standard Test Method for Security Glazing Materials and Systems.

.3 Glass Association of North American (GANA)
- .1 GANA Glazing Manual 50th Anniversary Edition-2008.
- .2 GANA Laminated Glazing Reference Manual-2019.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Pre-Installation Meetings:
- .1 Convene pre-installation meeting 1 week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental Representative to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other building subtrades.
  - .4 Review manufacturer's written installation instructions and warranty requirements.

.2 Arrange for site visit with Departmental Representative prior to start of Work to examine existing site conditions adjacent to demolition Work.

.3 Hold project meetings every week.

.4 Ensure key personnel attend.

.5 Departmental Representative will submit written notification of change

to meeting schedule established upon contract award 24 hours prior to scheduled meeting.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.4 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Submit duplicate 200mm x 200mm size samples of glazing unit and sealant material.

.5 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
.1 Submit testing and analysis of glass under provisions of Section 01 45 00.
.2 Submit shop inspection and testing for glass.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 77 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for glazing for incorporation into manual.

1.5 QUALITY ASSURANCE

.1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect glazing and frames from nicks, scratches, and blemishes.
.3 Protect prefinished aluminum surfaces with strippable coating.
.4 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 20.

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

1.7 AMBIENT CONDITIONS

.1 Ambient Requirements:
.1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Design Criteria:
.1 Limit glass deflection to 1/200 with full recovery of glazing materials.

.2 Polycarbonate security glazing:
.1 Laminated, each lamination 12.7 mm thick separated by polyurethane interlayer, 38.1 mm overall thickness polycarbonate sheet, clear colour.
.2 Physical Attack Standard: to ASTM F1915 Grade 2
.3 Ballistic performance: to ASTM F1233 Class III.
.4 Flexural strength: to ASTM D790.
.5 Light transmittance: 83 to ASTM D1003.
.6 Surface burning characteristics for flame and smoke spread: to ASTM E84.
.7 Self ignition characteristics: to ASTM D1929.

2.2 ACCESSORIES

.1 Setting blocks: Comply with ASTM C864, 80-90 Shore A durometer hardness to ASTM D2240, Provide compatible setting blocks specifically recommended by the sheet material manufacturer for use with sheet

materials and glazing materials used.

.2 Spacer shims: 50-60 Shore A durometer hardness to ASTM D2240, Provide compatible spacer shims of material, size, and shape specifically recommended by the sheet material manufacturer for the materials used.

.3 Glazing tape:

.1 Preformed 100 percent solid, butyl compound elastomeric tape or ribbon (coiled on release paper), non-staining and non-migrating, with continuous built-in shim (pre-shimmed), if recommended in writing by the glazing manufacturer for the application indicated, comply with AAMA 800.

PART 3 - EXECUTION

3.1 EXAMINATION

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

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

.1 Perform work in accordance with GANA Glazing Manual and GANA Laminated Glazing Reference Manual for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.

.3 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
- .1 Leave Work area clean at end of each day.
  - .1 Remove traces of primer, caulking.
  - .2 Remove glazing materials from finish surfaces.
  - .3 Remove labels.
  - .4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

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

3.5 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.
- .1 Do not mark heat absorbing or reflective glass units.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Commercial grade glazing film installed on interior glass surfaces to modify transparency properties, physical properties and visual characteristics of glass.

1.2 REFERENCE

.1 ASTM International (ASTM).
- .1 ASTM E84-20, Standard Test Method for Surface Burning Characteristics of Building Materials
- .2 ASTM E903-20. Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

.2 International Window Film Association (IWFA)
- .1 IWFA Visual Quality Standard for Applied Window Film 1999.

1.3 SUBMITTALS

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

.2 Submit duplicate 300 x 300 mm sample of each type of film installed on 6 mm thick clear plate glass. Submit 2 samples of type of film specified.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Glazing film: technical properties when tested to ASTM E903 when applied to the exterior surface of single-pane to control both light and privacy:
- .1 Material: Polyester
- .2 Backing Adhesive: Acrylic Pressure Sensitive Adhesive
- .3 Design Pattern: Frost/Matte
- .4 Surface Finish: Matte
- .5 Opacity: Translucent
- .6 Performance Level: Premium
- .7 Visible light transmission: 86%.
- .8 Visible light reflection - exterior: 8%.
- .9 Shading coefficient: 0.95%.
- .10 Ultraviolet ray protection (280nm-380nm): greater than 99%.
- .11 Fire Rating to ASTM E84: Class A
- .12 Overall Thickness: 50 µ.
- .13 Film colour: White.

2.2 ACCESSORIES

.1 Adhesive: acrylic pressure sensitive adhesive that forms a molecular bond between the film and glass.

.2 Cleaners, primers, and sealers: types recommended by film manufacturer.

2.3 FABRICATION

.1 Apply film to glass in accordance with manufacturer's written instructions. Comply with manufacturer’s written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and datasheet. Install film in the same manner as tested.

.2 Site apply glazing film to glass panels:

.1 Ensure no deleterious material adheres to glass by scraping surface of glass using industrial razors. Ensure dust, grease, and chemical residue are removed from surface of glass before installation of film.

.2 Examine glass under natural daylight and identify cracks, blisters, bubbles, discolouration, edge defects or other anomalies that may cause film to delaminate, or cause vision transparency or distortion problems.

.3 View glass from 2.0 m minimum. Report findings to Departmental Representative.

.4 Proceed with Work only after receipt of written approval from Departmental Representative.

.5 Install film to glass panels ensuring no blisters, bubbles, scratches, edge defects or distortions.

.6 Cut film edges straight and square to within 3 mm of edge of panel.

.3 Splicing. Splices are not permitted.

PART 3 - EXECUTION

3.1 INSTALLER'S INSPECTION

.1 Conduct Visual Inspection: in accordance with IWFA - Visual Quality Standard for Applied Window Film.

.2 Remove and replace complete glass panel that continues to show blisters, bubbles, tears, scratches, edge defects or vision distortion in film when viewed under natural daylight from 2.0 m minimum after 30 day period. No site repair or reinstallation of Glazing films will be permitted.

3.2 FINAL CLEANING

.1 Wash interior and exterior of each window and film using cleaning solution recommended by film manufacturer.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrication

.2 Section 06 10 00 – Rough Carpentry

.3 Section 07 92 00 - Joint Sealants

1.2 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM C645-18, Standard Specification for Nonstructural Steel Framing Members.
- .2 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .3 ASTM C754-20, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .4 ASTM F1267-18, Standard Specification for Metal, Expanded, Steel.

.2 National Association of Architectural Metal Manufacturers / Expanded Metal Manufacturers Association (NAAMM/EMMA)
- .1 NAAMM/EMMA 557-20, Standard for Expanded Metal

.3 Environmental Choice Program (ECP)
- .1 CCD-047-98(R2005), Architectural Surface Coatings.
- .2 CCD-048-95(R2006), Surface Coatings - Recycled Water-Borne.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Safety Data Sheets (SDS).

.5 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual – 2020 plus amendments.
  - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

.6 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards
- .1 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

.7 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S102:2018-REV1, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing and include product characteristics,

performance criteria, physical size, finish and limitations.

.3 Samples:
.1 Submit duplicate 300 mm long samples of non-structural metal framing.

1.4 QUALITY ASSURANCE

.1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.4 Partition assembly to be non-combustible construction.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect metal framing from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 20.

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C645, minimum 1.2 mm thickness hot dipped zinc-coated (galvanized) steel sheet in accordance with ASTM A653/A653M, Z180, for screw attachment of sheet steel.
.1 Knock-out service holes at 450 mm centres.
.2 Stud size as noted on drawings.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 50 mm flange height.

.3 Metal channel stiffener: size to suit framing, 1.2 mm thick cold rolled steel, coated with rust inhibitive coating.

.4 Furring, framing and accessories: ASTM C645.

.5 Blocking and/or plywood: refer to Section 06 10 00.

2.2 ACCESSORIES

.1 Flattened metal mesh: Fabricated from cold rolled carbon-steel sheet to NAAMM/EMMA 557. Style 3/4-9F: nominal strand thickness of 3.05mm (2.74mm to 3.35mm). Diamond opening of 14.3mm x 42.88mm.

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 non-structural metal framing application in accordance with manufacturer's written instructions.
  .1 Visually inspect substrate in presence of Departmental Representative.
  .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

.1 Erect partitions in accordance with framing requirements of ASTM C754.

.1 Align partition tracks at floor and ceiling and secure at 300 mm on centre maximum.

.2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at 300 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.
  .1 Position studs in tracks at floor and ceiling. Cross brace steel studs at 1200mm oc as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to ceiling track using screws.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.
.1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.
.2 Provide anti-spread bracing between double steel stud for framed opening to next adjacent spaced stud. Anti-spread bracing to be installed maximum 1219mm from finished floor and then 300mm oc to ceiling track.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.
.1 Secure track to studs at each end, in accordance with manufacturer's instructions.
.2 Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.
.1 Use 50 mm leg ceiling tracks.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Weld wire mesh to each metal stud using a 3mm fillet weld along the strand at 200mm oc.

.18 Wire mesh to be secured at all edges by anti-spread bracing, studs, or corners

.19 Align sheet vertical and horizontal edges on the centre line of the steel stud or anti-spread bracing.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.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.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCE STANDARDS

.1 ASTM International

.1 ASTM F1861-21, Standard Specification for Resilient Wall Base.

1.3 SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for resilient base and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate 300 mm long base edge strips.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Provide shop drawings, product data and samples according to Section 01 33 00.

.2 Provide extra materials of resilient base and adhesives in accordance with Section 01 77 00.

.3 Extra materials one piece and from same production run as installed materials.

.4 Identify each roll of resilient base and each container of adhesive.

.5 Deliver to Departmental Representative, upon completion of the work of this section.

.6 Store where directed by Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Maintain air temperature and structural base temperature at installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Resilient Base (RB): to ASTM F1861, Type TP-Rubber Base, height 100mm, continuous, Style B-coved, preformed external corners at coved base. Colours as selected by Departmental Representative.

.2 Primers and adhesives: of types recommended by base manufacturer to suit substrate and installation.

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 resilient base installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

3.2 PREPARATION

.1 Clean floor and wall removing any dirt to ensure proper adhesion as per manufacturer's printed instructions.

3.3 APPLICATION: RUBBER BASE

.1 Lay out base to keep number of joints at minimum.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base.

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Install straight and level to variation of 1:1000.

.6 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 00. Leave Work area clean at end of each day.

3.5 PROTECTION

.1 Protect new base from time of final set of adhesive until final inspection.

END OF SECTION

PART 1 – GENERAL

1.1 RELATED SECTIONS

.1 Section 07 42 13 23 – Metal Composite Material Wall Panels

.2 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

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

.1 ASTM C307-18. Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

.2 ASTM C413-18. Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.3 ASTM C579-18. Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes

.4 ASTM D2047-17. Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.

.5 ASTM D2240-15e1. Standard Test Method for Rubber Property - Durometer Hardness.

1.3. SUBMITTALS

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

.2 Submit Manufacturers technical literature to indicate special handling procedures, preparation criteria, installation instructions, finishing and cleaning procedures.

.3 Submit Product Data Sheets for each component. Include performance characteristics, performance criteria and limitations.

.4 Submit Manufacturers WHMIS SDS - Safety Data Sheets.

.5 Submit shop drawings. Indicate layout of divider strips and expansion joints.

.6 Submit samples. Submit duplicate 300 x 300 x 6 mm thick samples of each colour, texture and finish.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00.

.2 Provide manufacturer’s standard maintenance instructions.

1.5 MOCK-UPS

.1 Construct mock-ups in accordance with Section 01 45 00.

.2 Prepare mock-up of a minimum area of 10 m2 or one complete room as directed by Departmental Representative. Clean, prepare floor surfaces and apply floor coatings. Departmental Representative to accept cleaning procedures, preparation of floor surfaces, application procedures and appearance of completed installation.

.3 Construct mock-up where directed.

.4 Allow minimum of twenty-four (24) hours for inspection of mock-up by Departmental Representative before proceeding with coating work.

.5 When accepted, mock-up will demonstrate minimum standard for this work. Accepted Mock-up may remain as part of the finished work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store materials in accordance with Section 01 61 00. Deliver in original containers, sealed, with labels intact in manner to prevent damage.

.2 Remove damaged, opened and rejected materials from site.

.3 Ensure materials remain in original wrapping and containers until used.

.4 Close and seal tightly all partly used containers. Store protected in well ventilated fire-safe area at moderate temperature.

.5 Deliver materials to job site just prior to installation. Store materials inside, in dry location, away from heavy traffic areas.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Waste Management Plan.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities. Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material in appropriate on-site for recycling in accordance with Waste Management Plan.

.3 Divert unused aggregate materials from landfill to facility approved by Departmental Representative. Divert unused epoxy matrix materials from landfill to official hazardous material collections site approved by Departmental Representative.

.4 Do not dispose of unused paint and epoxy materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

1.8 ENVIRONMENTAL REQUIREMENTS

.1 Safety.

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.

.2 Ensure no open flame heating devices are used.

.3 Discourage occupancy of treated space until volatile materials are no longer being emitted and there is no odour.

.4 Provide adequate respiratory protection to exposed individuals.

.2 Ventilation.

.1 Provide ventilation continuously during and after cleaning, preparation and coating application. Operate system twenty-four (24) hours per day during application. Provide continuous ventilation for seven (7) days after completion of application or until all odours are reduced to approval of Departmental Representative.

.2 Ventilate enclosed spaces to approval of Departmental Representative.

.3 Temperature.

.1 Do not apply coating systems unless uniform minimum 10 degrees C air temperature at installation area for twenty-four (24) hours prior to and after application.

.2 Maintain minimum temperature 10 degrees C within area of installation until final acceptance of building.

.4 Apply finish coatings only when dust is no longer being generated by related construction operations. Schedule operations such that airborne particles will not affect the quality of the finished surface.

.5 Apply coatings only when surfaces are clean, dry, properly cured and adequately prepared in accordance with manufacturers written instructions and to approval of Departmental Representative.

PART 2 – PRODUCTS

2.1 MATERIALS

.1 Low odour products: whenever possible, select products exhibiting low odour characteristics. If two products are otherwise equivalent, select the product with the lowest odour.

.2 Interior, high-performance, seamless, 3 component, epoxy based flooring system. Heavy-duty, decorative, textured system. Nominal installed thickness 6.0 mm. standard slip resistance (type ef1) and high slip resistance (type ef2), medium texture. Colour and pattern selected by Departmental Representative from manufacturer’s standard available range.

.1 Physical Characteristics:

.1 Compressive Strength: 68.948 MPA at 7 days to ASTM C579.

.2 Tensile Strength: 13.790 MPA to ASTM C307.

.3 Hardness: 85-90 to ASTM D2240 shore D Durometer.

.4 Co-efficient of Friction: Medium Texture 0.7 to ASTM D2047.

.5 Water absorption: less than 0.1% to ASTM C413.

.2 Components:

.1 Primer: penetrating, two component, moisture tolerant, 100% solids epoxy primer.

.2 Base: 3 component, trowelled epoxy based mortar. Trowel applied mortar base, consisting of epoxy resin, curing agent and finely graded silica aggregate.

.3 Undercoat: 3 component, free flowing epoxy formulation consisting of resin and curing agent.

.4 Aggregate. Brightly coloured, select graded quartz aggregates.

.5 Sealer. UV resistant, chemical resistant, 2 - component, 100% solids epoxy based, clear sealer.

.6 Waterproofing membrane primer: Manufacturer's proprietary primer specifically intended for use with waterproofing membrane system for application to new and cured concrete. 3 - component, epoxy based system intended to completely seal the substrate and prevent the possibility of pinholes forming in the overlayment.

.7 Waterproofing membrane: by same manufacturer as flooring. Recommended for use with flooring system. 2 - component, liquid applied, urethane membrane for use on horizontal surfaces. Minimum applied thickness: 25 mils. 100 % solids. Seamless and monolithic. Tensile strength: 7584.2 KPA. Bond strength: greater than 2757.9 KPA. Elongation: 200%.

.3 Baseboard: 6.0 mm thick, integral coved base using same system and components as floor surface. Minimum 150 mm high. Extend into corners and around external corners in accordance with manufacturers standard details. Colour to match flooring.

.4 Sub-floor filler and leveler: 2 part, latex modified, portland cement mortar requiring no water to produce cementitious paste. As recommended by epoxy coating manufacturer for use with their product. Minimum compressive strength of 25 MPa.

.5 Metal edge strips: aluminum extruded, smooth, mill finish, shoulder flush with top of adjacent floor finish.

.6 Divider strips: 1.25 mm thick brass selected by Departmental Representative x thickness of topping.

.7 Accessories: base caps, base divider strips, separator strips, purpose made and to match divider strips.

.8 Sealing compound: as recommended by epoxy manufacturer.

PART 3 - EXECUTION

3.1 GENERAL

.1 Comply with manufacturers written data, including product technical bulletins, product catalogue installation instructions,

product carton installation instructions, and datasheet. Manufacturer's recommendations will be considered as minimal instructions. Method of application to be as approved by Departmental Representative.

.2 Apply coatings only when surfaces are clean, dry, properly cured and adequately prepared in accordance with manufacturers written instructions and to approval of Departmental Representative.

3.2 WORKMANSHIP

.1 Moisture content of concrete: maximum 16%.

.2 Apply coating using trained applicators, using equipment specifically designed for this purpose.

3.3 PREPARATION

.1 Remove surface mounted fittings and fastenings prior to undertaking any operations. Store for re-installation after operations are complete. Leave surfaces to be treated as free as possible from surface obstacles.

.2 Test floors to ensure they are dry and cured to approval of manufacturer. Ensure that floor slabs are dry by using test methods as recommended by flooring manufacturer.

3.4 PROTECTION

.1 Protect existing building surfaces as well as all mechanical and electrical equipment in areas of work from spatters, markings and other damage. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect floors and adjacent spaces from damage caused by cleaning and preparation operations.

.3 Mask around surrounding surfaces to produce neat, clean clear junction lines. Cover or mask surfaces, equipment and other hardware in areas of work to prevent damage and to protect from drops and splatters. Use non-staining coverings.

.4 Protect items that are permanently attached. Protect factory finished products and equipment.

3.5 SURFACE PREPARATION

.1 Prepare all floor surfaces in accordance with manufacturers written instructions and as follows:

.1 Remove ridges, bumps and other materials. Remove loose material, grind out protrusions.

.2 Completely remove, down to bare concrete: all coatings, laitance, paints, oils, grease, dirt, stains and any unsound concrete from concrete floors using a combination of commercial degreasers, alkaline wash, water blasting, hand grinding, shot blasting or wet sand blasting as required to suit site conditions.

.3 Thoroughly scrub concrete slab with heavy-duty detergent or cleaners appropriate to emulsify particular contamination present.

.4 Thoroughly rinse with clean water. Repeat procedure as required to remove contamination. Remove rinse water by forcing to appropriate drains or by power vacuum. Perform all chemical cleaning in strict accordance with federal, provincial and municipal regulations, which prohibit introduction of certain chemicals and contaminants into sewers, open bodies of water and into ground.

.5 Remove all remaining residue, dust, dirt, and other debris by vacuuming, wiping with dry, clean cloths.

.6 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.

.7 Allow surface to dry completely prior to application of any primers or surface coatings.

.2 Do not proceed with application of new coatings until prepared surfaces have been accepted by Departmental Representative.

.3 Clean floor and apply filler. Patch depressions and fill cracks and holes. Trowel and float to leave smooth, flat hard surface. Apply filler to produce smooth and level surfaces, free from holes and bumps that would affect the appearance of the finished floors. Apply filler to achieve floor level to a tolerance of 1:500. Prohibit traffic until filler cured and dry. Apply filler to create slopes as indicated, slopes to be minimum 1% to new drains unless noted otherwise. Feather edge filler at drains and at junction with existing surfaces.

3.6 INSTALLATION

.1 Apply waterproofing membrane primer. Apply waterproofing membrane throughout entire area scheduled to receive epoxy floorings.

.2 Apply primer, base and undercoat to all areas. Total system thickness 6.0 mm.

.3 Broadcast aggregate evenly into wet surface of undercoat. Apply in both directions to ensure even coverage without any visible seams. Obtain uniform colour distribution to approval of Departmental Representative.

.4 Apply sealer at thickness to obtain medium texture and slip resistance as specified.

.5 Apply flooring to produce smooth, level surface, uniform in thickness, sheen, colour, texture and finish, free from marks, dirt, particles, runs, crawls, curling, holes, air pockets and other defects.

.6 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.

.7 Install divider strips straight and level to detailed pattern. Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.7 CLEANING

.1 Remove excess materials from floor, base and wall surfaces without damage. Clean and seal floor and base surface to flooring manufacturer's printed instructions.

3.8 PROTECTION IN FINISHED WORK

.1 Protect new floors from time of initial set until final inspection.

.2 Prohibit traffic on floor for forty-eight (48) hours after installation or longer in accordance with manufacturer’s written instructions.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED SECTIONS

.1 Section 04 22 00 – Concrete Unit Masonry

.2 Section 05 50 00 – Metal Fabrications

1.2 REFERENCE STANDARDS

.1 Green Seal Environmental Standards (GS)

.1 GS-11-2015, 3.2 Edition, Paints and Coatings.

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

.1 Safety Data Sheets (SDS).

.3 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual – 2020 plus amendments.

.2 Maintenance Repainting Manual - 2019.

.4 National Research Council Canada (NRC)

.1 National Building Code of Canada 2015 (NBC).

.5 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1113-A2016, Architectural Coatings.

1.3 QUALITY ASSURANCE

.1 Contractor shall have a minimum of five years proven satisfactory experience. When requested, provide a list of last three comparable jobs including, job name and location, specifying authority, and project manager.

.2 Qualified journeymen who have a "Tradesman Qualification Certificate of Proficiency" shall be engaged in painting work. Apprentices may be employed provided they work under the direct supervision of a qualified journeyman in accordance with trade regulations.

.3 Conform to latest MPI requirements for interior painting work including preparation and priming.

.4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) shall be in accordance with MPI Painting Specification Manual "Approved Product" listing and shall be from a single manufacturer for each system used.

.5 Other paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.

.6 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.7 Standard of Acceptance:
.1 Walls: No defects visible from a distance of 1000 mm at 90° to surface.
.2 Ceilings: No defects visible from floor at 45° to surface when viewed using final lighting source.
.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

1.4 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Provide paint products meeting MPI "Environmentally Friendly" E2 or E3 ratings based on VOC (EPA Method 24) content levels.

.2 Where indoor air quality (odour) is a problem, use only MPI listed materials having a minimum E2 or E3 rating.

1.5 SCHEDULING OF WORK

.1 Submit work schedule for various stages of painting to Departmental Representative for approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for any changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about the building.

1.6 SUBMITTALS

.1 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used in accordance with Section 01 33 00.

.2 Submit WHMIS SDS - Safety Data Sheets.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:
.1 Product name, type and use.
.2 Manufacturer's product number.
.3 Colour numbers.
.4 MPI Environmentally Friendly classification system rating.
.5 Manufacturer's WHMIS Safety Data Sheets (SDS).

1.7 SAMPLES

.1 Submit full range colour sample chips in accordance with Section 01 33 00. Indicate where colour availability is restricted.

.2 Submit 200 x 300 mm sample panels of each paint with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards.

1.8 QUALITY CONTROL

.1 When requested by Departmental Representative, prepare and paint designated surface, area, room or item (in each colour scheme) to requirements specified herein, with specified paint or coating showing selected colours, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

1.9 DELIVERY, HANDLING AND STORAGE

.1 Deliver, store and handle materials in accordance with manufacturer’s written instructions.

.2 Labels shall clearly indicate:
- .1 Manufacturer's name and address.
- .2 Type of paint or coating.
- .3 Compliance with applicable standard.
- .4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Provide and maintain dry, temperature controlled, secure storage.

.5 Observe manufacturer's recommendations for storage and handling.

.6 Store materials and supplies away from heat generating devices.

.7 Store materials and equipment in a well-ventilated area with temperature range 7°C to 30°C.

.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.

.10 Remove paint materials from storage only in quantities required for same day use.

.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

1.10 SITE REQUIREMENTS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces in accordance with Section 01 51 00.
- .2 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
- .3 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .4 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities shall be provided by Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
- .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Apply paint to adequately prepared surfaces, when moisture content is below paint manufacturer's prescribed limits.

.3 Surface and Environmental Conditions:
- .1 Apply paint finish only in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
- .2 Apply paint only to adequately prepared surfaces and to surfaces within moisture limits noted herein.
- .3 Apply paint only when previous coat of paint is dry or adequately cured.

.4 Additional Interior Application Requirements:
- .1 Apply paint finishes only when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.
- .2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Paint, stain and wood preservative finishes and related materials (thinners, solvents, etc.,) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Ontario Ministry of Environment, Conservation and Parks, and Regional levels of Government.

.3 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.4 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.5 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground the following procedures shall be strictly adhered to:
- .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
- .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
- .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.
- .5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.6 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.7 Set aside and protect surplus and uncontaminated finish materials. Deliver to or arrange collection by organizations for verifiable re-use or re-manufacturing.

.8 Close and seal tightly partly used sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.
- .1 Use MPI listed materials having E3 or E2 rating where indoor air quality requirements exist.
- .2 Primer: VOC limit 100g/L maximum to SCAQMD Rule 1113.
- .3 Paint: VOC limit 100g/L maximum to SCAQMD Rule 1113.

.2 Paint materials for paint systems shall be products of a single manufacturer.

2.2 COLOURS

.1 Submit proposed Colour Schedule to Departmental Representative for approval.

.2 Colour schedule will be based upon the selection of five base colours and three accent colours.

.3 Selection of colours will be from manufacturer’s full range of colours.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.

.2 Paste, powder or catalyzed paint mixes shall be mixed in strict accordance with manufacturer's written instructions.

.3 Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.

.4 Thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss shall be defined as the sheen rating of applied paint, in accordance with the following values:

Gloss Level Category	Units @ 60°	Units @ 85°
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces shall be as specified herein

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete Masonry Units: smooth and split face block and brick
.1 INT 4.2K Waterborne Light Industrial, 5 gloss level finish.

.2 Structural Steel and Metal Fabrications: columns, beams, joists and miscellaneous metals.
.1 INT 5.1B Waterborne Light Industrial, 5 gloss level finish.

.3 Galvanized Metal Doors, Frames, and Misc. Steel:
.1 INT 5.3K Waterborne Light Industrial, 5 gloss level finish.

PART 3 - EXECUTION

3.1 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.2 EXISTING CONDITIONS

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using a properly calibrated electronic moisture meter, except test concrete floors for moisture using a simple "cover patch test" and report findings to Departmental Representative. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
.1 Concrete: 12%.
.2 Concrete Block/Brick: 12%.

3.3 PROTECTION

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect building occupants in and about the building.

.5 Removal of electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings shall be done prior to undertaking any painting operations by Contractor. Items shall be securely stored and re-installed after painting is completed by Contractor.

.6 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in occupied areas to approval of Departmental Representative.

3.4 CLEANING AND PREPARATION

.1 Clean and prepare surfaces in accordance with MPI Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly.
- .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. However, minimize the use of kerosene or any such organic solvents to clean up water-based paints.

.2 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.3 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.4 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements.

.5 Touch up of shop primers with primer as specified in applicable section. Major touch-up including cleaning and painting of field connections, welds, rivets, nuts, washers, bolts, and damaged or defective paint and rusted areas, shall be by supplier of fabricated material.

.6 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

.1 Method of application to be as approved by Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:
- .1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
- .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
- .3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.
- .4 Brush out immediately all runs and sags.
- .5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access and only when specifically authorized by Departmental Representative.

.5 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Finish closets and alcoves as specified for adjoining rooms.

.10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Unless otherwise specified, paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.

.2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.7 FIELD QUALITY CONTROL

.1 Field inspection of painting operations to be carried out by independent inspection firm as designated by Departmental Representative.

.2 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.3 Co-operate with inspection firm and provide access to areas of work.

3.8 RESTORATION

.1 Clean and re-install all hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.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.

.3 Place paint, stains, primer defined as hazardous or toxic waste, including tubes and containers, in containers or areas designated for hazardous waste.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrication

.2 Section 09 21 16 – Gypsum Board Assemblies

.3 Section 09 22 16 – Non-Structural Metal Framing

1.2 REFERENCE STANDARDS

.1 ASTM International
- .1 ASTM A123/A123M-17, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- .3 ASTM A240/A240M-20a Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Applications.
- .4 ASTM A653/A653M-20, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .5 ASTM A924/A924M-20, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .6 ASTM B456-17, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.81-M90, Air Drying and Baking Alkyd Primer for Vehicles and Equipment.
- .2 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.
- .3 CGSB 31-GP-107MA-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.3 CSA International
- .1 CSA B651-18, Accessible Design for the Built Environment.

.4 National Building Code (NBC) 2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.
.2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

.4 Samples:
.1 Submit samples for all listed accessories.
.2 Samples will be returned for inclusion into work.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:
.1 Provide special tools required for assembly, disassembly or removal of toilet and bath accessories in accordance with requirements specified in Section 01 78 00.
.2 Deliver special tools to Departmental Representative.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

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

PART 2 - PRODUCTS

2.1 MATERIALS

.1 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.
.2 Stainless Steel Sheet: to ASTM A240, Type 304 or 316 alloy.
.1 Finish: Unless otherwise indicated, AISI No.4 Brushed Finish.

.3 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

.1 Toilet tissue dispenser: single fold tissue recessed, 1.6mm type 304 stainless steel well welded to 2.0mm flange. Dimension 178mm x 178mm with depth of 114mm and diameter 137mm.

.2 Security Accessible Grab Bars: to CSA B651-18, 38mm O.D. 1.21mm stainless steel seamless pipe with 4 satin finish. Tubing is welded to 79mm x min. 3mm stainless steel flanged secured to wall with security screws. Min. 3mm stainless steel closure plate provide below pipe with round over exposed edges to ensure no sharp edges. Grab bar to sustain 453.59kg loading. With tabs to secure to wall mounted privacy curtain hooks.

.1 SGB-1 L shape grab bar: min. 750mm horizontal x 750mm vertical.

.2 SGB-2: Horizontal min. 600mm.

.3 SGB-3: Vertical Length Min. 1000mm.

.4 SGB-4 L shape grab bar: Min. 1000mm horizontal and 750mm vertical.

.3 Privacy Curtain Hook/Shower Hook: 1.89mm type 304 stainless steel surface mounted collapsible security hook with mounting back plate. Hook to have type #4 finish. All seems to be tig welded and ground smooth. Hook to be constructed with pivoting ball joint release when excess force of 9.07kgs is applied.

.4 Privacy Curtain: Canvas fire resistant curtain with clear vinyl tops and bottoms.

.1 Length of Curtain: 1600mm.

.2 Offset of bottom curtain from finish floor: 450mm.

.3 Height of curtain from finish floor: 1000mm.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to ASTM A123/A123M.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.4 FINISHES

.1 Chrome and nickel plating: to ASTM B456, satin finish.

.2 Manufacturer's or brand names on face of units not acceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

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

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

3.2 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:
- .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
- .2 Hollow masonry units, existing plaster or drywall: use toggle bolts drilled into cell or wall cavity.
- .4 Toilet and shower compartments: use male to female through bolts.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

3.3 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
  .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.

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

3.6 SCHEDULE

.1 Locate accessories as follows. Exact locations determined by Departmental Representative.

.2 Toilet tissue dispenser: one in each washroom mounting height 650 mm above finished floor.

.3 Privacy Curtain Hook: two (2) within every shower compartment mounting height at 1030mm above finish floor.

.4 Shower Hook: one (1) within every shower compartment mounting height at 1200 mm above finish floor.

.5 Security Accessible Grab Bars:

  .1 Horizontal mounted: 750mm

  .2 Vertical: base of grab bar 650mm

END OF SECTION

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 11 19 13 – DETENTION DOOR PANELS AND FRAMES

1.2 REFERENCE STANDARDS

.1 American National Standards Institute (ANSI)
- .1 ANSI A117.1-2017, Accessible and Usable Buildings

.2 American National Standards Institute (ANSI)/Builders Hardware Manufacturers Association (BHMA)
- .1 ANSI/BHMA A156.1-2016, American National Standard for Butts and Hinges.
- .2 ANSI/BHMA A156.2-2017, Bored and Preassembled Locks and Latches.
- .3 ANSI/BHMA A156.3-2014, Exit Devices.
- .4 ANSI/BHMA A156.4-2019, Door Controls - Closers.
- .5 ANSI/BHMA A156.5-2014, Auxiliary Locks and Associated Products.
- .6 ANSI/BHMA A156.6-2015, Architectural Door Trim.
- .7 ANSI/BHMA A156.8-2015, Door Controls - Overhead Stops and Holders.
- .8 ANSI/BHMA A156.10-2017, Power Operated Pedestrian Doors.
- .9 ANSI/BHMA A156.12-2018, Interconnected Locks and Latches.
- .10 ANSI/BHMA A156.13-2017, Mortise Locks and Latches Series 1000.
- .11 ANSI/BHMA A156.14-2019, Sliding and Folding Door Hardware.
- .12 ANSI/BHMA A156.15-2015, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
- .13 ANSI/BHMA A156.16-2018, Auxiliary Hardware.
- .14 ANSI/BHMA A156.17-2019, Self-closing Hinges and Pivots.
- .15 ANSI/BHMA A156.18-2016, Materials and Finishes.
- .16 ANSI/BHMA A156.19-2019, Power Assist and Low Energy Power - Operated Doors.
- .17 ANSI/BHMA A156.20-2017, Strap and Tee Hinges and Hasps.
- .18 ANSI/BHMA A156.21-2019, Thresholds.
- .19 ANSI/BMHA A156.22-2017, Door Gasketing and Edge Seal Systems.
- .20 ANSI/BHMA A156.36-2016, Auxiliary Locks
- .21 ANSI/BHMA A156.115-2016, Hardware Preparation in Steel Doors or Steel Frames

.3 Accessibility for Ontarians with Disabilities Act (AODA)
- .1 AODA-2012 plus amendments, Accessibility for Ontarians with Disability Act

.4 Canadian Standards Association (CSA)
- .1 CSA B651-18, Accessible Design for the Built Environment.

.5 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

.6 International Organization for Standardization (ISO)
- .1 ISO 9001-2015, Quality Management
- .2 ISO 14001-2015, Environmental Management

.7 National Fire Protection Association (NFPA)
.1 NFPA 252-2017, Standard Methods of Fire Tests of Door Assemblies

.8 Underwriter Laboratories Inc. (UL)
.1 UL10B-2008, Standard for Fire Tests of Door Assemblies
UL10C-2016, Standard for Positive Pressure Fire Tests for Door Assemblies
.2 UL228-2006, Standard for Door Closers-Holders, with or without Integral Smoke Detectors
.2 UL325-2019, Standard for Door, Drapery, Gate, Louver, and Window Operations systems

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 Use only ULC listed and labelled hardware for fire doors

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

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

.3 Shop Drawings - Hardware Schedule: Submit complete reproducible copy of detailed hardware schedule in a vertical format in accordance with section 01 33 00.
.1 List groups and suffixes in proper sequence.
.2 Completely describe door and list architectural door number.
.3 Manufacturer, product name, and catalog number.
.4 Function, type, and style.
.5 Size and finish of each item.
.6 Mounting heights.
.7 Explanation of abbreviations and symbols used within schedule.
.8 Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening

.4 Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.
.1 Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.

.5 Samples:
.1 Submit for review and acceptance of each unit.
.2 Samples will be returned for inclusion into work.
.3 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.4 After approval samples will be returned for incorporation in Work.

.6 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.7 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 77 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.

1.6 MAINTENANCE MATERIALS SUBMITTALS

.1 Extra Stock Materials:
.1 Supply maintenance materials in accordance with Section 01 77 00.
.2 Tools:
.1 Supply two spanner tools for each size spanner screw on job.
.2 Supply two 2 sets of wrenches for door closers, locksets and fire exit hardware.

1.7 QUALITY ASSURANCE

.1 Regulatory Requirements:
.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.8 DELIVERY, STORAGE AND HANDLING

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

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

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 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 door hardware from nicks, scratches, and blemishes.
.3 Protect prefinished surfaces with wrapping.
.4 Replace defective or damaged materials with new.

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

1.9 WARRANTY

.1 Manufacturer
- .1 Closers: Thirty year mechanical, Three year finish, One year electrical.
- .2 Exit Devices: Five year mechanical, Three year finish, One year electrical.
- .3 Cylinders: Three year.
- .4 Best 45H Lockset: Limited Lifetime mechanical, Three year finish, Five year electrical.
- .5 Stanley Hinges: Limited Lifetime mechanical, Three year finish, One year electrical.
- .6 All other Hardware: Two years.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

.2 Hardware for additions or alterations to existing institutions to match existing hardware for make, material, finish, and to be keyed into the existing system at the manufacturer's plant.

2.2 DOOR HARDWARE

.1 Butts and hinges to ANSI/BHMA A156.1 and ANSI/BHMA A156.17:
- .1 Template screw hole locations
- .2 Bearings are to be fully hardened.
- .3 Bearing shell is to be consistent shape with barrel.
- .4 Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
- .5 Non-Removable Pin screws shall be slotted stainless steel screws.
- .6 Hinges shall be full polished, front, back and barrel.
- .7 Hinge pin is to be fully plated.
- .8 Bearing assembly is to be installed after plating.
- .9 Sufficient size to allow 180-degree swing of door
- .10 Furnish five knuckles with flush ball bearings
- .11 Provide hinge type as listed in schedule.
- .12 Furnish 3 hinges per leaf.
- .13 UL10C listed for Fire rated doors.

.2 Electrified Functions for Hinges: Comply with the following:

.1 Power Transfer: Concealed PTFE-jacketed wires, secured at each leaf and continuous through hinge knuckle. Provide wire quantity and sizes required for electric hardware be served.

.2 Monitoring: Concealed electrical monitoring switch.

.3 Power Transfer and Monitoring: Concealed PTFE-jacketed wires, secured at each leaf and continuous through hinge knuckle, and with concealed electrical monitoring switch.

.3 Mortise Locks and Latches:

.1 Tested and approved by ANSI/BHMA A156.13, Series 1000, Operational Grade 1, Extra-Heavy Duty, Security Grade 2 and be UL10C.

.2 Furnish UL or recognized independent laboratory certified mechanical operational testing to 4 million cycles minimum.

.3 Provide to meet in accordance ISO 9001 and ISO 14001.

.4 Fit ANSI/BHMA A115.1 door preparation

.5 Functions and design as indicated in the hardware groups

.6 Solid, one-piece, 19mm (3/4-inch) throw, anti-friction latchbolt made of self-lubricating stainless steel

.7 Deadbolt functions shall have 25mm (1 inch) throw bolt made of hardened stainless steel

.8 Latchbolt and Deadbolt are to extend into the case a minimum of 9.5mm (3/8 inch) when fully extended

.9 Auxiliary deadlatch to be made of one piece stainless steel, permanently lubricated

.10 Provide sufficient curved strike lip to protect door trim

.11 Lever handles must be of forged or cast brass, bronze or stainless steel construction and conform to ANSI A117.1. Levers that contain a hollow cavity are not acceptable

.12 Lock shall have self-aligning, thru-bolted trim

.13 Levers to operate a roller bearing spindle hub mechanism

.14 Mortise cylinders of lock shall have a concealed internal setscrew for securing the cylinder to the lockset. The internal setscrew will be accessible only by removing the core, with the control key, from the cylinder body.

.15 Spindle to be designed to prevent forced entry from attacking of lever

.16 Provide locksets with 7-pin removable and interchangeable core cylinders

.17 Each lever to have independent spring mechanism controlling it

.18 Core face must be the same finish as the lockset.

.4 Mortise Deadbolt:

.1 Tested and approved by ANSI/BHMA A156.36, Operational Grade 1.

.2 Provide to meet in accordance with ISO 9001 and ISO 14001.

.3 Locksets and cores to be of the same manufacturer to maintain complete lockset warranty

.4 2-70mm (3/4 inch) backset

.5 25mm (1 inch) throw deadbolt

.6 Provide locksets with 7-pin core.

.5 Cylinders:

.1 Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.

.2 Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.

.3 Coordinate and provide as required for related sections.

.6 Door Closers shall:

.1 Tested and approved by ANSI/BHMA 156.4, Grade 1

.2 UL10C certified

.3 Provide to meet in accordance with ISO 9001 and ISO 14001.

.4 Closer shall have extra-duty arms and knuckles

.5 Conform to ANSI 117.1

.6 Maximum 61.9mm (2 7/16 inch) case projection with non-ferrous cover

.7 Separate adjusting valves for closing and latching speed, and backcheck

.8 Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions

.9 Full rack and pinion type closer with 38mm (1 1/2 inch) minimum bore

.10 Mount closers on non-public side of door, unless otherwise noted in specification

.11 Closers shall be non-handed, non-sized and multi-sized.

.7 Automatic Operators shall:

.1 Be listed under UL10C and UL325.

.2 Be capable of functioning on doors weighing up to 158.7kg (350 lb).

.3 Conform to ANSI/BHMA A156.10 and ANSI/BHMA A156.19 and be suitable for use in both full energy and low energy applications.

.4 Be non-handed.

.5 Incorporate the following adjustment capabilities: opening force, closing force, open speed, close speed, and open check speed.

.6 Incorporate a non-ferrous cover not exceeding 6 inches square in section.

.7 Incorporate a separate On-Off-Hold Open switch.

.8 Be microprocessor controlled and incorporate a position encoder.

.9 Readily function with standard activation and safety sensors, provide activation devices as required.

.10 Function as a manual door closer without power applied, and shall power open/ spring close with power applied.

.11 Function with 115 VAC electrical service for operator and standard low voltage connections for activation.

.12 Automatic operators by Stanley “Magic-Force” series

.13 Units must be FURNISHED and INSTALLED

.8 Low Energy Operators shall:

.1 Conform to ANSI/BHMA A156.19 as a low energy power opening device.

.2 Be listed under UL228, UL325, UL10B, UL10C, NFPA 252 and FCC listed.

.3 Shall be non-handed.

.4 Be rated for door panels weighing up to 160 kg (350 lbs).

.5 The manual door closer within the Low Energy Operator shall be adjusted to meet CSA B651 and AODA, 2.26kg (5 lbs) opening force Push-Side applications only.

.6 Operator shall be isolated from mounting plate with rubber mounts to mitigate the transmission of forces between the door and the operator.

.7 Shall have a position encoder to communicate with microprocessor.

.8 Incorporate a resetable powered operation counter that tracts both powered and non-powered cycling of the Operator.

.9 Incorporate the following adjustable settings:

.1 Hold Open Timer, to 28 seconds

.2 Open Speed

.3 Backcheck Speed

.4 Vestibule Sequence Timer

.5 Include DIP switch controls for:

.1 On board diagnostics.

.2 Power close.

.3 Push and Go operation.

.4 Time delay logic for electrified hardware components.

.6 Include terminals for auxiliary controls including:

.1 Activation devices; provide two discrete inputs.

.2 Vestibule sequencing.

.7 Control switches including:

.1 Day/Night open (illuminated).

.2 Power On-Off.

.8 Includes adhesive Low Energy Operator mounting templates.

.9 R-14 Aluminum Alloy Materials.

.10 For non-powered operation, the unit shall function as a standard door closer with adjustable spring force size 1 thru 6.

.9 Push Plates: Provide with four beveled edges ANSI/BHMA 156.6, type J301, 1.27mm (.050 inch) thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.

.10 Pulls with plates: Provide with four beveled edges ANSI/BHMA 156.6, type J301, 1.27mm (.050 inch) thickness Plates with ANSI/BHMA 156.6, type J401 Pull as listed in hardware set. Provide proper fasteners for door construction.

.11 Kickplates: Provide with four beveled edges ANSI/BHMA 156.6, type J102, 254mm (10 inches) high by width less 50mm (2 inches) on single doors and 25mm (1 inch) on pairs of doors. Furnish oval-head countersunk screws to match finish.

.12 Door Bolts: Flush bolts for metal doors.

.1 Flush slide bolt: to ANSI/BHMA-A156.16, type L04201, 200 mm long rod, 606.

.2 Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3, Grade 1, Type 25 for hollow metal label doors.

.3 Lever extension flush bolt: to ANSI/BHMA-A156.16, type L14251 fire rated, cast brass, 300 mm long rod, 19 mm backset, mortised keeper, 628 at openings where allowed local authority.

.4 Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.

.13 Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.

.1 Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.

.2 Provide mounting brackets for soffit applied hardware.

.3 Provide hardware preparation (cutouts) for latches as necessary.

.14 Power Supply: Provide power supply for (MLR) Electric Latch Retraction exit devices

.1 Motherboard will accept up to four plug-in Control Modules. Provide the appropriate necessary control module to operate the number of ELR exit devices used at each opening. The Control Module shall include a Time delay Feature, variable (0-4 minutes) latch retraction period in response to a momentary input.

.2 UL Listed for class II output

.3 Include circuit breakers for protection of motherboard

.4 115 or 230 Volt user selectable switch, with AC input= 115 Volt at 1 Amp

.5 Control module shall include Fire alarm terminal and Auxiliary contacts for remote signaling.

.6 Optional card for Battery Backup (BT) power tap module to operate a Card reader or when ELR devices require battery backup (Lead Acid Batteries are not included and is to be furnished by others)

.15 Auxiliary locks and associated products: Heavy duty steel sliding bolt latch with lockable handle and hasp. Dimensions of sliding bolt to be min 228mm x 127mm with the diameter of the bolt to be min. 19mm. Sliding bolt latch to be welded to new metal door for utility chase with continuous weld. Hasp to lock handle of sliding bolt latch into place with padlock, minimum diameter for pad lock to suit 16mm diameter shackle.

2.3 MISCELLANEOUS HARDWARE

.1 Padlocks: Extra heavy industrial keyed padlock with 16mm removal shackle harden boron alloy. Body to be constructed of hardened steel with a bump proof design. Cylinders to be drill and pick resistant.

.1 Lock body: 53mm x 92mm x 32mm.

.2 Security Rating: CEN 5.

2.4 FINISH

.1 Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional finishes shown by certain manufacturers for their products.

.2 Powder coat door closers to match other hardware, unless otherwise noted.

.3 Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame colour.

2.5 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Provide security screws, security nuts, rivets, spanner screws or other equally secure approved devices for affixing various hardware items.

.3 Use only rivets, security screws, or security nuts at locations where maximum security against removal is required.

.4 Use spanner screws only at locations where security against removal is not as important, and where it is necessary to remove and repair items from time to time.

.5 Security screws and nuts to have an extra head which twists off when screw or nut is fully secured, leaving main head without holes or slots for insertion of tool for removal.

.6 Spanner screws to have slots or holes that require a special spanner tool to remove screws.

.7 Round head screws not acceptable except at locations approved where material is not thick enough to permit counter-sinking.

.8 Standard screws not acceptable.

.9 Exposed fastening devices to match finish of hardware.

.10 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.11 Use fasteners compatible with material through which they pass.

2.6 KEYING

.1 Padlocks to be as directed by Departmental Representative. Prepare detailed keying schedule in conjunction with Departmental Representative.

.2 Prepare keying schedule in consultation with Departmental Representative. Keying system to include keying alike in groups, and keying differently. Submit schedule for approval.

.3 Master keying not allowed.

.4 Construction keying not allowed.

.5 Provide keys in triplicate for each key-code.

.6 Stamp key-code numbers on keys, prison lock cases, and institutional lock cylinders. Stamp year of issue on prison keys.

.7 Deliver keys via bonded courier or registered mail to person and place designated by Departmental Representative.

.8 Certify that lock manufacturer maintains a register listing all key-codes issued to this project to ensure that replacement keys may be ordered by key-code number only in future, and that locks added in future will not accidentally duplicate existing codes.

.9 Assign key-code numbers which identify the institution, plus the particular key-code within the institution.

.10 Key-code numbers which directly relate to the actual physical cuts on the keys, not allowed.

PART 3 - EXECUTION

3.1 ELECTRICAL COORDINATION

.1 Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.

.1 Do not proceed until unsatisfactory conditions have been corrected.

3.2 HARDWARE LOCATIONS

.1 Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.

.1 Recommended Locations for Builder’s Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).

3.3 INSTALLATION

.1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

.2 Supply metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Use only manufacturer's supplied fasteners.
.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

3.4 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
.1 Leave Work area clean at end of each day.

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
.3 Remove protective material from hardware items where present.
.4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00.

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

3.6 DEMONSTRATION

.1 Keying System Setup and Cabinet:
.1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
.2 Place file keys and duplicate keys in key cabinet on their respective hooks.
.3 Lock key cabinet and turn over key to Departmental Representative.

.2 Maintenance Staff Briefing:
.1 Brief maintenance staff regarding:
.1 Proper care, cleaning, and general maintenance of projects complete hardware.
.2 Description, use, handling, and storage of keys.

.3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.7 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.8 SCHEDULE

.1 Sliding Door 145 and 147:
1 – Southern Folger #1300 Trackset
1 – 212C Door Pull
1 – 214S Flush Pull
1 - 1017A Food Pass Lock
2 - 203FP Food Pass Hinges
1 - Kickplate 127mm high

.2 Sliding Door 146:
1 – Southern Folger #1300 Trackset
1 – 212C Door Pull
1 – 214S Flush Pull
1 - Kickplate 127mm high

.3 Access Door 145B:
3 – 204FMSS Hinges
1 – 10300M-1 x 24VAC Lock w/Best Removable Core Cylinders
1 – 200MRS DPS
2 – 214S Flush Pulls
1 - 420 Detention Door-Stop
1 – 906 Inmate Push Button, frame mounted
1 - Camden 7000 Series push switch with ASSA Abloy Cylinder, flush mounted

.4 Access Door 147B and 146B:
.1 3 - 204FMSS hinges.
.2 1 – Heavy duty sliding bolt latch
.3 1 – Heavy Industrial padlock

.5 Access Door 128B:
.1 2 - 204FMSS hinges.
.2 1 – Heavy duty sliding bolt latch
.3 1 – Heavy Industrial padlock

END OF SECTION

PART 1 – General

1.1 RELATED REQUIREMENTS

.1 Section 04 22 00 – CONCRETE MASONRY UNIT

.2 Section 07 92 00 – JOINT SEALANTS

.3 Section 08 80 00 – GLAZING

.4 Section 09 91 00 – PAINTING

.5 Section 11 19 12 – DETENTION HARDWARE

1.2 REFERENCE STANDARDS

.1 American National Standards Institute / National Association of Architectural Metal Manufacturers / Hollow Metal Manufactures Association

.1 NAAMM/HMMA 830-02, Hardware Selection for Hollow Metal Doors and Frames

.2 NAAMM/HMMA 840-17, Guide Specification for Receipt, Storage and Installation of Hollow Metal Doors and Frames

.3 NAAMM/HMMA 863-14, Guide Specifications for Detention Security Hollow Metal Doors and Frames

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

.1 ASTM A370-20: Test Methods and Definition for Mechanical Testing of Steel Products.

.2 ASTM A1011/A1011M-18a: Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

.3 ASTM A653/A653M-20, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM F1450-12a(2019): Standard Test methods for Hollow Metal Swinging Door Assemblies for Detention Facilities.

.3 American Welding Society (AWS)

.1 AWS B2.1/B2.1M:2014-AMD1: Specifications for Welding Procedure and Performance Qualifications

.4 CSA Group (CSA)

.1 CSA G40.20-13/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CSA W47.1-19, Certification of companies for fusion welding of steel

.3 CSA W59-18, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specification Manual 2020 plus amendments.

.6 National Fire Protection Association (NFPA)

.1 NFPA 80-19, Standard for Fire Doors and Fire Windows.

.2 NFPA 101-2021: Life Safety Code.

.3 NFPA 252-17, Standard Methods of Fire Tests of Door Assemblies.

.7 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113-A2016, Architectural Coatings.

.2 SCAQMD Rule 1168-A2017, Adhesives and Sealants Applications.

.8 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S104-2015, Standard Method for Fire Tests of Door Assemblies.

.2 CAN/ULC-S105-2016, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC-S104.

.9 Underwriters' Laboratories Inc. (UL)

.1 UL 752-05: Standard for Bullet-Resisting Equipment.

1.3 REQUIREMENTS OF REGULATORY AGENCIES

.1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC-S104 and NFPA 252 for ratings specified or indicated.

.2 Fire doors and frames to be ULC or ULI listed and labelled for fire protection ratings as indicated. Test products in conformance with CAN/ULC-S104, NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.4 SAMPLES

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

.2 Submit one 300 x 300 mm corner sample of each type of frame.

1.5 SHOP DRAWINGS AND INFORMATIONAL SUBMITTALS

.1 Submit product data: in accordance with Section 01 33 00.

.2 Submit shop drawings: in accordance with Section 01 33 00.

.1 Include door and frame elevations and sections.

.2 Indicate required anchorage and accessory items, field dimensions, and finishes.

.3 Show erection, construction, and other requirements not fully described by manufacturer’s data.

.4 Include a transverse and longitudinal section through the door showing construction and reinforcing.

.5 Include details of hardware reinforcements, joints, connections, and light cut-outs.

.6 Submit drawings stamped and signed by professional engineer registered in the Province of Ontario, Canada.

.7 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, and arrangement of hardware, fire rating and finishes.

.8 Indicate each type frame material, core thickness, reinforcements, location of anchors and exposed fastenings, fire rating, and finishes.

.9 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

.10 Submit test and engineering data, and installation instructions as outlined within this section.

.11 Do not proceed with fabrication without receipt of approved submittal drawings and approved hardware schedules.

.3 Quality Assurance Submittals:

.1 Reference list showing detention projects for which the manufacturer has supplied security hollow metal. Include dates of completion.

.2 Where fire-rated door or frame assemblies cannot be labeled, if acceptable to the Departmental Representative, furnish a "Certificate of Equivalence" from the manufacturer in lieu of label, certifying that design, materials, and construction are equal to tested and labeled assemblies.

.3 Mill Certification for materials used to fabricate specified items.

1.6 TESTS

.1 Doors to be tested to meet the following:

.1 Static Load: centrally apply load of 4000 kg at quarter points on door. Maximum deflection must not exceed 30 mm. Permanent set not to exceed 10.0 mm after release of load.

.2 Rack Test: Concentrate load of 2645 kg on one unsupported corner of the door. Door must not fail. Deflection must not exceed 50mm.

.3 Impact Load Test: Door to be mounted in a frame similar to installation conditions. Subject door to a series of impact loads of 271 Joules following a pattern of targets from a pendulum ram, see image on next page.

.1 Number of impacts shall be conducted as follows:

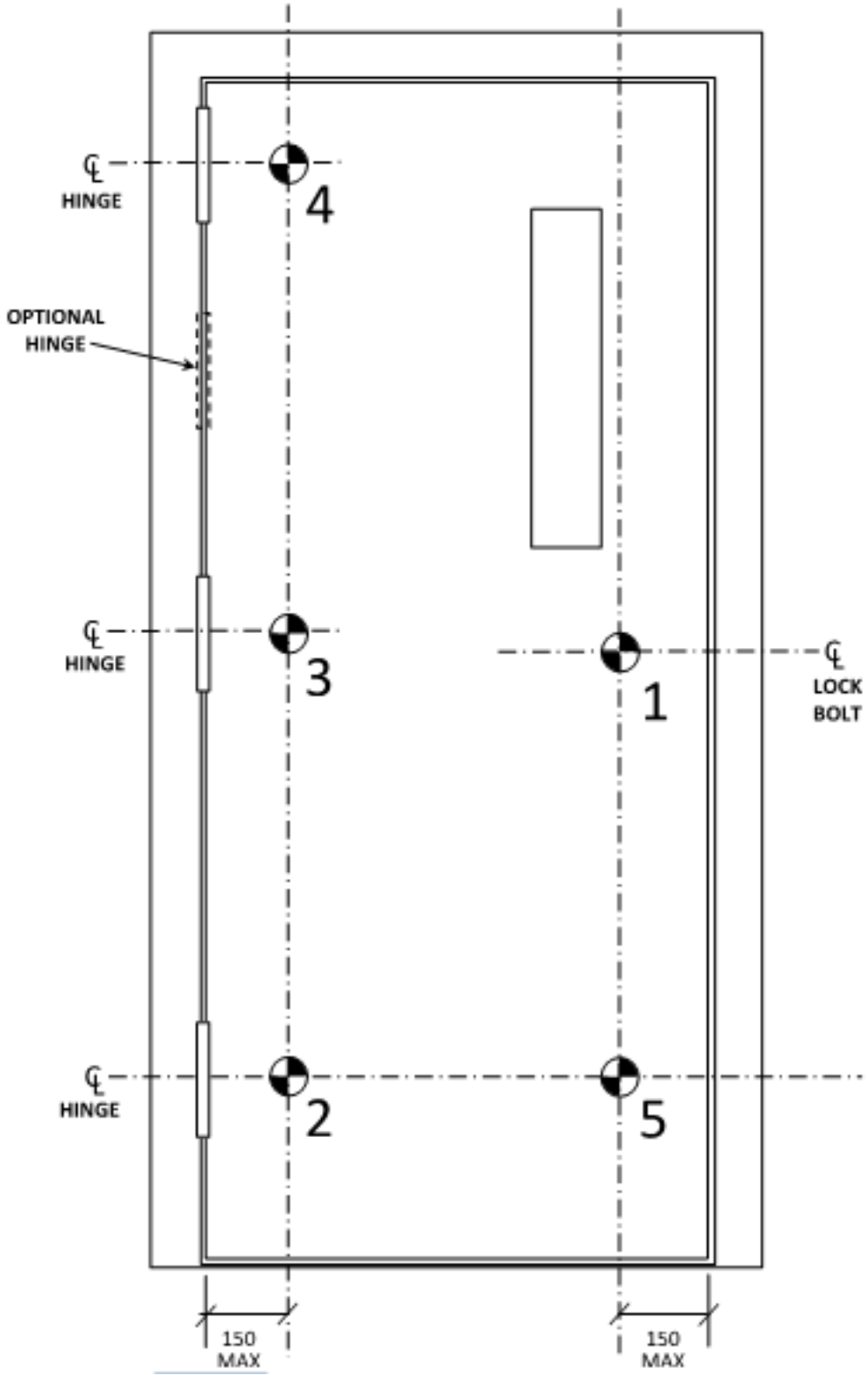
.1 200 lock or strike impacts (target 1)

.2 75 hinge impacts (targets 2, 3, &4)

.3 100 corner impacts (target 5)

.2 Door shall remain operable after each of the tests.

Pattern Locations for Targets of Impact Testing



1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications:

.1 Personnel and plant equipment capable of fabricating security hollow metal assemblies of the type specified.

.2 Meet the standards set by Hollow Metal Manufacturers Association, a division of the National Association of Architectural Metal Manufacturers for fabrication methods and product quality control.

.3 Member of National Association of Architectural Metal Manufacturers and subject to quality performance requirements.

.4 Provide security hollow metal work manufactured by a single firm specializing in the production of detention hollow metal work. Provide doors and frames from the same manufacturer.

.5 Welders currently qualified under AWS B2.1/B2.1M or certified under CSA W47.1 Classification 2.1 to perform the type of work required.

.6 At least 10 years of experience and 3 jobs of equal complexity which have been completed and occupied within the last 5 years. References shall include, but not be limited to the following:

.1 Name and location of project, date of occupancy and contract value.

.2 Name, address, and telephone numbers of the Owner's operations supervisor, Owner's maintenance supervisor, Owner, and General Contractor.

.3 Provide documentation of labeling ability as required on specified assemblies.

.7 Provide documentation of labeling ability as required on specified assemblies.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 unless noted otherwise within this section.

.2 Packing, Shipping, Handling, and Unloading:

.1 Carton, crate or palletize hollow metal doors, frames, and other items to provide protection in transit.

.3 Acceptance at Site:

.1 Conform to requirements of NAAMM/HMMA 840.

.2 Inspect for damage and shortages.

.3 Promptly repair minor damage. Clean and touch up with rust inhibitive primer or galvanizing repair paint as applicable.

.4 Storage and Protection:

.1 Conform to NAAMM/HMMA 840.

.2 Remove wrappings or coverings from doors and frames immediately upon delivery to the project site.

.3 Store materials in a dry covered area.

.4 Place materials on planking or blocking, at least 100mm off of the ground, 50 mm off of a paved area or floor slab. Do not store flat.

.5 Store doors and frames in an upright position with heads upper most. Place no more than 5 single opening frames or 3 multi-opening frames in a group. Provide, by means of wood strips, a space of at least 6 mm between all units to permit air circulation.

.6 Do not use non-vented plastic or canvas shelters which could create a humidity chamber.

.5 Waste Management and Disposal:

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

PART 2 – Products

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A653/A653M, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.

.2 Provide doors fabricated of cold-rolled, pickled and oiled stretcher leveled steel sheets with clean smooth surfaces. Door to be constructed with 2.0mm sheet steel on both sides as per NAAMM/HMMA 863. Form molded members straight with joints coped or mitered, and in true alignment. Welded joints on exposed surfaces shall be dressed smooth, to be invisible. Doors shall be custom made full flush design, internally reinforced, sound deadened and insulated, 50 mm thick to receive detention locks.

.3 Face sheets shall be mild steel fully welded on edges with continuous inner-reinforcements full height and width. Provide internally 3.2mm steel channel banding around complete door perimeter, spot welded to face sheet 75 mm on center. Inner reinforcements shall be truss design with triangular form, or interlocking channels with "Z" bar stiffeners, the shape of which cannot be altered without changing the length of the sides. Flat apexes shall be resistance spot welded on 70 mm centers horizontally and 75 mm centers vertically. Insulate each flute of reinforcement with minimum 24 kg/m^3 density rock wool.

.4 Bevel vertical door edges 3 mm in 50 mm and internally reinforced full length with 3 mm thick steel channels spot welded not over 75 mm on center inside both door faces. Close top and bottom door edges with continuous recessed 3.5mm channels extending the full width of the door and welded 76 mm on center maximum to both faces and continuously welded to the vertical door edge channels to form a single perimeter frame inside the door. Top and bottom edges of doors shall be finished flush, except for provisions for weatherproofing. Mortise, reinforce, drill and tap door edges to receive templated specified hardware in accordance with the approved hardware schedule and the hardware manufacturer's recommendations for the proper installation of hardware and detention equipment

.5 Clearances shall be coordinated with frame and in accordance with NAAMM/HMMA 863, Part 2, and Section 2.02.

.6 Doors shall be free from warpage, wind or buckle. Bends shall be of minimum radius for the thickness of metal used.

.7 Doors to be constructed to meet minimum 45 minute fire resistance rating.

.8 The removable glass stop shall consist of 3.2mm angle securely fastened to the frame using machine screws (6 mm #20UNRC: 25 mm at 150 mm on center and no more than 100 mm from corners). Exposed screw heads shall be button head type, and shall be Torx fitting tamperproof. The finished glass stop shall be tight fitting and mitered at the corner joints. There shall be a minimum 25 mm glass engagement.

2.2 DOOR FRAME FABRICATION

.1 Custom-made, fully assembled, factory-welded units of the size and shapes shown on the approved shop drawings. “Knock-down" frames will not be accepted. Coordinate frame dimension to thickness of door.

.2 Strong, rigid, neat in appearance, and free from defects. Frame members shall be clean cut, straight, and of uniform profile

.3 Form frames to provide mitered trim and butted stops. Join head and jamb members by continuous welds occupying the full depth and width of the frame. Grind exposed welds smooth and flush.

.4 When frames are for door light or food pass, fabricate members as closed tubular shapes having no visible seams or joints on exposed surfaces. Grind exposed welds smooth and flush.

.5 Frames over 1200 mm wide installed in masonry partitions shall have a channel stiffener not less than 2.5mm welded into the head at the factory.

.6 Protect cutouts and reinforcements with pressed steel mortar guards on the inside of the frame.

.7 Bottom sill anchors formed of not less than 2.66mm steel shall be securely welded to the bottom of each jamb.

.8 Frames for installation in masonry walls shall be provided with non-removable adjustable jamb anchors constructed of not less than 1.9mm material. Provide jamb anchors at 400 mm on center.

.9 Welded frames that are to be installed in previously prepared masonry openings shall be 12 mm smaller in width and 6 mm smaller in height than the masonry opening to provide 6 mm clearance on all sides.

.10 Removable glass stop for view window frame shall consist of 3.2mm angle securely fastened to the frame using machine screws of 6 by 32 mm spaced at 200 mm on center maximum. Exposed screw heads shall be round, pan, or oval type, and shall be Torx drive, tamperproof. The finished glass stop shall be tight fitting and mitered at the corner joints. There shall be a minimum of 25 mm glass engagement. Install plaster guards covering the glass stop screws on masonry grouted frames.

.11 Exposed screw heads shall be round, pan, or oval type, and shall be Torx drive, tamperproof.

.12 When shipping limitations dictate, frames for large openings shall be fabricated in sections designed for field welded splicing. Welds shall be ground smooth and primed for painting. Sections shall be assembled at the factory to ensure proper fit and be clearly marked for field reassembly.

.13 Door frames to be constructed to meet minimum 45 minute fire resistance rating.

2.3 DOOR REINFORCEMENT FOR HARDWARE

.1 Mortise, reinforce, drill, and tap doors at the factory for mortised hardware in accordance with the approved hardware schedule and templates. Doors to receive surface-mounted hardware shall have inner reinforcing plates for drilling and tapping to be performed in the field.

.2 For each mortised hinge, provide a reinforcing plate measuring 5 by 38 by 250 mm that is continuously welded inside the edge channel. The top hinge preparation shall be additionally braced by a channel, welded to the back of the hinge reinforcing plate and inside the edge reinforcing channel.

.3 Where detention locks are scheduled, provide reinforced pocket to receive locks. The secure side of the door shall be finished flush with a 5 mm backup plate to protect lock. Form the pocket perimeter of 2.6mm channels on three sides with the door edge channel completing the perimeter frame. Do not cut the door edge channel except for passage of the lock bolt. Provide a 5 mm thick steel mounting and protection plate to cover the lock pocket and extend at least 20 mm on three sides beyond the cutout. Secure the lock to the protection plate in accordance with the lock manufacturer's instructions. Secure the cover plate to the door by at least six 6 mm security-type machine screws. Make provisions so that removal of the lock is impossible when the lock bolt is extended.

.4 Reinforcements for door pulls shall be 10 mm steel welded inside door. Reinforcement size shall be 35 by 254 mm for loop type pull and 150 by 175 mm for flush type pull. Minimum 2.6mm reinforcing shall be welded inside the door for all other surface hardware items.

2.4 FRAME REINFORCEMENT FOR HARDWARE

.1 Mortise, reinforce, drill, and tap frames at the factory for templated mortised hardware, in accordance with the approved hardware schedules and templates. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates completely drilled and tapped for installation in the field.

.2 For each mortised hinge, provide a 4.5mm, off-set reinforcing plate that is factory drilled and tapped and measures 38 by 250 mm. Top hinge reinforcement shall be additionally braced by a 4.5mm backup angle welded to the reinforcement and to the inside of the frame trim.

.3 Where electrical frame-mounted locks are used, provide a special housing with a 4.5mm backup for attachment of the lock and a lock cover plate of the same thickness. Provide a junction box or enclosure behind each item of electrical hardware on the frame. Conduit shall be factory installed between interconnecting electrical items within each frame.

.4 All other mortised and surface-mounted hardware reinforcements shall be not less than 2.66mm.

2.5 FACTORY FINISHING

.1 After fabrication, dress, fill, and sand tool marks and surface imperfections to make faces and vertical edges smooth, level, and free of irregularities.

.2 Surfaces shall be chemically treated and cleansed of rust, oil, and impurities and given a phosphate treatment to ensure paint adhesion.

.3 Paint exposed surfaces of doors, and both inside and outside of frames with a minimum of one-mil thickness of rust inhibitive primer which shall be dried and completely cured to develop hardness before shipment.

2.6 OPENING PROVISIONS

.1 Conform to “Guide Specifications for Detention Security Hollow Metal Doors and Frames”, NAAMM/HMMA 863.

.2 Food Pass/Cuff Port Openings:

.1 Provide where shown on the drawings or specified in the detention hardware section schedule of hardware sets.

.2 Opening: flush using 2.6mm minimum interior channels securely welded to the inside of both face sheets.

Continuously arc weld and dress smooth the four corner seams.

.3 Fabricate from two 2.5mm steel plates, spot welded together to produce an inset fit that, when closed, will prevent tampering with the lock and hinges.

.4 Treat for maximum paint adhesion and apply rust inhibitive primer.

.3 Removable Glazing Stops:

.1 Provide 25 x 25x 3 mm steel angle fastened to opening frame at maximum 150 mm on center and 75 mm maximum from corners. Provide Torx Security Plus, round, pan, or oval head M6-1, machine screw security fasteners

.2 Provide stainless steel Torx security plus screws for exterior and shower area removable glass stops.

2.7 CLEARANCES AND TOLERANCES

.1 Unless otherwise specified or required by Code, edge clearances and manufacturing tolerances for swinging doors, shall conform to NAAMM/HMMA 863.

2.8 HARDWARE LOCATIONS

.1 Unless otherwise indicated or required by Code, locate hardware in accordance with NAAMM/HMMA 830.

PART 3 – Execution

3.1 EXAMINATION

.1 Examine the conditions under which security hollow metal doors and frames are to be installed. Notify the Departmental Representative in writing of conditions which may be detrimental to the satisfactory and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Prior to installation, examine frames and correct for size, swing, squareness, alignment, twist, and plumbness.

3.3 INSTALLATION /ERECTION

.1 Install in accordance with final, approved, shop drawings and manufacturer's instructions, and as specified.

.2 Frames:

.1 Comply with the NAAMM/HMMA 840.

.2 Place frames prior to construction of enclosing walls and ceilings.

.1 Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set.

.2 Install a minimum of two wood frame spreaders as shown in the installation guides. Do not use temporary bottom shipping spreaders for installation.

.3 Install anchors at locations and in quantities specified or shown on drawings.

.3 Doors:

.1 Fit doors accurately in their respective frames in accordance with NAAMM/HMMA 840.

.2 Maintain specified door clearances, except for special conditions otherwise noted.

3.4 FIELD QUALITY CONTROL – DOOR AND FRAME

.1 Installation Records:

.1 Prepare and Maintain written records showing that:

.1 Installers have been instructed about the proper installation procedures and acceptable tolerances.

.2 Verify installation of frames for squareness, alignment, twist, and plumbness.

.3 Check that edge clearances for swinging doors do not exceed that specified under “Manufacturing Tolerances” in Part 2 of this specification. Metal hinge shims may be used to maintain clearances.

.4 Verify that all glazing sealant is pick resistant type.

3.5 FIELD QUALITY CONTROL – DOOR HARDWARE

.1 Follow Departmental Representative instructions regarding all observed or detected non-compliances or inconsistencies in order to ensure doors and hardware are properly and securely installed and functioning properly.

3.6 ADJUSTING AND CLEANING

.1 Keep hollow metal surfaces clean and free of grout, tar, or other bonding material or sealer. Clean material off of frames and doors immediately following installation.

.2 Leave work clean and in proper operating condition. Remove defective work and replace with new material. Defective work includes but is not limited to doors and frames which are warped, bowed, or damaged.

.3 Finish smooth exposed field welds and touch up with rust inhibitive primer.

.4 Touch up primed or painted surfaces which have been scratched or marred during installation. Use rust inhibitive primer.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 National Fire Prevention Association (NFPA)

.1 NFPA 13-2019, Standard for the Installation of Sprinkler Systems.

.2 NFPA 25-2020, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.2 Indicate:

.1 Materials.

.2 Finishes.

.3 Method of anchorage

.4 Number of anchors.

.5 Supports.

.6 Reinforcement.

.7 Assembly details.

.8 Accessories.

.4 Samples:

.1 samples of following:

.1 Each type of sprinkler head.

.5 Test reports:

.1 Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.7 Manufacturers' Instructions:

.1 Provide manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 in accordance with NFPA 20.

.2 Manufacturer's Catalog Data, including specific model, type, and size for:

.1 Pipe and fittings.

.2 Sprinkler heads.

.3 Pipe hangers and supports.

.4 Mechanical couplings.

.3 Drawings:

.1 Sprinkler heads and piping system layout.

.1 Prepare 760 mm by 1050 mm detail working drawings of system layout in accordance with NFPA 13, "Working Drawings (Plans)".

.2 Show data essential for proper installation of each system.

.3 Show details, plan view, elevations, and sections of systems supply and piping.

.4 Show piping schematic of systems supply, devices, valves, pipe, and fittings.

.2 Electrical wiring diagrams.

.4 Design Data:

.1 Calculations of sprinkler system design.

.2 Indicate type and design of each system and certify that each system has performed satisfactorily in the manner intended for not less than 18 months.

.5 Field Test Reports:

.1 Preliminary tests on piping system.

.6 Records:

.1 As-built drawings of each system.

.1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.

.2 Submit 760 mm by 1050 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.

.7 Operation and Maintenance Manuals:

.1 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in wet sprinkler systems with documented experience.

.2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00.

.2 Provide spare sprinklers and tools in accordance with NFPA 13.

1.6 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

.3 Storage and Protection:

.1 Store materials indoors in dry location.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

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

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, and as follows:

.1 All areas shall be designed for hazard coverage indicated with design area and associated densities.

.2 Pipe size and layout:

.1 Hydraulic design.

.2 Sprinkler head layout to NFPA 13 or as directed by authorities having jurisdiction

.3 The hydraulic design shall be sized to accommodate the higher and most remote zones.

.4 Allow for additional sprinkler heads and pipe distribution to suit all existing interferences.

.5 When sidewall sprinklers listed for light hazard occupancies are used, pipe sizing and spacing shall be according to ordinary hazard rules.

.3 Water supply:

.1 Base design on NFPA 13 and obtain water supply for appropriate fire hydrants from municipality. Conduct

flow and pressure test of water supply in vicinity of project to verify municipal data and to obtain criteria for basis of design. Adjust water test values to allow for peak period water usage.

.2 Hydraulic calculations shall commence at water main connection at source. Provide as part of hydraulic calculation submission, fire hydrant flow test data and deduct 10% as safety factor based on available pressure value.

.4 Zoning:

.1 System zoning as indicated (existing zoning to remain)

.2 Reuse existing isolating valve and flow switch for each zone and as indicated.

.3 Minimum operating pressure for institutional horizontal sidewall sprinkler-heads shall be 207 kPa to provide maximum horizontal spray discharge for light hazard occupancy and hydraulic calculations for uniform distribution of water over design area.

.2 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.

.3 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with detailed shop drawings. Allow for additional sprinkler heads and pipe distribution to suit all existing interferences.

.4 Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.

.5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.

.6 Location of Sprinkler Heads:

.1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for light hazard occupancy.

.2 Uniformly space sprinklers on branch, where applicable.

.7 Water Distribution:

.1 Make distribution uniform throughout the area in which sprinkler heads will open.

.2 Discharge from individual heads in hydraulically most remote area to be 100% of specified density.

2.2 ABOVE GROUND PIPING SYSTEMS

.1 Provide fittings for changes in direction of piping and for connections.

.1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.

.2 Perform welding in shop; field welding will not be permitted.

.3 Conceal piping in all areas.

2.3 PIPE, FITTINGS AND VALVES

.1 Pipe:

.1 Ferrous: to NFPA 13.

.2 Fittings and joints to NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.

.2 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.

.3 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will not be permitted.

.4 Rubber gasketted grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.

.5 Fittings: ULC approved for use in wet pipe sprinkler systems.

.6 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

.7 Side outlet tees using rubber gasketted fittings are not permitted.

.8 Sprinkler pipe and fittings: metal.

.3 Pipe hangers:

.1 listed for fire protection services in accordance with NFPA.

2.4 SPRINKLER HEADS

.1 General: to NFPA 13 and ULC listed for fire services.

.2 Sprinkler Head Types:

.1 Institutional pendant chrome link and lever type.

.2 Institutional sidewall chrome link and lever type.

.3 Provide nominal 13 mm orifice sprinkler heads.

.1 Release element of each head to be fusible alloy solder link of intermediate temperature rating or higher as suitable for specific application.

.2 Provide corrosion-resistant sprinkler heads in accordance with NFPA 13.

.3 Provide institutional type sprinkler heads. Heads shall be designed to break away under an applied load of not more than 50kg. Each load shall be complete with a conical escutcheon assembly firmly attached to the sprinkler body with tamper resistant fasteners. Each sprinkler head shall be complete with heavy duty retaining flange which connects to sprinkler pipe and prevents sprinkler movement.

.4 Upright Sprinkler Head:

.1 Upright bronze, quick response for hazard coverage as indicated, 5.6 K factor, corrosion resistant coating,

chrome finish, fusible link type; 68°C rated, 13mm orifice.

.5 Pendant Sprinkler Head:

.1 Bronze, quick response for hazard coverage as indicated, 5.6 K factor, corrosion resistant coating, chrome finish, fusible link type; 68°C rated, 13mm orifice.

.6 Horizontal Sidewall Institutional Sprinkler Head:

.1 13mm dia. orifice automatic sprinkler with deflector and conical escutcheon. Flush style arrangement

.2 The institutional sprinkler head shall be designed to breakaway under an applied load of not more than 50 kg.

.3 The sprinkler shall utilize a meltaway fusible alloy solder principle of operation.

.4 The sprinkler and conical escutcheon shall be chrome plated. The conical escutcheon assembly shall be firmly attached to the sprinkler body with tamper resistant fasteners.

.5 Sprinkler shall be complete with heavy duty retaining flange which connects to sprinkler pipe and prevents sprinkler movement.

2.5 PIPE SLEEVES

.1 Provide pipe sleeves where piping passes through walls, floors, and roofs.

.2 Secure sleeves in position and location during construction.

.3 Provide sleeves of sufficient length to pass through entire thickness of wall, floors, and roofs.

.4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.

.1 Firmly pack space with mineral wool insulation.

.2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass.

.3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.

.5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide hot-dip galvanized steel, sleeves.

.2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.

.6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide 0.61 mm thick galvanized steel sheet.

2.6 ESCUTCHEON PLATES

.1 Provide one piece type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished chrome in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

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 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

.2 Coordinate sprinkler head locations with reflected ceiling plans, plumbing, architectural, electrical and HVAC plans and existing building systems.

.3 After completion of sprinkler system, the sprinkler contractor shall furnish a written statement or certificate as per NFPA and to the effect that the work covered by the contract has been completed in accordance with approved tender documents. Provide copies of test certificates.

3.3 PIPE INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.

.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.

.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

.4 Inspect piping before placing into position.

.5 Provide guards on sprinkler heads in all mechanical rooms, electrical rooms, service spaces/closets, janitor closets, recycling/garbage rooms, storage areas and below staircases in circulation areas.

3.4 DISINFECTION

.1 Disinfect new piping and existing piping.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.

.4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.5 FIELD PAINTING

.1 Refer to Section 09 91 23.

3.6 FIELD QUALITY CONTROL

.1 Site Test, Inspection:

.1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.

.2 Test, inspect, and approve piping before covering or concealing.

.3 Preliminary Tests:

.1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.

.2 Flush piping with potable water in accordance with NFPA 13.

.3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.

.4 Formal Tests and Inspections:

.1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.

.2 Submit written request for formal inspection at least 15 days prior to inspection date.

.3 Repeat required tests as directed.

.4 Correct defects and make additional tests until systems comply with contract requirements.

.5 Furnish appliances, equipment, instruments, connecting devices, and personnel for tests.

.6 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.

3.7 CLEANING

.1 Clean in accordance with Section 01 74 00.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 ASTM International (ASTM)
- .1 ASTM A126-04(2019), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
- .2 ASTM B62-17, Standard Specification for Composition Bronze or Ounce Metal Castings.

.2 CSA Group (CSA)
- .1 CSA B64 Series-11(R2021), Backflow Preventers and Vacuum Breakers.
- .2 CSA B79-08(R2018), Commercial and Residential Drains and Cleanouts.
- .3 CSA B125.1, P-18/ASME A112.18.1-18 – Plumbing Supply Fittings.

.3 Efficiency Valuation Organization (EVO)
- .1 International Performance Measurement and Verification Protocol (IPMVP).
  - .1 IPMVP Core Concepts 2014.

.4 National Research Council Canada (NRC)
- .1 National Plumbing Code of Canada 2015 (NPC).

.5 Plumbing and Drainage Institute (PDI)
- .1 PDI-WH201-2017, Water Hammer Arresters Standard.

.6 American National Standards Institute (ANSI)
- .1 ANSI/ISEA Z358.1-2014, Emergency Eyewash and Shower Equipment.

.7 American Association of State Highway and Transportation Officials (AASHTO), H-20 Load Requirements

1.2 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00.

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
- .2 Indicate dimensions, construction details and materials for specified items.
- .3 Submit WHMIS SDS. Indicate VOC's for adhesive and solvents during application and curing.

.3 Shop Drawings:

.1 Submit shop drawings to indicate materials, finishes, method of anchorage, number of anchors, dimensions construction and assembly details and accessories for items specified herein.

.4 Instructions: submit manufacturer's installation instructions.

.5 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00, include:

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

1.3 QUALITY ASSURANCE

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Waste Management and Disposal:

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

PART 2 PRODUCTS

2.1 FLOOR DRAINS

.1 Floor Drains: to CSA B79.

.2 Type 1: general duty; cast iron body round, adjustable head, sediment basket nickel bronze strainer, integral seepage pan, clamping collar, trap primer tapping, c/w vandal-proof screws Grate openings shall consist of multiple holes approximately 10mm in diameter.

2.2 CLEANOUTS

.1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

2.3 WATER HAMMER ARRESTORS

.1 Hard drawn copper construction, bellows piston type: to PDI-WH201.

2.4 TRAP SEAL PRIMERS

.1 Brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install in accordance with National Plumbing Code of Canada 2015, Ontario Building Code 2012, and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

.1 Install cleanouts at base of soil and waste stacks, at locations required code, and as indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor, or unless indicated otherwise.

3.4 3.04 WATER HAMMER ARRESTORS

.1 Install on branch supplies to fixtures in laundry rooms, showers and where indicated.

3.5 3.05 TRAP SEAL PRIMERS

.1 Install for floor drains and elsewhere, as indicated.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.

.3 Install minimum 10mm dia. soft copper plastic tubing to floor drain.

3.6 START-UP

.1 Timing: start-up only after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.2 Provide continuous supervision during start-up.

3.7 TESTING AND ADJUSTING

.1 Timing:

.1 After start-up deficiencies rectified.

.2 After certificate of completion has been issued by authority having jurisdiction.

.2 Application tolerances:

.1 Pressure at fixtures: +/- 70 kPa.

.2 Flow rate at fixtures: +/- 20%.

.3 Adjustments:

.1 Verify that flow rate and pressure meet design criteria.

.2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.

.4 Floor drains:

.1 Verify operation of trap seal primer.

.2 Prime, using trap primer. Adjust flow rate to suit site conditions.

.3 Check security, accessibility, removeability of strainer.

.4 Clean out baskets.

.5 Access doors:

.1 Verify size and location relative to items to be accessed.

.6 Cleanouts:

.1 Verify covers are gas-tight, secure, yet readily removable.

.7 Water hammer arrestors:

.1 Verify proper installation of correct type of water hammer arrestor.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American Society of Mechanical Engineers International (ASME)
- .1 ASME B16.15-2018, Cast Copper Alloy Threaded Fittings: Classes 125 and 250.
- .2 ASME B16.18-2018, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ASME B16.22-2018, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
- .4 ASME B16.24-2016, Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 ASTM International Inc. (ASTM)
- .1 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
- .2 ASTM B88M-20, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American Water Works Association (AWWA)
- .1 AWWA C111/A21.11-17, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Ontario Regulation 332/12 Ontario Building Code.

.5 Canadian Standards Association (CSA International)
- .1 CSA B242-05(R2016), Groove and Shoulder Type Mechanical Pipe Couplings.

.6 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

.7 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Safety Data Sheets (SDS).

.8 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
- .1 MSS SP-80-2019, Bronze Gate, Globe, Angle and Check Valves.

.9 National Research Council (NRC)/Institute for Research in Construction
- .1 NRCC 47668, National Plumbing Code of Canada (NPC) - 2015.

.10 Transport Canada (TC)
.1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

.11 Underwriters Laboratories of Canada (ULC)
.1 CAN/ULC-S101-14, Fire Endurance Tests of Buildings Construction and Materials.
.2 CAN/ULC-S102.2:18, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.
.3 CAN/ULC-S115:18, Standard Method of Fire Tests of Firestop.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management:

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Place materials defined as hazardous or toxic in designated containers.

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

PART 2 PRODUCTS

2.3 PIPING

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.

2.4 FITTINGS

.1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ASME B16.24.

.2 Cast bronze threaded fittings, Class 125 and 250: to ASME B16.15.

.3 Cast copper, solder type: to ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ASME B16.22.

.5 NPS 2 and larger: roll grooved to CSA B242.

2.5 JOINTS

.1 Rubber gaskets, latex-free 1.6 mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin copper alloy.

.4 Teflon tape: for threaded joints.

.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM flush seal gasket.

.6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

2.6 BALL VALVES

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01.

.2 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, stainless steel ball, PTFE adjustable packing, brass gland and PTFEseat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01.

PART 3 EXECUTION

3.3 APPLICATION

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

3.4 INSTALLATION

.1 Install in accordance with NPC, Ontario Plumbing Code and local authority having jurisdiction.

.2 Install pipe work in accordance with Section 23 05 05, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.

.5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

3.5 VALVES

.1 Isolate fixtures and branches with ball valves.

3.6 PRESSURE TESTS

.1 Conform to requirements of Section 23 05 00.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.7 PRE-START-UP INSPECTIONS

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

.3 Ensure that pressure booster systems are operating properly.

.4 Ensure that air chambers, expansion compensators are installed properly.

3.8 DISINFECTION

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Departmental Representative.

.2 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.9 START-UP

.1 Timing: Start up after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.4 Water treatment systems operational.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:

.1 Establish circulation and ensure that air is eliminated.

.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.

.3 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.

.4 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.10 PERFORMANCE VERIFICATION

.1 Scheduling:

.1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.

.2 Procedures:

.1 Verify that flow rate and pressure meet Design Criteria.

.2 TAB HWC in accordance with Section 23 05 93.

.3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.

.4 Sterilize HWS and HWC systems for Legionella control.

.5 Verify performance of temperature controls.

.6 Verify compliance with safety and health requirements.

.7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

3.11 OPERATION REQUIREMENTS

.1 Provide detail specification requirements for operation and maintenance requirements including, cleaning and maintenance of specified materials and products for this project or co-ordinate with Section 23 05 05.

.2 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 00.

3.12 CLEANING

.1 Clean in accordance with Section 01 74 00.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Sections 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

ASTM International Inc.

.1 ASTM B32-08(2014), Standard Specification for Solder Metal.

.2 ASTM B306-20, Standard Specification for Copper Drainage Tube (DWV).

.3 ASTM C564-14, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 National Research Council (NRC)/Institute for Research in Construction.

.1 National Plumbing Code of Canada (NPC) 2015.

.3 Canadian Standards Association (CSA International).

.1 CSA B137 Series-20, Thermoplastic Pressure Piping Compendium.

.2 CSA B70:19, Cast Iron Soil Pipe, Fittings and Means of Joining.

.3 CSA B125.3-18, Plumbing Fittings.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00.

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

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

PART 2 PRODUCTS

2.1 COPPER TUBE AND FITTINGS

.1 Above ground sanitary and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CSA B125.3.

.2 Wrought copper: to CSA B125.3.

.2 Solder: lead free, tin-copper alloy 95:5, type TA, to ASTM B32.

2.2 CAST IRON PIPING AND FITTINGS

.1 Buried sanitary and vent minimum NPS 3, to: CSA B70, with one layer of heavy bituminous protective coating.

.1 Mechanical Joints:

.1 Provide hubless soil pipe couplings designated as heavy weight, constructed of extra wide 4 to 6 band corrugated type 304 stainless steel bands, with heavy duty worm drive clamps.

.2 Flanged gasket to be made of neoprene rubber, meeting ASTM C564.

.3 Tightened to 9.0 N-m torque.

.2 Above ground sanitary and vent: to CSA B70.

.1 Joints:

.1 Provide hubless soil pipe couplings designated as heavy weight, constructed of extra wide 4 to 6 band corrugated type 304 stainless steel bands, with heavy duty worm drive clamps.

.1 Flanged gasket to be made of neoprene rubber, meeting ASTM C564.

.2 Tightened to 9.0 N-m torque.

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 INSTALLATION

.1 In accordance with Section 23 05 05.

.2 Install in accordance with National Plumbing Code, Ontario Plumbing Code and local authority having jurisdiction.

.3 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space and to grade as indicated.

.4 Support of piping to be in accordance with NPC.

3.3 TESTING

.1 Hydraulically test to verify grades and freedom from obstructions.

3.4 PERFORMANCE VERIFICATION

.1 Cleanouts:

.1 Ensure accessible and that access doors are correctly located.

.2 Open, cover with linseed oil and re-seal.

.3 Verify that cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.4 Affix applicable label (sanitary, vent, etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

.1 American Society for Mechanical Engineers (ASME/Canadian Standards Association (CSA)
.1 ASME A112.18.1-2018/CSA B125.1-18, Plumbing Supply Fittings.
.2 ASME A112.18.2-2015/CSA B125.2-15, Plumbing Waste Fittings.
.3 ASME A112.19.2-2018/CSA B45.1-18, Ceramic Plumbing Fixtures.
.4 ASME A112.19.3-2017/CSA B45.4-17, Stainless Steel Plumbing Fixtures.
.5 ASME A112.19.5-2017/CSA B45.15-17, Flush Valves and Spuds for Water Closets, Urinals, and Tanks.

.3 CSA Group (CSA)
.1 CSA B125.3-18, Plumbing Supply Fittings.
.2 CSA B651-18, Accessible Design for the Built Environment.
.3 CSA B45.4-17/ASME A122.19.3-2017, Stainless Steel Plumbing Fixtures.
.4 CSA B45.5-17/IAPMO Z124-2017, Plastic Plumbing Fixtures.
.5 CSA B45.8-18/IAPMO Z403-2018, Terrazzo, Concrete, Composite Stone, and Natural Stone Plumbing Fixtures.
.6 CSA B125.3-18, Plumbing Fittings. CSA B651-18, Accessible Design for the Built Environment.

.5 National Research Council Canada (NRC)
.1 National Building Code of Canada 2015 (NBC).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:
.1 Submit manufacturer's instructions, printed product literature and data sheets for washroom fixtures and include product characteristics, performance criteria, physical size, finish and limitations.
.2 Indicate fixtures and trim:
.1 Dimensions, construction details, roughing-in dimensions.
.2 Factory-set water consumption per flush at recommended pressure.
.3 (For water closets, urinals): minimum pressure required for flushing.

1.3 CLOSEOUT SUBMITTALS

.1 Include:
.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.
.3 List of recommended spare parts.

1.4 PRODUCTS

.1 This specification requires the procurement, installation, and commissioning of the drug loo model “covert”, from SWS Detention, unit 1 2120 Notre Dame Avenue Winnipeg Manitoba R3H 0K1. Paul Smith, telephone 204-779-1982, paul@swsgroupinc.ca.

.2 The Departmental Representative, Consultant, and Client have been unable to identify a comparable alternate source of a known product that meets the requirements of the required drug loo equipment. In addition to providing for the above mentioned equipment in their submission, the Contractor is permitted to propose an alternate known product that provides the same functionality as the equipment identified above, and meets the minimum specifications below. The Contractor shall notify the Contracting Officer and provide their alternate proposal a minimum of 1 week prior to tender closing.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:
.1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store and protect from nicks, scratches, and blemishes.
.3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

.1 Fixtures: manufacture in accordance with ASME A112 Series and CAN/CSA-B45 Series.

.2 Trim, fittings: manufacture in accordance with CSA B125.3.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: as indicated.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

.7 Water closets:
WC-1: secure type, barrier free.
.1 Blowout jet water closet 450 mm high fabricated from 14 gauge, type 304 stainless steel. Construction shall be seamless welded with exposed surfaces satin finished except seat area which shall have high polish finish. Elongated bowl with self draining flush rim. Trap shall pass a 54 mm diameter ball and be fully enclosed. Fixture shall withstand loading of 2260 kg without permanent damage. Flush valve (13.25 lpf) integral with unit. Fixture shall be furnished with necessary concealed fasteners for proper high security installation and secure wall sleeve

.8 Drug loo banned substances recovery unit:
The banned substances recovery unit shall be fabricated from 316 stainless steel and connect to and receive all waste from WC-1. The unit shall separate banned substances from faeces, send all fecal matter to sanitary drain then rinse and sanitize any remaining banned substances. Unit shall be provided with:
.1 Anti-microbial concentrate dispenser system for sterilization.
.2 Control panel to allow operator select recovery mode, normal mode(no recovery), Chamber wash, Rotate turntable and sanitize mode. During recovery mode, water supply to w/c is to be shut off until recovery process completes.
.3 12v DC power supply for control unit.

.9 Fixture piping:
.1 Hot and cold water supplies to fixtures:
.1 Chrome plated rigid flexible supply pipes with screwdriver handwheel stop, reducers, escutcheon.

.2 Waste:
.1 Brass P trap with clean out on fixtures not having integral trap.
.2 Chrome plated in exposed places.

.10 Chair carriers:
.1 Factory-manufactured floor-mounted carrier systems for wall-mounted fixtures.

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 washroom fixtures installation in accordance with manufacturer's written instructions.
.1 Visually inspect substrate.
.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Mounting heights:
.1 Standard: see architectural details.
.2 Wall-hung fixtures: see architectural details.
.3 Barrier-free: to CSA B651.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:
.1 Adjust water flow rate to design flow rates.
.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
.3 Adjust flush valves to suit actual site conditions.

.3 Checks:
.1 Water closets, urinals: flushing action.
.2 Aerators: operation, cleanliness.
.3 Vacuum breakers, backflow preventers: operation under all conditions.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.
.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.

.3 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American Society for Mechanical Engineers (ASME/Canadian Standards Association (CSA)
- .1 ASME A112.18.1-2018/CSA B125.1-18, Plumbing Supply Fittings.
- .2 ASME A112.18.2-2015/CSA B125.2-15, Plumbing Waste Fittings.

.2 CSA Group (CSA)
- .1 CSA B125.3-18, Plumbing Fittings.
- .2 CSA B651-18, Accessible Design for the Built Environment.

.3 National Research Council Canada (NRC)
- .1 National Building Code of Canada 2015 (NBC).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

- .1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00.

.2 Include:

- .1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.
- .2 Details of operation, servicing, maintenance.
- .3 List of recommended spare parts.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00.

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

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

PART 2 PRODUCTS

2.1 MANUFACTURED SHOWER UNITS

.1 Trim, fittings: manufacture in accordance with CSA B125.3.

.2 Exposed plumbing brass to be chrome plated.

.3 Number, locations: architectural drawings to govern.

.4 All fixtures to be product of one manufacturer.

.5 Trim in any one location to be product of one manufacturer and of same type.

.6 Characteristics common to all shower units:

- .1 Cabinet type stand-alone stalls.
- .2 Cabinet fabricated from 1.9mm thick type 304 stainless steel.
- .3 Floor fabricated from 3.0mm thick type 304 stainless steel.
- .4 Knock-down construction, with all tamper-proof stainless steel screws.
- .5 Exposed stainless steel surfaces polished to #4 satin finish, except floor which shall have a non-slip glass blast finish.
- .6 Units shall require no accessible chase area for installation or maintenance.
- .7 Underside of stall shall be sound-deadened with fire-resistant material.
- .8 25mm rigid insulation shall be adhered to the exterior of rear and side walls of stall for sound attenuation.
- .9 Recessed stainless steel soap dish attached from behind and places to minimize interference with adjacent walls or shower cabinets.
- .10 All trim and attachments shall be tamper-resistant and anti-suicide.

.7 SH-1: Accessible shower stall.

- .1 Will comply with ADA and CSA B651-18 and AODA accessibility requirements.
- .2 Will have maximum 12.7mm high transom at entrance.
- .3 Will have a 1.9mm thick stainless steel removable access panel in side wall for shower head, valve, and soap dish. Panel shall be attached with vandal-resistant security screws.
- .4 Vandal-resistant, anti-suicide showerhead.
  - .1 Fixed position.
  - .2 303 stainless steel
  - .3 Mounted from rear w/ no visible fasteners.
  - .4 30 degree angle of spray.
  - .5 9.46 litres per minute (2.5 gpm).
  - .6 Mounted 1830mm above shower floor.
- .5 Single-temperature pneumatic valve.
  - .1 Hot and cold pressure balancing valve with anti-scald feature.
  - .2 Diaphragm activated.

.3 Self-closing valve assembly.

.4 Hold-open metering range from 5-90 seconds.

.5 Pushbutton operation, requiring less than 22N (5 lbs.) of force to operate, mounted 1220mm above shower floor.

.6 Valve assembly accessible from behind only.

.7 Pneumatic system shall be entirely self-contained and shall require no outside air supply.

.6 Drain:

.1 With removable grid strainer grate secured with tamper-proof screws.

.7 Stainless steel solid welded seat:

.1 38mm diameter 1.5mm thick stainless steel tubing.

.2 Minimum 38mm radius on all protruding corners.

.3 14 gauge stainless steel seat panel.

.4 Seat height 457mm above shower floor.

.8 Anti-suicide grab bars:

.1 Type 304 stainless steel polished to #4 satin finish.

.2 Shall have 3.0mm thick stainless steel plate, with weep holes, welded to bottom and extending to the shower wall.

.3 Attached to shower wall with tamper-resistant security screws.

.9 Shower dimensions: 910mm x 1625mm x 2235mm high.

2.2 ACCESSORIES

.1 Break-away towel hook

.1 Wall mounted with tamper-proof security screws.

.2 Stainless steel.

.3 Anti-suicide and tamper-proof.

.2 Hookless, break-away shower curtain:

.1 Curtain of flame-retardant 6 gauge vinyl with anti-bacterial properties.

.2 Curtain to have clear panel on top 1/3 and bottom 1/4 of height. Colour: from manufacturer's standard range of colours.

.3 Affixed to interior top rail of shower cabinet with full-length hook-and-loop strip.

2.3 FIXTURE PIPING

.1 Waste:

.1 Brass P trap with cleanout on each fixture not having integral trap.

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 INSTALLATION

.1 Mounting heights:

.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

.2 Physically handicapped: to comply with most stringent of either NBCC or CSA B651-18.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 00.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 TRIAL USAGE

.1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 Exhaust fans.

.2 Showers

1.2 PROTECTION OF OPENINGS

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

1.3 PAINTING

.1 Prime and touch up marred finished paintwork to match original.

.2 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

1.4 SPARE PARTS

.1 Furnish spare parts in accordance with Section 01 78 00 as follows:

.1 One spare thermostatic mixing valve for each shower.

.2 One spare, metering control unit for each shower.

1.5 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01 78 00.

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

1.6 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.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 Where specified elsewhere in Divisions 21, 22 and 23, manufacturers to provide demonstrations and instructions.

.3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, Departmental Representative may record these demonstrations on video tape for future reference.

1.7 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00.

.2 Operation and maintenance manual to be approved by, and final copies deposited with, Departmental Representative before final inspection.

.3 Operation data to include:

.1 Control schematics for each system including environmental controls.

.2 Description of each system and its controls.

.3 Description of operation of each system at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for each system and each component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.4 Maintenance data shall 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.

.5 Performance data to include:

.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified elsewhere.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93.

.6 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless so directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.7 Additional data:

.1 Prepare and insert into operation and maintenance manual when need for same becomes apparent during demonstrations and instructions specified above.

1.8 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00.

.2 Shop drawings and product data shall show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances (eg. access door swing spaces).

.3 Shop drawings and product data shall be 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 as to current model production.

.5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 33 00: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

1.9 CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of fans and new and existing ductwork in area of work.

1.10 AS-BUILT DRAWINGS

.1 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of the work. Mark there on all changes as work progresses and as changes occur. This shall include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 On a weekly basis, transfer information to reproducibles, revising reproducibles to show all work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection at all times.

.2 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing (TAB), 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 Departmental Representative for approval and make corrections as directed.

.4 TAB to be performed using as-built drawings.

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

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

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Do not dispose of unused paint material into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

.3 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.4 Dispose of corrugated cardboard, polystyrene, plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

1.12 HALOCARBONS

.1 Comply with Federal Halocarbon Regulations 2003 under the Canadian Environmental Protection Act 1999, EPAM and PSPC Ontario Region Halocarbon Information Sheet dated March 2010.

1.13 EQUIPMENT REQUIREMENTS AND INSTALLATIONS

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.

.3 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

.4 Provide new materials and equipment of proven design, quality and of current models with published ratings for which replacement parts are readily available. Materials and equipment must be free from blemishes, oxidation, damage, etc.

.5 The following definitions shall apply to all sections and drawings of Division 21, 22 and 23.

.1 "CONCEALED" - mechanical services and equipment in hung ceilings and non-accessible chases and furred spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein (eg. mechanical rooms).

.3 "PROVIDE" - will mean supply, installation and connection.

.6 Uniformity:

.1 Use product of one manufacturer unless otherwise specified, for equipment or material of the same type of classification.

.2 Installation:

.1 Unless otherwise specified, follow manufacturer's recommendations for safety, adequate access for inspection, maintenance and repairs.

.2 Permit equipment maintenance and disassembly with minimum disturbance to connecting piping and duct systems without interference with building structure or other equipment.

.3 Lubrication:

.1 Provide accessible lubricating means for bearings, including permanent lubrication "Lifetime" bearings.

.7 Provide and install all necessary vibration control components.

.8 All fasteners used in inmate accessible areas shall be tamperproof (eg. Torx Plus security screws).

1.14 ELECTRICAL

.1 Electrical work to conform to Division 26 including the following.

.2 Provide all controls, disconnects, magnetic starters, transformers, relays, wiring and panels for all motors and devices for packaged equipment as indicated in various specification sections.

.3 Electrical equipment shall bear CSA labels and/or ULC approvals to comply with local power utility's requirements. Conform to the requirements of the Canadian Electrical Code, National Building Code, local, municipal and provincial authorities.

.4 Control panels to be complete with barriered numbered terminal strip for interconnecting of conductors between master control panel and remote control panel and associated equipment.

.5 Controls

.1 All power and control wiring, relays, transformers and wiring related to controllers, sensors, control panels and control devices, which are related to control systems to be provided by Division 23, unless specifically indicated otherwise.

.2 All wiring to be run in conduit.

.3 Control wiring to be copper conductor type RW 90 (XLPE); minimum #14 AWG for power circuits and minimum #18 AWG for control only.

.4 Conduit to be E.M.T. minimum 20mm complete with compression couplings. Provide ground conductor in all conduit runs.

.5 Use liquid tight flexible conduit for final connection to motorized dampers and vibrating equipment.

.6 Ensure that Division 26 has provided for auxiliary contacts for the building control systems.

1.15 MOTORS

.1 Provide motors for mechanical equipment as specified.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Departmental Representative for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.3 Motors under 373 W (½ hp): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, unless otherwise specified or indicated.

.4 Motors 373 W (½ hp) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, maximum temperature rise 40°C, 3 phase, 575 V, unless otherwise specified or indicated.

.5 Motor controllers and all electrical wiring unless otherwise shown shall be provided under Division 26. Factory installed wiring and equipment in packaged units to be compatible with external control power; and connecting terminals shall be clearly identified.

.6 Polyphase motors shall be squirrel cage induction of CEMA Design B for fans and pumps.

.7 Where motor type, power, speed or other essential data are not specified, obtain this information from the manufacturer of the equipment and have it approved before ordering motors.

.8 CEMA standards shall be taken as minimum requirements for motor design and performance.

.9 All motors shall be CEMA open-drip-proof unless specified otherwise.

.10 All motors shall be specially selected for quiet operation and high efficiency and compatible with variable speed drives (where applicable).

.11 Motors shall be rated for continuous duty and full load. The maximum rise in temperature shall not exceed 40°C for open-drip-proof and 55°C for totally enclosed.

.12 Motors shall be capable of withstanding momentary overloads of 50% without injurious overheating.

.13 Motors for belt drive shall have adjustable bases with set screws to maintain belt tensions. Motors for direct drive shall be dowelled at base plate at two points.

.14 Motor shall have legible nameplates giving manufacturer's name, shop number, watts, rpm, current characteristics.

.15 Motor enclosures: suitable for service and location specified in project. Obtain information from manufacture and have it approved before ordering.

.16 Terminal box: coordinate dimensions and locations with Electrical Work. Locate box clear of motor ventilation opening.

1.16 TESTS

.1 Give 72 h written notice of date for tests.

.2 Insulate or conceal work only after testing and approval by Departmental Representative.

.3 Conduct tests in presence of Departmental Representative.

.4 Bear costs including retesting and making good.

.5 Piping:

.1 General: maintain test pressure without loss for 4 h unless otherwise specified.

.2 Hydraulically test steam and hydronic piping systems at 1-1/2 times system operating pressure or minimum 862 kPa, whichever is greater.

.3 Test drainage, waste and vent piping to National Building Code and authorities having jurisdiction.

.4 Test domestic hot, cold and recirculation water piping at 1-1/2 times system operating pressure or minimum 862 kPa, whichever is greater.

.5 Test fire systems in accordance with NFPA and authorities having jurisdiction and as specified elsewhere.

.6 Equipment: test as specified in relevant sections.

.7 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures or test medium.

.8 Provide written confirmation for each test conducted.

.9 Provide any equipment required to conduct tests.

.10 Test water shall be potable water and should be from a municipal system that treats water with chlorination or some other appropriate means to kill bacteria.

1.17 ACCESS DOORS

.1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

.2 Flush mounted 300 mm x 300 mm for hand entry unless otherwise noted. Doors to open 180°, have rounded safety corners, concealed hinges, screwdriver latches and anchor straps. Access doors located in inmate accessible areas shall be security type c/w tamper proof security screwdriver latches.

.3 Material:

.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Departmental Representative.

.2 Remaining areas: use prime coated steel.

.4 Installation:

.1 Locate so that concealed items are accessible.

.2 Locate so that hand entry is achieved.

.3 Installation by General Contractor.

.5 Fire rated access panels: 1.6mm. mounting frame, 1.01mm sandwich type insulated self-closing door with concealed hinge, 50mm thickness of fire rated insulation in door, self-latching ring pull latch, primer coated, 1½ hour rating. Access doors located in inmate accessible areas shall be security type c/w tamper proof security screwdriver latches.

.6 Access doors must maintain fire rating if installed in a fire rated assembly. Refer to Architectural Drawings for location of fire rated walls and ceilings.

.7 Furnish and locate access doors for concealed valves, traps, strainers, cleanouts, balancing and fire dampers, air vents and other parts requiring accessibility for service and maintenance.

1.18 DIELECTRIC COUPLINGS

.1 General:

.1 To be compatible with and to suit pressure rating of piping system.

.2 Where pipes of dissimilar metals are joined.

.2 Pipes NPS 2 and under: isolating unions.

.3 Pipes NPS 2-1/2 and over: isolating flanges.

1.19 CUTTING, PATCHING & MAKING GOOD

.1 All cutting and patching shall be by the Contractor.

.2 Division 21, 22 and 23 shall advise the trade responsible for cutting, in advance of the time required, of the location and extent of cutting required, and any other pertinent information.

.3 Division 21, 22 and 23 shall advise the trade responsible for patching and finishing of any pertinent information, such as clearance requirements around equipment.

.4 Costs arising to correct work due to failure to provide coordination information on time, incorrect sizes or locations or other pertinent information, shall not be extra to the Contract.

1.20 MECHANICAL SYSTEM SHUTDOWN

.1 Comply with Institution's shutdown procedures.

1.21 EXAMINATION OF SITE AND INFORMATION

.1 Material and equipment shall be brought into the building in such assemblies and sizes as to enter into the spaces where they are to be located and to be small enough to be hoisted into the building without difficulty. Any cutting, patching, etc. involved in getting large assemblies into place shall be the responsibility of the Contractor.

1.22 CO-ORDINATION

.1 Locate distribution systems, equipment and materials to provide minimum interference and maximum useable space.

.2 Where interference occurs, Departmental Representative shall approve relocation of equipment and materials.

.3 This contractor shall notify other Subcontractors who are concerned, of all openings, foundation work, hangers, inserts, anchors, or other provisions necessary in their work for the installation of this work and he shall furnish all information and necessary materials in ample time so that proper provisions can be made for same, and shall supply and correctly and accurately place all inserts sleeves, anchors, etc.

.4 Where anchors are required to be drilled and placed, Division 23 shall be responsible for their supply and installation. Pipe hangers and supports listed in Section 23 05 29 shall be provided by Division 23.

1.23 HOISTING AND RIGGING

.1 In accordance with the construction schedule provide and arrange for transportation, of all equipment and materials to site, and for the rigging, hoisting, storing and setting in place of equipment.

1.24 GUARANTEE

.1 Contractor shall guarantee all material and workmanship used in the work to be in strict accordance with the specifications, of best quality and type obtainable to give first-class construction and proper and efficient operation, and free from any defects. Any such defects which may appear in any of the work within one year after written acceptance of this work shall be repaired and replaced by the Contractor without additional expense to the Contract. Where such defects occur, Contractor shall be held responsible for all costs incurred in making the defective work good.

.2 This shall not obsolete any longer warranties on specific items of equipment.

.3 All injuries to adjacent work particularly plaster, wood finishes or other materials, or damage to other equipment, caused by such defects of this contractor's work or by subsequent replacement and repairs, shall be made good at the expense of this contractor. All repair work shall be done by trades responsible for the original work.

1.25 REVIEW/TAKEOVER PROCEDURES

.1 Conform to Division 01.

.2 Substantial performance will not be considered until the following items have been completed to the Departmental Representative's satisfaction.

.1 All systems are complete and operation.

.2 All systems have been commissioned and successfully passed testing over the entire range of their operating capacities under automatic control. (Note: seasonal or environmental conditions resulting in the delay of some testing will be accommodated by issuance of conditional certificate).

.3 Commissioning and testing reports.

.4 Air balancing reports.

.5 "As-built" and/or record drawings and specifications.

.6 Operations and Maintenance Manuals.

.7 The Owner, operating and maintenance personnel have received training on all systems and equipment.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 EXECUTION

3.1 NOT USED $END

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.2 National Research Council Canada (NRC)
.1 National Fire Code of Canada 2015 (NFC).

.3 CSA Group
.1 CSA B52:18, Mechanical Refrigeration Code.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00.

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

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

PART 2 PRODUCTS

2.1 NOT USED

.1 Not Used.

2.2 EXECUTION

2.3 APPLICATION

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

2.4 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 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

2.5 CLEARANCES

.1 Provide clearance 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 recommended by manufacturer or as indicated (whichever is greater) without interrupting operation of other system, equipment, components.

2.6 DRAINS

.1 Install piping with grade in direction of flow except as indicated.

.2 Install drain valve at low points in piping systems, at equipment and at section isolating valves.

.3 Pipe each drain valve discharge separately to above floor drain. Discharge to be visible.

.4 Drain valves: NPS 3/4 gate or globe valves unless indicated otherwise, with hose end male thread, cap and chain.

2.7 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.

2.8 PIPEWORK INSTALLATION

.1 Screwed fittings jointed with Teflon tape.

.2 Protect openings against entry of foreign material.

.3 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.4 Assemble piping using fittings manufactured to ANSI standards.

.5 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.6 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.7 Slope piping, except where indicated, in direction of flow for positive drainage and venting.

.8 Install, except where indicated, to permit separate thermal insulation of each pipe.

.9 Group piping wherever possible and as indicated.

.10 Ream pipes, remove scale and other foreign material before assembly.

.11 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.

.12 Provide for thermal expansion as indicated.

.13 Valves:

.1 Install in accessible locations.

.2 Remove interior parts before soldering.

.3 Install with stems above horizontal position unless otherwise indicated.

.4 Valves accessible for maintenance without removing adjacent piping.

.5 Use ball valves at branch take-offs for isolating purposes except where otherwise specified.

2.9 SLEEVES

.1 General: install where pipes pass through masonry, concrete structures, fire rated assemblies, and elsewhere as indicated.

.2 Material: schedule 40 black steel pipe.

.3 Construction: foundation walls and where sleeves extend above finished floors to have annular fins continuously welded on at mid-point.

.4 Sizes: 6 mm minimum clearance between sleeve and uninsulated pipe or between sleeve and insulation.

.5 Installation:

.1 Concrete, masonry walls, 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: Provide space for firestopping. Maintain fire rating integrity.

.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.

2.10 ESCUTCHEONS

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: one piece type with vandal-resistant set screws. Chrome or nickel plated brass or type 302 stainless steel.

.3 Sizes: outside diameter to cover opening or sleeve. Inside diameter to fit around pipe or outside of insulation if so provided.

2.11 PREPARATION FOR FIRE STOPPING

.1 Uninsulated unheated pipes not subject to movement: No special preparation.

.2 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging fires topping material or installation.

.3 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

2.12 FLUSHING OUT OF PIPING SYSTEMS

.1 Flush system in accordance with associated Section applicable for piping system.

.2 Before start-up, clean interior of piping systems in accordance with requirements of Section 01 74 00 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.

2.13 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

.1 Advise Departmental Representative 48 hours minimum prior to performance of pressure tests.

.2 Pipework: test as specified in relevant sections.

.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 Departmental Representative.

.6 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.

.7 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

2.14 EXISTING SYSTEMS

.1 Connect into existing piping systems at times approved by Departmental Representative.

.2 Request written approval 10 days minimum, prior to commencement of work.

.3 Be responsible for damage to existing plant by this work.

.4 Ensure daily clean-up of existing areas.

2.15 CLEANING

.1 Clean in accordance with Section 01 74 00.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)
- .1 ASME B1.20.1-2013(2018), Pipe Threads, General Purpose (Inch).
- .2 ASME B16.18-2018, Cast Copper Alloy Solder Joint Pressure Fittings.

.2 ASTM International
- .1 ASTM A276/A276M-17, Standard Specification for Stainless Steel Bars and Shapes.
- .2 ASTM B62-17, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .3 ASTM B283/B283M-20, Standard Specification for Copper and Copper Alloy Die Forgings (Hot-Pressed).
- .4 ASTM B505/B505M-18, Standard Specification for Copper-Base Alloy Continuous Castings.

.3 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
- .1 MSS SP-25-2018, Standard Marking System for Valves, Fittings, Flanges and Unions.
- .2 MSS SP-80-2019, Bronze Gate Globe, Angle and Check Valves.
- .3 MSS SP-110-2010, 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.

.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.
- .2 Submit WHMIS SDS - Safety Data Sheets.

.3 Shop Drawings:
- .1 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.

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.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Delivery and Acceptance Requirements:

.1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

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

PART 2 PRODUCTS

2.1 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 Copper tube systems: solder ends to ASME B16.18.

.3 Ball Valves:

.1 NPS 2 and under:

.1 Body and cap: cast high tensile bronze to ASTM B62.

.2 Pressure rating: Class 125.

.3 Connections: screwed ends to ASME B1.20.1 and with hexagonal shoulders or solder ends to ASME B16.18

.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: PTFE with external packing nut.

.8 Operator: removable lever handle.

.4 Electronic Solenoid Valves:

.1 Body: brass.

.2 Trim: Stainless steel.

.3 Seals: PTFE.

.4 Pressure rating: Class 125.

.5 Power: 120V/1Ø/60Hz.

.6 Valves shall be "normally open" (N.O.) configuration.

.7 Valves supplied and installed by this Division; wired by Division 26.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Remove internal parts before soldering.

.2 Install valves with unions at each piece of equipment arranged to allow servicing, maintenance, and equipment removal.

3.2 CLEANING

.1 Clean in accordance with Section 01 74 00.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B31.1-2018, Power Piping.

.2 ASTM International

.1 ASTM A125-96(2018)e1, Standard Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-14e1, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563-15, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP-58-2018, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application and Installation.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for hangers and supports and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit shop drawings for:

.1 Bases, hangers and supports.

.2 Connections to equipment and structure.

.4 Manufacturers' Instructions:

.1 Provide manufacturer's installation instructions.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 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 and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 20.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

.1 . Design Requirements:

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS SP 58.

.3 Ensure that supports, guides, anchors do not transmit excessive quantities of heat to building structure.

.4 Design hangers and supports to support systems under conditions of operation, allow free expansion and contraction, prevent excessive stresses from being introduced into pipework or connected equipment.

.5 Provide for vertical adjustments after erection and during commissioning. Amount of adjustment in accordance with MSS SP 58.

2.2 GENERAL

.1 Fabricate hangers and supports in accordance with MSS SP 58 and ASME B31.1.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.3 PIPE HANGERS

.1 Finishes:

.1 Pipe hangers and supports: painted with zinc-rich paint after manufacture.

.2 Ensure steel hangers in contact with copper piping are copper plated.

.2 Upper attachment structural: suspension from lower flange of I-Beam:

.1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.

.1 Rod: 9 mm UL listed.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL listed to MSS SP 58.

.3 Upper attachment structural: suspension from upper flange of I-Beam:

.1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, UL listed to MSS SP 58.

.2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut UL listed.

.4 Upper attachment to concrete:

.1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate, UL listed to MSS SP 58.

.5 Hanger rods: threaded rod material to MSS SP 58:

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.3 Do not use 22 mm or 28 mm rod.

.6 Pipe attachments: material to MSS SP 58:

.1 Attachments for steel piping: carbon steel black.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for hot pipework.

.4 Oversize pipe hangers and supports for hot pipework.

.7 Adjustable clevis: material to MSS SP 58 UL listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for rivetting to insulation shields.

.8 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP 58.

.9 U-bolts: carbon steel to MSS SP 58 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: black.

.2 Finishes for copper, pipework: black with formed portion plastic coated.

2.4 RISER CLAMPS

.1 Steel or cast iron pipe: black carbon steel to MSS SP 58, type 42, UL listed.

.2 Copper pipe: carbon steel copper plated to MSS SP 58, type 42.

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.5 INSULATION PROTECTION SHIELDS

.1 Insulated cold piping:

.1 64 kg/mü density insulation plus insulation protection shield to: MSS SP 58, galvanized sheet carbon steel. Length designed for maximum 3 m span.

.2 Insulated hot piping:

.1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP 58.

2.6 CONSTANT SUPPORT SPRING HANGERS

.1 Springs: alloy steel to ASTM A125, shot peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).

.2 Load adjustability: 10% minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.

.3 Provide upper and lower factory set travel stops.

.4 Provide load adjustment scale for field adjustments.

.5 Total travel to be actual travel +20%. Difference between total travel and actual travel 25 mm minimum.

.6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.7 VARIABLE SUPPORT SPRING HANGERS

.1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.

.2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.

.3 Variable spring hanger complete with factory calibrated travel stops.

.4 Steel alloy springs: to ASTM A125, shot peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 .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 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to industry standards.

.3 Steel pipes: install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: install below joint.

.3 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.4 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.5 Use approved constant support type hangers where:

.1 Vertical movement of pipework is 13 mm or more,

.2 Transfer of load to adjacent hangers or connected equipment is not permitted.

.6 Use variable support spring hangers where:

.1 Transfer of load to adjacent piping or to connected equipment is not critical.

.2 Variation in supporting effect does not exceed 25% of total load.

3.3 HANGER SPACING

.1 Plumbing piping: to most stringent requirements of Canadian Plumbing Code, Ontario Building Code and authority having jurisdiction.

.2 Fire protection: to applicable fire code.

.3 Copper piping: up to NPS 1/2: every 1.5 m.

.4 Within 300 mm of each elbow.

MAXIMUM PIPE SIZE: NPS	MAXIMUM SPACING STEEL	Maximum Spacing Copper
UP TO 1-1/4	2.4 M	1.8 m
1-1/2	3.0 M	2.4 m
2	3.0 M	2.4 M
2-1/2	3.7 M	3.0 m
3	3.7 M	3.0 M
3-1/2	3.7 M	3.3 m
4	3.7 M	3.6 M

3.4 HANGER INSTALLATION

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 HORIZONTAL MOVEMENT

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 FINAL ADJUSTMENT

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

3.7 CLEANING

.1 Clean in accordance with Section 01 74 00.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 National Research Council (NRC)/Institute for Researching in Construction.

.1 National Plumbing Code of Canada (NPC)-2015.

1.2 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Provide separate shop drawings for each type of isolated system complete with performance and product data.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Divert unused metal and wiring materials from landfill to metal recycling facility approved by Departmental Representative.

.3 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.4 Dispose of corrugated cardboard, polystyrene, plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

PART 2 PRODUCTS

2.1 GENERAL

.1 Performance of vibration isolation to be as indicated.

2.2 SPRINGS

.1 Design stable springs so that ratio of lateral to axial stiffness is equal to or greater than 1.2 times the ratio of static deflection to working height. Select for 50% travel beyond rated load. Units to be complete with levelling devices.

.2 Ratio of height when loaded to diameter of spring to be between 0.8 to 1.0.

.3 Cadmium plate for all installations.

.4 Colour code springs.

2.3 HANGERS

.1 Colour coded springs, rust resistant, painted box type hangers. Arrange to permit hanger box or rod to move through a 30° arc without metal to metal contact.

.2 Type H1 - neoprene - in-shear, moulded with rod isolation bushing which passes through hanger box.

.3 Performance: as indicated.

2.4 VIBRATION ISOLATION SCHEDULE $TABLE

.1 Schedule:

EQUIPMENT	TYPE OF ISOLATOR	DEFLECTION	REMARKS
IN-LINE EXHAUST FAN	H1	6 MM	EXTERNAL

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install vibration isolation equipment in accordance with manufacturers instructions and adjust mountings to level equipment.

.2 Ensure ducting and electrical connections to isolated equipment do not reduce system flexibility and that conduit and ducting passage through walls and floors do not transmit vibrations.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.
.2 CAN/CGSB-24.3-12, Standard for Pipe Identification.

.2 CAN/CSA-Z431-12(R2016), Basic and safety principles for man-machine interface, marking and identification - Coding principles for indicators and actuators (Adopted IEC 60073:2002, sixth edition, 2002-05)

1.2 SUBMITTALS

.1 Product Data:

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

.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.
.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.3 QUALITY ASSURANCE

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

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

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

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20.
.2 Do not dispose of unused paint and/or coating material into sewer system, into streams, lakes, onto ground or in locations where it will pose health or environmental hazard.

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 laminated plastic, 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 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 Departmental Representative.

2.4 PIPING SYSTEMS GOVERNED BY CODES

.1 Identification:

.1 Sprinklers: to NFPA 13.

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 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB-24.3.

.3 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.

.4 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.5 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 plastic-coated cloth 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.

.6 Colours and Legends:

.1 Where not listed, obtain direction from Departmental 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
Domestic hot water supply	Green	DOM. HW SUPPLY
Domestic cold water supply	Green	DOM. CWS
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT
Sprinklers	Red	SPRINKLERS

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 English.

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 TIMING

.1 Provide identification only after painting specified Section 09 91 23 has been completed.

3.3 INSTALLATION

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC and/or CSA registration plates as required by respective agency.

.3 Identify systems, equipment to conform to PSPC PMSS.

3.4 NAMEPLATES

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.5 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.

3.6 VALVES, CONTROLLERS

.1 Valves and operating controllers, except at plumbing fixtures 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 Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively.

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 00.

.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 GENERAL

.1 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 Names of personnel it is proposed to perform TAB to be submitted to and approved by Departmental Representative within 90 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

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 so as 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 be 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 so as 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 and confirm in writing to Departmental 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 Departmental Representative in writing all 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 Divisions 22 and 23.

1.8 OPERATION OF SYSTEMS DURING TAB

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

1.9 START OF TAB

.1 Notify Departmental 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, caulking complete.

.5 All pressure, leakage, other tests specified elsewhere in Divisions 22 and 23 complete.

.6 All 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 Duct systems clean.

.2 Ducts, are airtight to within specified tolerances.

.3 Correct fan rotation.

.4 Access doors, installed, closed.

1.10 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 Other HVAC systems: plus 5%, minus 5%.

1.11 ACCURACY TOLERANCES

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

1.12 INSTRUMENTS

.1 Prior to TAB, submit to Departmental Representative list of instruments to be 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 Departmental 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 Departmental 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 to be 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 Departmental 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 Departmental Representative.

.2 Provide manpower and instrumentation to verify up to 30% of reported results.

.3 Number and location of verified results to be at discretion of Departmental Representative.

.4 Bear costs to repeat TAB as required to satisfaction of Departmental Representative.

1.17 SETTINGS

.1 After TAB is completed to satisfaction of Departmental Representative, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings, and cap all instrument test ports.

.2 Permanently mark settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.18 COMPLETION OF TAB

.1 TAB to be considered complete when final TAB Report received and approved by Departmental Representative.

1.19 AIR SYSTEMS

.1 Do TAB of following systems, equipment,

.2 Do TAB of systems, equipment, components, components, controls:

.1 Exhaust fans.

.2 Supply air outlets.

.3 Quality assurance: Perform TAB under direction of supervisor qualified to standards of AABC.

.4 Measurements: to include, but not limited to, following 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.

.5 Locations of systems measurements to include, but not be limited to, following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille).

1.20 OTHER SYSTEMS

.1 Plumbing systems:

.1 TAB procedures:

.1 Shower valves: adjust to suit project pressure and temperature conditions.

PART 2 PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 EXECUTION

3.1 NOT USED

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 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.

.2 Reference Standards:

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ASHRAE 90.1-2019, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc. (ASTM)

.1 ASTM B209M-14, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335/C335M-17, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C449-07(2019), Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

.4 ASTM C547-17, Standard Specification for Mineral Fiber Pipe Insulation.

.5 ASTM C553-13, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.6 ASTM C921-10(2015), 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 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.5 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-102:18-REV1, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.2 .2 CAN/ULC-701.1:2017, STANDARD FOR THERMAL INSULATION, POLYSTYRENE, BOARDS AND PIPE COVERING. ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.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 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.

.4 Manufacturers' Instructions:

.1 Provide manufacture's written duct insulation jointing recommendations. and special handling criteria, installation sequence, cleaning procedures.

1.3 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00.

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

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

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°C mean temperature when tested in accordance with ASTM C335/C335M.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, without 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 without 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/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

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 Tape: self-adhesive, aluminum, reinforced, 75 mm wide minimum.

.5 Contact adhesive: quick-setting

.6 Canvas adhesive: washable.

.7 Banding: 19 mm wide, 0.5 mm thick stainless steel.

.8 Fasteners: 4 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, 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 Hangers and supports in accordance with Section 23 05 29.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.6 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 warm air ducts	C-1	no	25
Round warm air ducts	C-1	no	25
Supply, return and exhaust ducts exposed in space being served			none
Exhaust duct between exhaust fans and louvres	C-1	no	25

.2 Finishes: conform to following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	None	none
Indoor, exposed within mechanical room	CRF/1	CRD/2

3.5 CLEANING

.1 Clean in accordance with Section 01 74 00.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

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

.1 ASTM C335 / C335M - 17, Standard Test Method for Steady-State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C449 - 07(2019), Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

.3 ASTM C547 - 19, Standard Specification for Mineral Fiber Pipe Insulation.

.4 ASTM C921 - 10(2015), Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts.

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

.1 Safety Data Sheets (SDS).

.4 Manufacturer's Trade Associations

.1 Thermal Insulation Association of Canada (TIAC): Mechanical Insulation Best Practice Guide (Revised 2005).

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102.2:2018, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

.2 CAN/ULC-S702-14, Standard for Thermal Insulation Mineral Fibre for Buildings.

1.2 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.

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00. Include product characteristics, performance criteria, and limitations.

.1 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00.

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00.

.4 Samples:

.1 Submit samples in accordance with Section 01 33 00.

.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.

.1 Instructions: submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project, qualified to standards of TIAC.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.

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.

.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 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 20.

.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-S102.2.

.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/C335M.

.3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702.1or ASTM C547.

.2 Maximum "k" factor: to CAN/ULC-S702.1.

.4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/ULC-S702.1 or ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702.1, ASTM C547.

2.3 INSULATION SECUREMENT

.1 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.2 Contact adhesive: quick setting.

.3 Canvas adhesive: washable.

.4 Bands: stainless steel, 19 mm wide, 0.5 mm thick.

2.4 CEMENT

.1 Thermal insulating and finishing cement:

.1 Hydraulic setting on mineral wool, to ASTM C449.

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 JACKETS

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CAN/CGSB-51.53 with pre-formed shapes as required.

.2 Colours: white.

.3 Minimum service temperatures: -20 degrees C.

.4 Maximum service temperature: 65 degrees C.

.5 Moisture vapour transmission: 0.02 perm.

.6 Thickness: 0.5mm.

.7 Fastenings:

.1 Use solvent weld adhesive compatible with insulation to seal laps and joints.

.2 Tacks.

.3 Pressure sensitive vinyl tape of matching colour.

.2 Canvas:

.1 220 gm/m^2 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

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 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

.1 Application: at valves, unions at equipment.

.2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.

.3 Insulation:

.1 Insulation, fastenings and finishes: same as system.

.2 Jacket: PVC. Installation Of Elastomeric Insulation

.4 Insulation to remain dry. Overlaps to manufacturer's instructions. Ensure tight joints.

.5 Provide vapour retarder as recommended by manufacturer.

3.5 PIPING INSULATION SCHEDULES

.1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified.

.2 TIAC Code: A-1.

.1 Securements: SS bands or Tape at 300 mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.

.1 Securements: SS bands or Tape at 300 mm on centre.

.2 Seals: VR lap seal adhesive, VR lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 Thickness of insulation as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000 mm long.

.2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC Code	Pipe Sizes (NPS) and insulation thickness (mm)					
	Run Out	to 1	1-1/4 to 2	2-1/2 to 4	5 to 6	8 & over		
Domestic HWS		A-1	25	25	25	38	38	38
Domestic CWS		A-3	25	25	25	25	25	25

.5 Finishes:

.1 Exposed indoors: PVC jacket.

.2 Exposed in mechanical rooms: PVC jacket.

.3 Concealed, indoors: canvas on valves, fittings. No further finish.

.4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.

.5 Finish attachments: SS bands, at 150 mm on centre. Seals: closed.

.6 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 00.

.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 of low-pressure metallic ductwork, joints and accessories.

1.2 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

.2 ASTM International (ASTM)

.1 ASTM A480/A480M-18a, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.2 ASTM A635/A635M-15, 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-20, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA 012-2006, SMACNA HVAC Duct Construction Standards - Metal and Flexible.

.2 SMACNA 016-2012, SMACNA HVAC Air Duct Leakage Test Manual.

.3 ANSI/SMACNA 008-2008, SMACNA IAQ Guidelines for Occupied Buildings Under Construction

1.3 SUBMITTALS

.1 Submit shop drawings and product data in accordance with Section 01 33 00.

.2 Product Data: submit WHMIS MSDS - Safety Data Sheets for the following:

.1 Sealants.

.2 Tape.

1.4 QUALITY ASSURANCE

.1 Certification of Ratings:

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

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.

.2 During construction meet or exceed the requirements of ANSI/SMACNA 008, IAQ Guidelines for Occupied Buildings under Construction.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Waste Management and Disposal:

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Collect and separate for disposal paper, plastic, polystyrene, corrugated cardboard, packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.

.3 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 PRODUCTS

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

.1 Maximum Pressure 500 Pa

.2 SMACNA Seal Class 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, polymer type flame resistant duct sealant. Temperature range of minus 30°C to plus 93°C.

2.3 TAPE

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

2.4 DUCT LEAKAGE

.1 In accordance with ANSI/SMACNA 016 HVAC Air Duct Leakage Test Manual.

2.5 FITTINGS

.1 Fabrication: to ANSI/SMACNA 006.

.2 Radiused elbows.

.1 Rectangular: standard radius Centreline radius: 1.5 times width of duct

.2 Round: smooth radius. Centreline radius: 1.5 times diameter.

.3 Mitred elbows, rectangular:

.1 To 400 mm: with single thickness turning vanes.

.2 Over 400 mm: with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: with radius on branch 1.5 times width of duct.

.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.

.5 Transitions:

.1 Diverging: 20 degrees maximum included angle.

.2 Converging: 30 degrees maximum included angle.

.6 Offsets:

.1 Full radiused elbows.

.7 Obstruction deflectors: maintain full cross-sectional area.

.1 Maximum included angles: as for transitions.

2.6 STAINLESS STEEL(FOR SHOWER EXHAUST DUCTWORK)

.1 To ASTM A480/A480M, Type 304.

.2 Finish: number 4.

.3 Thickness, fabrication and reinforcement: to SMACNA 012

.4 Joints: to SMACNA 012

2.7 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z275 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA 012.

.3 Joints: to SMACNA 012.

2.8 HANGERS AND SUPPORTS

.1 Hangers and Supports: in accordance with Section 23 05 29.

.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.1 Maximum size duct supported by strap hanger: 500mm.

.2 Hanger configuration: to SMACNA 012.

.3 Hangers: black steel angle with black steel rods to SMACNA and the 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

.4 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.2 For steel joist:manufactured joist clamp.

.3 For steel beams: manufactured beam clamps.

PART 3 EXECUTION

3.1 GENERAL

.1 Do work in accordance with NFPA 90A, NFPA 90B and SMACNA 012.

.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 012.

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA 012.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: in accordance with SMACNA 012:

Duct Size (mm)	Spacing (mm)
to 1500	3000

3.3 SEALING AND TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed tape in sealant and recoat with minimum of one coat of sealant to manufacturers recommendations.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 ANSI/SMACNA 006-2006, SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00.

.2 Indicate the following:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

1.3 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 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 PRODUCTS

2.1 GENERAL

.1 Manufacture in accordance with SMACNA 006 - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame mm thick with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40°C to plus 90°C, density of 1.3 kg/m^3.

2.3 ACCESS DOORS IN DUCTS

.1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:

.1 Up to 300 x 300 mm: two sash locks complete with safety chain.

.2 301 to 450 mm: four sash locks complete with safety chain.

2.4 TURNING VANES

.1 Factory or shop fabricated single thickness with trailing edge, to recommendations of SMACNA 006, SMACNA - HVAC Duct Construction Standards - Metal and Flexible and as indicated.

2.5 INSTRUMENT TEST

.1 1.6 mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.6 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Flexible connections:

.1 Install in following locations:

.1 Inlets and outlets of exhaust air fans.

.2 Length of connection: 100 mm.

.3 Minimum distance between metal parts when system in operation: 75 mm.

.4 Install in accordance with recommendations of SMACNA 006, SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access doors and viewing panels:

.1 Size:

.1 300 x 300mm for servicing entry.

.2 150 x 150mm for viewing.

.3 As indicated.

.2 Locations:

.1 Devices requiring maintenance (e.g. humidistats).

.2 Required by code.

.3 Elsewhere as indicated.

.3 Instrument test ports.

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Install insulation port extensions as required.

.4 Locations.

.1 For traverse readings:

.1 Inlets and outlets of exhaust fan systems.

.2 Main and sub-main ducts.

.3 And as indicated.

.4 Turning vanes:

.1 Install in accordance with recommendations of SMACNA 006, SMACNA - HVAC Duct Construction Standards - Metal and Flexible. and as indicated.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.1 ANSI/SMACNA 006-2006, HVAC Duct Construction Standards, Metal and Flexible (SMACNA 1966-2005).

1.2 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00.

1.3 WASTE MANAGEMENT AND THE DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20, and with Waste Reduction Workplan.

1.4 GENERAL

.1 Manufacture to SMACNA standards.

1.5 SINGLE BLADE DAMPERS

.1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA 006, SMACNA - HVAC Duct Construction Standards - Metal and Flexible. except maximum height 300 mm as indicated.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

PART 2 EXECUTION

2.1 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA 006, SMACNA - HVAC Duct Construction Standards - Metal and Flexible. and in accordance with manufacturer's instructions.

.3 For supply, return and exhaust systems, locate balancing dampers in each branch duct.

.4 Runouts to grilles: install single blade damper located as close as possible to main ducts.

.5 All dampers to be vibration free.

.6 Ensure damper operators are observable and accessible.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 American National Standards Institute/Air Movement and Control Association (ANSI/AMCA)

.1 ANSI/AMCA 99-2016, Standards Handbook.
.2 ANSI/AMCA 210-2016/ASHRAE 51-16, Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating.
.3 AMCA Publication 211-13, Product Rating Manual for Fan Air Performance.
.4 ANSI/AMCA 300-14, Reverberant Room Method for Sound Testing of Fans.
.5 ANSI/AMCA 301-14, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
.6 AMCA 311-16, Product Rating Manual For Fan Sound Performance

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00.

.2 Provide:

.1 Fan performance curves showing point of operation, kW (BHP) and efficiency.

.2 Sound rating data at point of operation.

.3 Indicate:

.1 Motors, bearings, shaft details.

.2 Minimum performance achievable with variable speed controllers.

1.3 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00.

1.4 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.5 MANUFACTURED ITEMS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.

PART 2 PRODUCTS

2.1 FANS GENERAL

.1 Capacity: flow rate, total static pressure, W (bhp), efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.2 Fans: statically and dynamically balanced, constructed in conformity with ANSI/AMCA 99.

.3 Sound ratings: comply with ANSI/AMCA 301, tested to ANSI/AMCA 300. Unit shall bear AMCA certified sound rating seal.

.4 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210. Unit shall bear AMCA certified rating seal.

.5 Motors:

.1 Sizes as indicated on drawings.

.6 Factory primed before assembly in colour standard to manufacturer.

.7 Sealed lifetime oilite bearings.

.8 Vibration isolation: to Section 23 05 48.

.9 Flexible connections: to Section 23 33 00.

2.2 CABINET FANS - GENERAL PURPOSE

.1 Cabinet hung single or multiple wheel with DWDI centrifugal fans in factory fabricated casing complete with vibration isolators, motor, variable speed direct drive inside casing.

.2 Fabricate casing of zinc coated or phosphate treated steel, reinforced and braced for rigidity. Provide removable panels for access to interior. Uncoated, steel parts shall be painted over with corrosion resistant paint to CAN/CGSB-1.181. Finish inside and out, over prime coat, with rust resistant enamel. Internally line cabinet with 50 mm thick rigid water proof acoustic insulation, pinned and cemented, complete with metal nosings on all exposed edges.

.3 Fans shall be complete with spring operated, back draft dampers.

.4 Units shall be complete with disconnect switches at units.

.5 Fan shall be controlled by low voltage duct mounted humidistat complete with 120V/1Ø/60Hz to 24 VAC step-down transformer.

PART 3 EXECUTION

3.1 FAN INSTALLATION

.1 Install fans as indicated, complete with resilient mountings specified in Section 23 05 48, flexible electrical leads and flexible connections in accordance with Section 23 33 00.

.2 Bearings and extension tubes to be easily accessible.

.3 Access doors and access panels to be easily accessible.

.4 Install duct mounted humidistats behind exhaust grilles as indicated on drawings. Installation of humidistats by this Division; wiring by Division 26.

END OF SECTION

PART 1 GENERAL

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 01 33 00.

.2 Indicate the following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

1.2 CERTIFICATIONS

.1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 20.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Dispose of corrugated cardboard, polystyrene, plastic, packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

1.4 EXTRA MATERIALS

.1 Provide maintenance materials in accordance with Section 01 78 00.

.2 Include:

.1 Keys for volume control adjustment.

.2 Keys for air flow pattern adjustment.

PART 2 PRODUCTS

2.1 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:

.1 Full perimeter gaskets.

.2 Plaster frames where set into plaster or gypsum board.

.3 Concealed fasteners.

.3 Concealed manual volume control damper operators.

.4 Colour: as directed by Departmental Representative.

2.2 MANUFACTURED UNITS

.1 Grilles, registers and diffusers of same generic type to be product of one manufacturer.

2.3 SUPPLY, RETURN AND EXHAUST GRILLES

.1 Type A Grilles: Perforated faced 304 stainless steel maximum security supply grilles. Sizes and mounting locations as indicated on drawings. The grille face shall consist of 5mm thick stainless steel with 8mm diameter holes spaced on 11mm centers staggered 60 degrees. The grille is to be welded to a wall sleeve of 5mm thick stainless steel with a rear mounting frame for a concealed and secure fastening.

.2 Type B exhaust Grilles: Steel, heavy duty, 0° deflection grille with 19 mm blade spacing, for surface mount application, 32 mm boarder, blades parallel to long dimension, white powder coat finish.

.3 Type C Supply Grilles: Steel, heavy duty, 0° deflection grille with 19 mm blade spacing, for surface mount application, 32 mm boarder, blades parallel to long dimension, white powder coat finish. Grille complete with steel balancing damper.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install in accordance with manufacturers instructions.

.2 Install with oval head stainless steel screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers and diffusers, in place, in shower rooms with Torx Plus security screws.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

.1 Section Includes:
.1 Materials, components and installation for heat reclaim devices.

1.2 REFERENCE STANDARDS

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)
.1 ASHRAE 84-2020, Method of Testing Air-to-Air Heat Exchangers (ANSI approved).

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
.1 Safety Data Sheets (SDS).

.3 American Society of Testing and Materials (ASTM)
.1 ASTM C653-17, Standard Guide for Determination of the Thermal Resistance of Low-Density Blanket-Type Mineral Fiber Insulation

.4 Air Conditioning, Heating, and Refrigeration Institute (AHRI)
.1 AHRI 1060-18, 2018 Standard for Performance Rating of Air-to-Air Exchangers for Energy Recovery Ventilation Equipment.

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:
.1 Submit shop drawings in accordance with Section 01 33 00.
.1 Indicate the following as a minimum:
.1 Airflow
.2 Heat exchange component construction
.3 Effectiveness
.4 Power
.5 Cabinet construction
.6 Operating weight and dimensions

.3 Quality assurance submittals: submit following in accordance with Section 01 33 00.
.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.

.4 Closeout Submittals:
.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00.

.5 Certificates:
.1 Catalogued or published ratings: obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.
.2 Provide confirmation of testing.

1.4 RESERVED

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.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00.
.2 Furnish list of individual manufacturer's recommended spare parts for equipment include:
.1 Bearings and seals.
.2 Addresses of suppliers.
.3 List of specialized tools necessary for adjusting, repairing or replacing.

PART 2 - PRODUCTS

2.1 RESERVED

2.2 GENERAL

.1 Comply with ASHRAE 84 2020.

2.3 AIR TO AIR REVERSING ENTHALPY-TYPE EXCHANGER

.1 Casing: Formed, single-wall, insulated, 20-gauge, galvanized-steel cabinet to ASTM C653-17, with urethane paint finish, factory-installed duct flanges on all duct openings, and drain connection.

.2 Access doors shall be hinged with airtight closed cell foam gaskets. Door pressure taps, with captive plugs, shall be provided for cross-core pressure measurement allowing for accurate airflow measurement.

.3 Reserved.

.4 Cabinet Insulation: Unit walls and doors shall be insulated with

25mm, 64kg/m^3 density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with a minimum R-value of 0.75 m^2K/W.

.5 Unit shall be equipped with Dual Core energy recovery technology. The unit shall be 90% efficient (sensible +-5%) at equal airflow in winter and up to 80% sensible in summer. It shall also provide up to 70% latent recovery in winter mode. Unit shall accomplish this recovery without a defrost cycle that will reduce the effectiveness of the device. Devices employing defrost cycles that bypass the energy recovery device, or reduce the effectiveness are not acceptable. Energy recovery device shall not require frost protection in applications down to -40 degrees. Cores shall be Generation 3, comprised of precisely corrugated high grade aluminum.

.6 Switchover damper section shall be comprised of low leakage dampers operated by fast acting electric actuators having damper switching times of 0.75 seconds. Dampers that do not switch within the specified times without objectionable noise are not acceptable.

.7 Recovery cycles shall be controlled by internal programmed thermostats measuring both supply and exhaust air, and optimizing performance of both heat recovery and free cooling modes.

.8 Control center / connections: Energy Recovery Ventilator shall have an Integrated programmable electrical control center where all high and low voltage connections are made. Control center shall be constructed to permit single-point high voltage power supply connections to the non-fused disconnect.

.1 Controls shall be integral and annunciate and record at the unit, the following:

.1 Fault alarms with description time, date;

.2 Temperatures at supply, fresh-air, return, and exhaust air streams;

.3 Dirty filter alarm

.2 Controller shall display on the face for user reference, and without requiring the opening of any access panels:

.1 Unit status

.2 Outdoor air temperature and humidity

.3 Return air temperature and humidity

.4 Supply air temperature and humidity

.5 Airflow in both streams

.9 Frost Control: The ERV core shall be designed to perform without condensing or frosting under normal operating conditions (defined as outside temperatures above -23°C and inside relative humidity below 40%). Occasional more extreme conditions shall not affect the usual function, performance or durability of the core. Outside of the above conditions, a defrost cycle shall run with recirculating air.

.10 Heat transfer surfaces: corrugated aluminum, edge sealed and bonded to casing.

.11 Performance characteristics: as indicated.

.12 Blowers: EC motors, direct-drive, forward-curved fans, statically and dynamically balanced and designed for continuous operation.

.13 Motors: electronically commutated (EC) type.

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 Install in accordance with manufacturers recommendations.

.2 Support independently of adjacent ductwork with flexible connections.

.3 Install access doors in accordance with Section 23 33 00 for access to heat exchange component, dampers, and power/control connections.

.4 Install 20mm dia drain tubing to mechanical space floor drain.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 00.

.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 SUBMITTALS

.1 Submit shop drawings/product data sheets for heating coils, including accessories.

1.2 REFERENCE STANDARDS

.1 Air-Conditioning, Heating & Refrigeration Institute.

.1 AHRI 410-2001 Forced-Circulation Air-Cooling and Air-Heating Coils

PART 2 PRODUCTS

2.1 DUCT MOUNTED HYDRONIC HEATING COILS

.1 Hydronic coils in accordance with drawing schedule, 1 or 2 row as indicated, each certified to AHRI Standard 410, Forced-Circulation Air-Cooling and Air-Heating Coils, each factory leakage tested at 2070 kPa (300 psi) under water, drainable, self-venting, and complete with:

.1 horizontal, continuous, 15.9 mm (5/8") diameter, 0.050 mm (0.020") wall thickness seamless copper tubes permanently bonded to plate or spirally wound aluminium fins and equipped with threaded female same end connections;

.2 flanged galvanized steel casing arranged to prevent air bypass around coil and factory punched for duct connections.

.2 Where required, coils are to be manufactured as "Registered Fittings" with a Canadian Registration Number (CRN).

.3 Acceptable manufacturers are:

.1 Aerofin Canada Services Inc.;

.2 Carrier Corp.;

.3 Daikin.

PART 3 EXECUTION

3.1 INSTALLATION OF DUCT MOUNTED HYDRONIC HEATING COILS

.1 Provide duct mounting heating coils in supply ductwork.

.2 Secure each coil in place from structure by means of hanger rods, independent of connecting ductwork but ready for duct connection and located for easy removal and access to power and control panel.

.3 Connect with piping in accordance with drawing detail.

END OF SECTION

PART 1 GENERAL

1.1

.1 The "provide" in this Division shall be interpreted as "supply, install, and connect".

.2 Energy Monitoring and Control System (EMCS) shall include Direct Digital Control (DDC)of mechanical systems as specified for this project.

.3 Building Automation System (BAS) shall include the EMCS as specified for this project.

1.2 GENERAL

.1 Extend the existing Networked DDC Control System to meet the requirements specified for this project. The new and extended DDC products and services shall be fully compatible with the existing Delta Controls system. The extended Control System shall consist of but is not limited to the following:

.1 Master Control Units as specified.

.2 Software required to implement a complete and operational system.

.3 Input and output control devices including sensors, actuators, conduit and wiring, as required to provide the operations specified.

1.3 DESCRIPTION OF SYSTEM

.1 The System Manufacturer must have maintained a local office within 50 kilometers of job site for at least 5 years with technical staff to provide technical information, routine and emergency maintenance on the system and all system components, and to provide training instructions to O&M staff.

.2 The System Manufacturer must have proven record of successful experience on projects of similar type and size.

.3 Submit the following information for review by Departmental Representative:

.1 Location of local office.

.2 Names and phone numbers of technical staff.

.3 Specification sheets for Master Control Units, Local Control Units and Terminal Control Units.

.4 Data communication network performance information including network protocols to be used, data rate, maximum number of nodes per Local Area Network (LAN).

1.4 ACCEPTABLE SYSTEM MANUFACTURERS AND PRODUCTS

.1 Control Contractor shall co-ordinate its work with Mechanical and Electrical Trades. Unless noted otherwise, the Control Contractor shall provide all interface devices, control wiring, and controls as required to provide the control operation specified.

.2 Control dampers, control valves and temperature control sensing wells shall be supplied by Control Contractor and installed by Mechanical Contractor under the supervision of Control Contractor.

.3 Unless noted in Division 26, Control Contractor shall provide line voltage and low voltage control wiring for equipment specified in Division 25. Refer to Division 26 for power wiring, starters, disconnect switches, etc., to be provided for mechanical equipment.

.4 Control Contractor shall provide all necessary power and dedicated circuits as required from local 120 volt branch circuits panel board for all Master Control Units. Install tamper locks on breakers of circuit panel.

.5 Unless noted otherwise, all other installation work required for the complete installation of EMCS, including all interface devices, control and power wiring, controls and controlled devices shall be provided by Control Contractor.

1.5 CO-ORDINATION

.1 Provide lockable panel for each MCU or LCU. All panels shall be EEMAC rated to environment requirements with hinged doors.

.2 Equip all panels for Master Control Units with standard keyed-alike cabinet locks, keyed to same key.

1.6 LOCKABLE PANELS

.1 Provide nameplates on all control items listed or shown in the submittal and approved control diagrams.

.2 Identify all panels and items mounted on panel face by laminated plastic nameplates 3 mm thick. Lettering shall be accurately aligned and engraved into the white core. Size of nameplates shall be 20 mm by 100 mm minimum. Lettering shall be minimum 5 mm high normal black lettering.

.3 Identify Field Sensors and Controlled Devices by plastic encased cards attached to the device by chain.

.4 Warning signage: provide each motor starter under remote automatic control (DO point on I/O Point Schedules) with signage warning of automatic starting under control of EMCS. (i.e. "Caution - this equipment is under automatic remote control of EMCS").

1.7 NAMEPLATES

.1 Submit shop drawings and product data in accordance with Section 23 05 00 Common Work Results - Mechanical. Submit control shop drawings within 15 days of Award of Contract.

.2 Shop drawings shall include:

.1 Description of software programs included.

.2 Specification sheets for each piece of equipment or control devices to be provided.

.3 Equipment and DDC Controllers location drawings.

.4 Mechanical control schematics.

.5 Sequence of operation for each mechanical system.

.6 DDC control point schedules.

1.8 SHOP DRAWINGS

.1 Installation and Calibration:

.1 Set control points and calibrate sensors immediately after installing controls.

.2 Completion Tests:

.1 After installation of each part of the system and completion of mechanical and electrical hood-up, perform tests to confirm correct installation and operation of equipment.

.2 Check and calibrate each AI using a calibrated digital thermometer, humidistat, velometer or transducer.

.3 Check each DI to insure proper settings and switching contacts.

.4 Check each AO to insure proper operation of valves and dampers. Verify tight closing, input and output signals.

.5 Check each DO to insure proper operation and lag time.

.6 Check all operating software.

.7 Check all application software. Provide samples of all logs and commands.

.8 Debug all software.

.9 The contractor shall be responsible for fine tuning and adjusting all control devices and make modifications as required to provide a fully operational EMCS.

.10 Submit test report with checklist showing all input/output control points and all software programs.

.3 All reported results are subject to verification by the Departmental Representative.

1.9 INSTALLATION AND COMPLETION TESTS

.1 The Contractor shall provide technical personnel and instrumentation to conduct startup verification testing.

.2 Verification:

.1 Perform point-by-point verification of entire system.

.2 Verify the calibration of all AI devices individually.

.3 Verify the calibration of all DI devices individually.

.4 Verify all AO devices are functional, start and span are correct, direction and normal positions are correct.

.5 Verify that all DO devices operate properly and that the normal positions are correct.

.6 Verify the system sequences of operation. Simulate all modes of operation.

.7 Verify the stability of all DDC loops and optimum start/stop routines.

.8 Check each alarm separately.

.9 Verify interlocks and conditional control response.

.10 Simulate alarm conditions to check the initiating value of variable and interlock action.

.3 The contractor shall complete and submit System Startup Verification Forms. Each item on the verification forms shall be signed off as verified (yes), or not verified (no) and actual date of verification.

1.10 SYSTEM STARTUP VERIFICATION TESTING

.1 The manual shall be custom designed for this project and contain only information relevant to this project.

.2 The manual shall provide full and complete coverage of the following subjects:

.1 Operational Requirements: This document shall describe, in concise English terms, all the functional and operational requirements for the system and its functions that have been implemented.

.2 System Operation: Complete step by step procedures for operation of the system, including required actions at each operator station; operation of computer peripherals; input and output formats; and emergency, alarm, and failure recovery. Step-by-step instructions for system startup, back-up equipment operation, and execution of all system functions and operating modes shall be provided.

.3 Maintenance: Documentation of all maintenance procedures for each and all system component including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective module.

.4 Test Procedures and Reports: The test implementation shall be recorded with a description of the test exercise script of events and documented as Test Procedures. A provision for the measurement or observation of results, based on the previously published Test Specification, forms the Test Reports.

.5 Configuration Control: Documentation of the basic system design and configuration with provisions and procedures for planning, implementing, and recording any hardware or software modifications required during the installation, test, and operating lifetime of the system.

1.11 OPERATION AND MAINTENANCE MANUAL

.1 Provide the services of competent instructors who will provide instruction to designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements, of the equipment and system specified. Instructors shall be thoroughly familiar with all aspects of the subject matter they are to teach.

1.12 TRAINING

.1 The Contractor shall provide all services; materials and equipment necessary for the maintenance of the Automatic Control Systems for a period of 12 months concurrent with the warranty period.

.2 The Contractor shall provide three minor inspections or as required by the manufacturer and one major inspection per year, and all service for the required maintenance. Major inspection shall be scheduled in April or November. A major inspection shall involve a point by point check and/or calibration. Provide dated database log to indicate executed point to point system check.

.3 Emergency Service: The Owner will initiate service calls when there is indication that the Automatic Control System is not functioning properly. The Contractor shall have qualified personnel available during the contract period to provide service to the "critical" overall control system components whenever required at no additional

cost to the owner. The contractor shall furnish the Departmental Representative with a telephone number where the service personnel can be reached at all times. The service technician shall be on the job ready to service the control system within 4 hours after receiving a request for service. The work shall be performed continuously until the control system is back in reliable operating condition. This service shall be provided on a 24 hours basis 7 days a week.

.4 Upon completion of each inspection or emergency service, submit fully detailed report in writing to Departmental Representative.

PART 2 PRODUCTS

2.1 GENERAL

.1 The Control Manufacturer shall design, supply, install and connect a data communication network to link all Terminal Control Units, Local Control Units, Master Control Units, and Operator Workstation.

.2 The data communication network shall include EMCS-LAN, EMCS-BUS, modems, network interface cards, network management hardware and software, and all network components including cables, connectors, repeater, hubs, and routers necessary for the internetwork.

.3 EMCS Local Area Network (EMCS-LAN): a high speed, high-performance, local area network over which Master Control Units (MCUs) and Operator Workstations (OWS) communicate with each other, directly on a peer to peer basis using the ISO 8802-3 (Ethernet) Data Link/Physical layer protocol. Each LAN shall have a minimum capacity of supporting at least 50 MCUs.

.4 EMCS Communication Bus (EMCS-BUS): a local secondary bus or subnetwork that links Local Control Units (LCUs) and Terminal Control Units (TCUs) to a Master Control Unit (MCU). The combined quantity of LCU's and TCUs directly connected to one EMCS-BUS subnetwork shall not exceed 50. Data transmission rate to be 9600 Baud minimum. Acceptable secondary Communication Bus: RS-485 LAN, Lontalk.

.5 Master Control Units (MCUs): Stand-alone fully user programmable DDC Controllers that reside on EMCS-LAN.

.6 Local Control Units (LCUs): Stand-alone fully user programmable DDC Controllers that reside on EMCS-BUS.

.7 Terminal Control Units (TCUs): Stand-alone DDC Controllers that reside on EMCS-BUS. Terminal Control Unit is not fully user-programmable, but is configured with its hardware and firmware to match a specific application.

2.2 BAS DATA COMMUNICATION NETWORK

.1 Provide to existing OWS the most recent software programs to permit command entry, information management, alarm management and database management functions for the equipment.

.2 Workstation operating system shall be multitasking and Window based, e.g. Windows 7, Windows 10.

.3 Workstation software shall include but not be limited to the following functions:

.1 Operator's commands and programming.

.2 Access control.

.3 Graphics software.

.4 Alarm management.

.5 Reports and logs.

.6 Database back-up and download.

.4 Refer to the specification for additional requirements of each function.

2.3 OWS SOFTWARE

.1 Provide software to enable non-programmer operator to perform global supervision tasks such as to view, and edit if applicable, the status of any object and property in the system.

.2 Operator shall be able to terminate automatic software control, initiate DO and AO manual commands, and return DO and AO manual commands to automatic software controls.

.3 Provide programming software at OWS to allow operator to create, edit, and download custom application programs to support MCUs and LCUs. On-line programming/configuration shall not interfere with normal system operation and control.

2.4 OPERATOR'S COMMANDS AND PROGRAMMING

.1 A minimum of 4 levels of access shall be supported:

.1 Level 0 No Password = Data Access and Display.

.2 Level 1 = Operator Overrides.

.3 Level 2 = Level 1 + Database Modification and Generation.

.4 Level 3 = Level 3 + Password Assignment: Addition / Modification.

.2 User-definable, automatic log-off timers of from 1 to 60 minutes shall be provided to prevent operators from inadvertently leaving devices on-line. Default setting shall be 3 minutes.

2.5 ACCESS CONTROL

.1 Provide OWS with upgraded graphics software necessary to permit the operator to create, modify, delete, file, and recall all graphics. Operators shall be able to start and stop equipment or change set points from graphical displays.

.2 The Contractor shall utilize the graphics software to generate the custom Building Outline Drawings, Equipment and Sensors Location Diagrams, and Control Schematic Diagrams for this project.

.3 Operator shall be able to build graphic displays that include on-line point data from multiple MCU panels. Data shall be updated every 10 seconds or less.

.4 Windowing: the windowing environment of the OWS shall allow the user to simultaneously view several graphics at the same time.

2.6 GRAPHICS SOFTWARE

.1 Provide the software to notify the operator of the occurrence of an alarm condition. All alarm messages shall be displayed and printed.

Alarm messages shall include as a minimum: location of alarm, time of occurrence, and type of alarm. Each point shall have its own message. Assignment of messages to a point shall be an operator editable function.

2.7 ALARM MANAGEMENT

.1 The Master Control Unit (MCU) is to be a stand-alone DDC controller with the following characteristics:

.1 MCU shall be micro processor based, multi-tasking, multi-user, real-time digital control processors capable of supervising other lower level programmable control units through a secondary network. Each MCU shall consist of modular hardware with plug-in processors, communication controllers, power supplies, and input/output modules.

.2 Each MCU shall provide at least two data communication ports for PC computer, modem and/or printer connection. MCU shall allow temporary use of portable devices without interrupting the normal operation of permanently connected modems, printers, or Operator's Terminals.

.3 The Processor shall execute programmable logic control (Direct Digital or Closed Loop Process Control) of associated HVAC equipment without interacting with any other Processor or Operator Workstation.

.4 Basic functional requirements to include scanning of digital/analog input, digital change of state (alarm) monitoring, analog input (alarm) monitoring, on-off digital control with programmable logic, analog control using programmable logic (including PID) with adjustable dead bands and deviation alarms, control of HVAC systems, as specified under sequence of operation instructions.

.5 Provide a designated MCU with a 28.8 kbps auto call/auto receive modem to communicate with remote operator workstations on an intermittent basis via telephone lines.

.2 Each MCU shall have sufficient capacity for its assigned D1, D0, A1, A0 points as indicated on the DDC Input/Output Point Schedules. Unless noted on the Input/Output Point Schedule or approved by the Departmental Representative, all points associated with one mechanical system shall be connected directly to the same MCU.

.3 Unless noted or approved by the Departmental Representative, provide a minimum of one Master Control Unit (MCU)for mechanical room.

.4 Minimum addressable memory shall be sufficient to support all performance and technical specifications. All operating system, executive, application, subroutines, and other configuration definition software, shall reside in non-volatile memory such as EPROM. All control description logic, application functions and operating data or software shall reside in battery backed RAM 72 hours or EPROM and hence modifiable on-line through the operator panel or remote operators interface. Complete Ram Memory must be downline loadable from Operator Workstation.

.5 Include an uninterruptible clock, with an accuracy of ±5 seconds per month and capable of deriving month/day/hour/min./seconds. Rechargeable batteries to provide a minimum of 72 hours of operation in the case of power failure.

.6 Integrated on-line diagnostics: each MCU panel shall continuously perform self-diagnostics, communication diagnosis and diagnosis of all subsidiary equipment. The MCUs shall provide both local and remote annunciation of any detected component failures, or repeated failure to establish communication. Diagnostic LEDs for power, communication and processor shall be provided at each MCU.

.7 Surge and transient protection: isolation shall be provided at all network terminations, as well as all field point termination to suppress inducted voltage transients consistent with IEEE Standard 587.

.8 Electrical noise protection: operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m.

2.8 MASTER CONTROL UNITS (MCU)

.1 The software programs specified shall be provided as an integral part of the Master Control Units and shall not be dependent upon any higher level computer for execution. Software shall include but not be limited to operating systems executive, control description logic, energy management and totalization. The MCU software shall also support the operator interface functions specified in OWS software.

.2 Programming:

.1 Control description logic shall be written in general control type or high level language. The operator shall, at his discretion, be able to alter the operating parameters on-line from the MCU or OWS to tune a control loop.

.2 Any change to the program shall be performed on-line.

.3 Control description logic will have access to values or status of all points available to the controller including global or common values, allowing cascading and interlocking control.

.4 The MCU shall have the ability to perform the following pre-tested control algorithms:

.1 Two Position Control.

.2 Proportional Control.

.3 Proportional plus Integral Control.

.4 PID Control.

.5 Automatic Control Loop Tuning.

.5 Equipment cycling protection: control software shall include a provision for limiting the number of times each piece of equipment may be cycled within any one-hour period.

.6 Heavy equipment delays: the system shall provide protection against excessive demand situations during start-up periods by automatically introducing time delays between successive start commands to heavy electrical loads. Motors of 15 kW and larger shall be included in the program.

.7 Fire shut-down: fans under the control of EMCS shall shut-down when a fire alarm signal is received by the EMCS.

.8 Power fail shut-down: in the even of the loss of normal power, there shall be an orderly shutdown of all MCUs to prevent the loss of database or operating system software.

.9 Automatic restart: upon the resumption of normal power, as determined by the emergency power transfer switches or fire alarm panel, the automatic restart program shall analyze the status of all controlled equipment, compare it with normal occupancy scheduling, and turn equipment on or off as necessary to resume normal operation.

.3 MCU panels shall have the ability to perform any or all of the following energy management routines:

.1 Auto Start/Stop Scheduling.

.2 Optimal Start/stop.

.3 Temperature Reset.

.4 Economizer Control.

.5 Peak Demand Limiting.

.4 Totalization:

.1 Runtime totalization: MCU panels shall automatically accumulate and store runtime hours for binary input and output points.

.2 Analog/pulse totalization: MCU panels shall automatically sample, calculate and store consumption totals on a daily, weekly, or monthly basis for user-selected analog and binary pulse input-type points.

.3 Event totalization: MCU panels shall have the ability to count events such as the number of times a pump or fan system is cycled on and off. Event totalization shall be performed on a daily, weekly, or monthly basis.

2.9 MCU SOFTWARE

.1 The Local Control Unit is to be a standalone DDC controller with the following characteristics:

.1 LCU shall incorporate a programmable microprocessor, non-volatile program memory, random access memory, power supplies and appropriate communication interfaces as required to perform specified functions.

.2 LCU shall incorporate a communication interface port for communication to the Master Control Unit (MCU).

.3 LCU shall execute it's logic and control (Direct Digital or Closed Loop Process Control) of associated equipment without interacting with any other Processor.

.4 Basic functional requirements to include scanning of digital/analog inputs, digital change of state (alarm) monitoring, analog input (alarm) monitoring, on-off digital control with configurable logic, analog control using configurable logic (including PID) with adjustable dead bands and deviation alarms, control of HVAC systems, specified under sequence of operation instructions.

.2 Minimum addressable memory shall be sufficient to support all performance and technical specifications. All operating system, executive, application, subroutine, and other configuration definition software, shall reside in non-volatile memory such as EPROM. All control description logic, applicable functions and operating data shall reside in battery backed RAM 72 hours or EEPROM and hence modifiable on-line through the operator panel or remote

operator interface. All operating data must be downline loadable from Operator Workstations.

.3 Each LCU shall have sufficient capacity for its assigned D1, D0, A1, A0 points as indicated on the DDC Input/Output Point Schedules. All points associated with one mechanical system shall be connected directly to the same LCU.

.4 The LCU shall include as a minimum 2 interface ports for connection of MCU controller and local computer terminal.

.5 In the event of loss of communications with, or failure of the MCU, this controller shall continue to perform control of the associated equipment. Controllers that use defaults or fail to open or closed position will not be acceptable.

.6 Unless noted otherwise, LCUs shall not be used to control any major mechanical equipment. LCUs shall be used to control packaged and distributed equipment such as packaged air handling units, radiation, and exhaust fans, and multi-zone VAV boxes.

2.10 LOCAL CONTROL UNITS (LCU)

.1 Software shall include but not be limited to definitions and operating systems executive, communications, control description logic, operator interface.

.2 Control description logic shall be written in general control type or high level language.

.3 Control description logic shall have access to values or status of all points available to the controller including global or common values, allowing cascading and interlocking control.

.4 Software to be generic and configurable from computer terminal or to be downloaded from operator workstations.

2.11 LCU SOFTWARE

.1 General: temperature sensors shall be RTD platinum type, unless otherwise noted.

.2 Temperature sensors shall be of the following types.

.1 Space RTD - suitable for wall mounting, with protective guard.

.2 Duct point RTD - suitable for insertion into air ducts at any angle, insertion length of 460 mm unless otherwise as noted on schedule or drawings.

.3 Immersion RTD - Spring loaded construction with compression fitting for 20 mm NPT well mounting. Lengths of 100 mm or 150 mm unless otherwise noted.

.4 Mixed Air Averaging RTD: continuous filament with probe length of 6000 mm minimum. Maximum 6 m² cross section area per sensor. Probe to be bent, at field installation time, to a minimum radius of 100 mm at any point along the probe length without degradation in performance.

.5 Outdoor RTD: complete with noncorroding shield designed to minimize solar and wind effects, threaded fitting for mating to 13 mm conduit, probe length of 100-150 mm.

.3 Provide each sensor with a temperature transmitter having the following minimum specifications:

.1 Output signal of 4-20 mA into maximum of 500 ohm load.

.2 Combined nonlinearity, repeatability and hysteresis effects not to exceed ±0.5% of full scale output.

.3 Integral, zero and span adjustments.

.4 Temperature effect of ±1.0% full scale or less.

.4 Range of sensors to suit application and to be submitted with shop drawings.

2.12 TEMPERATURE SENSORS AND TRANSMITTERS

.1 Provide humidity sensors with the following minimum specifications:

.1 Operating range: 10-90% RH.

.2 Operating temperature: 0°C to 60°C.

.3 Accuracy: +2% RH at 25°C.

.4 Response time: 60 seconds from 90% to 10% RH.

.2 Provide transmitters for all supplied relative humidity sensors with the following minimum specifications:

.1 Output signal of 4-20 mA or 0 to 10 VDC.

.2 Maximum output linearity error of ±1.0% of full scale output.

.3 Integral zero and span adjustments.

.4 Temperature effect of ±1.0% full scale or less.

.5 Drift: not to exceed 1% over 12 months.

2.13 HUMIDITY SENSORS AND TRANSMITTERS

.1 Provide pressure or differential pressure switches for ranges as indicated on point schedule.

.2 Pressure sensing elements shall be bourdon tube, bellows or diaphragm type.

.3 Adjustable setpoint and differential.

.4 Pressure switches shall be snap action type rated at 120 volts, 15 amps AC or 24 volts DC.

.5 Sensor assembly shall operate automatically and reset automatically when condition returns to normal.

2.14 PRESSURE SWITCHES

.1 Provide High/Low temperature switches for ranges as indicated on point schedule.

.2 Temperature sensing element shall be liquid, vapour or bimetallic type.

.3 Adjustable setpoint and differential.

.4 Snap action type rated at 120 Volts, 15 amps or 24 V DC as required.

.5 Sensors shall operate automatically and reset automatically. Sensors used for freeze detection or fire detection shall be manually reset type.

.6 Temperature switches shall be of the following types:

.1 General Purpose Duct type - suitable for insertion into air ducts, insertion length of 457 mm.

.2 Thermowell type - with compression fitting for 20 mm NPT well mounting, length of 100 mm. Immersion wells shall be stainless steel.

.3 Freeze detection type - continuous element with insertion length of 6000 mm minimum, suitable for duct mounting to detect the coldest temperature in any 30 mm section.

.7 Temperature accuracy shall be ±1°C.

2.15 TEMPERATURE SWITCHES

.1 Provide current to pneumatic transducers having the following minimum specifications:

.1 Input range of 4-20 mA or 0 to 10 VDC as suitable for interfacing with the FID digital-to-analog converter output subsystem.

.2 Directly proportioned output range of 20-104 kPa.

.3 Dustproof housing or panel mounted.

.4 Internal materials of the converter suitable for continuous contact with industrial standard instrument air.

.5 Combined nonlinearity, repeatability and hysteresis effects not to exceed +2% of full scale over the entire range.

.6 Integral zero and span adjustment.

.7 Temperature effect of +2.0% full scale or less.

.8 Maximum regulated supply pressure of 138 kPa or less.

.9 Provide air gauge on outlet.

.10 Air consumption: 0.008 scfm at 103 KPa supply.

2.16 CURRENT/ PNEUMATIC TRANSDUCERS

.1 Contacts rated at 5 amps at 120 V AC.

.2 Relays to be plug in type with termination base.

2.17 CONTROL RELAYS

.1 Provide current transducers with range to match load being metered.

.2 Current transducers shall measure line current and produce a proportional signal in one of the following ranges.

.1 4-20 mA dc.

.2 0-1 V dc.

.3 0-10 V dc.

.4 0-20 V dc.

2.18 CURRENT TRANSDUCER

.1 Provide adjustable current-operated solid-state relays with integral zero leakage LED for switching AC or DC circuits.

.2 The contacts shall close when the current level sensed by the internal current transformer exceeds the trip point set by the multi-turn adjustment.

.3 Range of monitored AC current to suit application and to be submitted with shop drawings.

2.19 CURRENT SENSING RELAY

.1 Construction: Blades shall not exceed 200 mm wide or 1250 mm long. Modular maximum size 1250 mm wide x 1500 mm high. Multiple sections to have stiffening mullions and jack shafts.

.2 Materials:

.1 Frame: 2.3 mm (13 gauge) galvanized sheet steel.

.2 Blades: two sheets 0.5 mm (22 gauge) or 1.6 mm (16 gauge) galvanized steel.

.3 Bearings: oil impregnated sintered bronze. Provide additional thrust bearings for vertical blades.

.4 Linkage and shafts: zinc plated steel.

.5 Seals: Replaceable neoprene seals or stain-less steel spring on sides, top and bottom of frame and along all blade edges and blade ends.

.3 Performance:

.1 50 L/s/m2 maximum allowable leakage against 1000 Pa static pressure.

.2 Temperature range: minus 50°C to 100°C.

2.20 CONTROL DAMPERS

.1 Provide direct coupled type electronic proportional damper operators where indicted or required.

.2 Spring return for "fail-safe" in Normally Open or Normally Closed position where required.

.3 Size operators to control dampers against maximum pressure or dynamic closing pressure whichever is greater.

.4 For modulating services, provide feedback circuit to indicate actuator position.

.5 Power Requirements 12 VA maximum at 24 V AC.

.6 Input signal: 2 to 10 VDC or 4 to 20 mA.

2.21 DAMPER OPERATORS ELECTRONIC

.1 Pneumatic tubing: use copper tubing type L with flared fittings unless otherwise specified.

2.22 PNEUMATIC TUBING

.1 Unless noted otherwise or approved by the Departmental Representative in writing, all control devices required for a complete and working EMCS System shall be new and shall be provided by the Contractor.

.2 The Contractor shall submit written requests to disconnect any controls and to obtain equipment down time. Only after receiving these requests shall such work be allowed to proceed.

.3 The Contractor shall be held responsible for repair costs due to Contractor negligence or abuse of owner equipment, or failure in reporting defective controls within 30 days of contract award.

.4 Shop drawings shall show all signal levels, pressures, etc., where tying into existing control equipment.

.5 Where existing controls are not to be reused or not required, they shall be removed and placed in storage for future disposition as directed by the Owner.

2.23 EXISTING CONTROLS

.1 Use type FT6 plenum rated cable for low voltage EMCS wiring in ceiling return plenum. Support FT6 cables in ceiling return plenum using Thomas & Betts TY-RAP cable straps and clamps screwed on to ceiling slab. Spacing to be 2M maximum. Do not use ceiling suspension wires for fastening cables. Exact routings shall suit site conditions and shall be to the approval of the Departmental Representative.

.2 Use EMT conduit for wiring in mechanical, electrical, janitor rooms or equipment rooms.

.3 Unless noted otherwise, install network cable within building in EMT conduit and install network cable between buildings in buried PVC conduit. The control contractor shall provide conduits with spare capacity not less than 50%.

.4 Field wiring for each digital input and output shall be No. 20 AWG, stranded twisted pair. For multi-conductor wire having four or more conductors, wire size shall be not less than No. 22 AWG solid copper. Analog input shall be wired with shielded No. 20 AWG, stranded twisted pair, copper wire. Analog output shall be wired with 3 shielded No. 20 AWG stranded twisted copper wires.

.5 Where conduits pass through fire rated walls or floors, provide schedule 40 steel sleeves filled with fire stopping material and approved sealant around conduits to maintain fire rating integrity.

2.24 CONDUIT AND WIRE

.1 Failure to carry the correct lengths or sizes of conduit or correct types of wire or the correct number of DDC panels is the contractor's responsibility and shall not be basis for additional charges by the contractor.

2.25 RESPONSIBILITY FOR QUANTITIES

.1 Provide numbered tape markings on all branch control wiring, and pneumatic tubing.

.2 At all junction boxes, splitters, cabinets and outlet boxes, maintain identification system.

.3 Use colour coded wires in communication cables, matched throughout system.

.4 Identify all power sources at each panel location.

2.26 WIRING IDENTIFICATION

.1 Colour code all Control System conduits.

.2 Coding to be located on all conduits and cables exposed after completion of construction in all locations including suspended accessible ceilings, tunnels and shafts.

.3 Coding to be plastic tape or paint at all points where conduit or cable enters wall, ceiling, or floor, and at 15000 mm intervals.

.4 Coding to be 25 mm wide, and fluorescent orange. Colour to be confirmed by the Contractor with the Departmental Representative at commencement of the project.

2.27 CONDUIT IDENTIFICATION

.1 Manufacturers' nameplates and CSA labels to be visible and legible after equipment is installed.

PART 3 EXECUTION

3.1

.1 All equipment shall be installed in according to manufacturers' published instructions.

.2 Provide programming for the system and adhere to the sequence of operation specified.

3.2 GENERAL

.1 Building Automation System (BAS) Network Architecture as shown on the Mechanical Drawings.

3.3 BUILDING AUTOMATION SYSTEM (BAS) NETWORK ARCHITECTURE

.1 DDC Input/Output Point Schedule, as shown on the Mechanical Drawings.

.2 Naming convention: PWGSC Standardized Identifiers and Expansions of Building Names, System Names and Point Names shall be used for identification. Identifiers shall be not more than 10 alphanumeric characters, and Expansions shall not more than 40 characters.

.3 The Application Programs shall be assigned with the specified DDC points as indicated on the DDC Input/Output Schedule. In addition, the Application Program shall be assigned with the following point types:

.1 Alarm Program with: all space temperature AI points, all supply air temperature AI points, all supply air and return air humidity AI points, all air filter pressure drop AI points, all supply air static pressure AI points, all AI points of heating water supply and return temperature, all AI points of chilled water supply and return temperature, all DI points of fans and pumps.

.2 Auto Start/Stop Program with: all DO points of fans and pumps.

.3 Run Time Total Program with: all DO points.

.4 Heavy Equipment Delay Program with: all DO points of motors of 15 kw and larger.

.5 PID Control Program with: all AO points of control valves (except terminal heating control valves and radiation control valves) and control dampers (except terminal zone control dampers).

.6 Analog/PI Total Program with all AI or PI points of water meters and energy meters.

.4 All DI or DO points assigned with "alarm" and "run time total" programs shall be provided with "critical" and "maintenance" alarms. All AI or AO points assigned with "alarm" program shall be provided with "critical" and "cautionary" alarms.

3.4 DDC INPUT/ OUTPUT POINT SCHEDULE

.1 Install sensors in accordance with the manufacturer's recommendations.

.2 Sensors used in mixing plenums shall be the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.

.3 Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m of sensing element for each 1 m^2 of cross section area.

.4 All pipe mounted temperature sensors shall be installed in wells. Install all liquid temperature sensors with heat conducting fluid in thermal wells.

.5 Outdoor air temperature sensors shall be installed on north wall, complete with sun shield at designated location.

.6 Building static pressure sensors: Pipe the low pressure port of the differential air static pressure sensor to the static pressure port located on the outside of the building through a high volume accumulator. Pipe the high pressure port to a location behind a thermostat cover.

.7 Supply duct static pressure sensor: Pipe the high pressure tap of the differential air static pressure sensor to the duct using a pitot tube. Pipe the low pressure port to a tee in the high pressure tap tubing of the corresponding building static pressure sensor.

3.5 INSTALLATION OF SENSORS

.1 Install actuators in accordance with the manufacturer's recommendations.

.2 Electronic dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low leakage dampers with seals, the actuator shall be mounted with a minimum 5 degree available for tightening the damper seals.

3.6 INSTALLATION OR ACTUATORS

.1 The exhaust fans shall be started/stopped by the BAS based on occupancy schedule or high humidity level detection, as sensed by duct humidity sensor.

.2 Monitor and display run status of fan motors at operator workstation

.3 Provide fan shutdown override in guard station as detailed on drawings. Coordinate with Division 26.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 22 42 01

.2 Section 23 34 00

1.2 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installations.

.2 CAN3-C235-20 Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

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 100-2013.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for electrical equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:

.1 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.

.2 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.3 Indicate on drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.4 Submit two (2) copies of 600 x 600 mm minimum size drawings and product data to inspection authorities.

.5 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified equipment and material.

.2 Where CSA certified equipment and material is not available, submit such material and equipment to inspection authorities for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with Authority having jurisdiction of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.5 CLOSEOUT PROCEDURES

.1 Submit in accordance with Section 01 77 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for electrical equipment for incorporation into manual.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.3 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.4 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.5 Safety precautions.

.6 Procedures to be followed in event of equipment failure.

.7 Other items of instruction as recommended by manufacturer of each system or item of equipment.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235-20.

.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 for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00.

.2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Section 26 29 03 except for conduit, wiring and connections below 50 V which are related to control systems as shown on mechanical drawings or specified in mechanical sections.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Departmental Representative and inspection authorities.

.2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

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

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: lamicoid 3 mm thick plastic engraving sheet black face, white core, lettering accurately aligned and engraved into core 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 Wording on nameplates to be approved by Departmental Representative prior to manufacture.

.3 Allow for minimum of twenty-five (25) letters per nameplate.

.4 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.5 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.6 Terminal cabinets and pull boxes: indicate system and voltage.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

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

.2 Pre-paint boxes, couplings and connectors.

.3 Colours:

Type	Prime	Auxiliary
up to 250 V	Yellow	

2.9 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint outdoor electrical equipment "equipment green" finish.

.2 Paint indoor switchgear and distribution enclosures light gray.

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 Inform Departmental 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 Departmental Representative.

3.2 INSTALLATION

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

3.3 NAMEPLATES AND LABELS

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

3.4 MOUNTING HEIGHTS

.1 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.2 Install electrical equipment at following heights unless indicated otherwise.

.1 Panelboards: as required by Code or as indicated.

3.5 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.6 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (heating) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, 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.

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before energizing.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

3.7 SYSTEM STARTUP

.1 Instruct operating personnel and Departmental Representative in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.8 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.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.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA-C22.2 No.18.1-13(R2018), Metallic Outlet Boxes, etc.

.2 CAN/CSA-C22.2 No.65-18, Wire Connectors (Tri-National Standard with UL 486A-486B).

.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)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT PROCEDURES

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 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 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 sized 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 conductors copper.

.2 Clamp for copper conductors.

.3 Bolts for copper conductors.

.4 Sized for conductors as required.

.4 Clamps or connectors for TECK cable, as required to: CAN/CSA-C22.2 No.18.3.

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 connector’s installation in accordance with manufacturer's written instructions.

.1 Inform Departmental 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 Departmental Representative.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors or cables and:

.1 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.

.2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.3 Install bushing stud connectors in accordance with NEMA and EEMAC 1Y-2.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.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.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 20.

1.2 Reference Standards

.1 CSA C22.1:21, 25th Edition, Ontario Electrical Code.

1.3 Product Data

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

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 600 V insulation of cross-linked thermosetting polyethylene material rated RWU90 XLPE or RW90 XLPE, Non Jacketted.

2.2 TECK 90 CABLE

.1 Cable: in accordance with Section 26 05 00.

.2 Conductors:

.1 Grounding conductor: copper.

.2 Circuit conductors: copper, size as indicated.

.3 Insulation:

.1 Cross-linked polyethylene XLPE.

.2 Rating, 600 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: aluminum interlocking.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:

.1 One hole aluminum straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.

.2 Channel type supports for two or more cables at 900 mm centers.

.3 Threaded rods: 6 mm diameter to support suspended channels.

.8 Connectors:

.1 Watertight, approved for TECK cable.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Perform insulation tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20.

.2 Cable Colour Coding: to Section 26 05 00.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34.

3.4 INSTALLATION OF TECK90 CABLE (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable exposed, securely supported by straps.

END OF SECTION

PART 1 GENERAL

1.1 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for grounding equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.2 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00.

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect grounding equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 EQUIPMENT

.1 Clamps for grounding of conductor: size as required to electrically conductive underground water pipe.

.2 Insulated grounding conductors: green, copper conductors, size as indicated.

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 grounding equipment installation in accordance with manufacturer's written instructions.

.1 Inform Departmental 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 Departmental Representative.

3.2 INSTALLATION GENERAL

.1 Install complete permanent, continuous grounding system including, electrodes, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Make grounding connections in radial configuration only, with connections terminating at single grounding point. Avoid loop connections.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, control panels, distribution panels, electric heaters, etc.

3.4 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

.4 Disconnect ground fault indicator during tests.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.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.

END OF SECTION

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 21.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for hangers and supports 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 01 61 00 and with manufacturer's written instructions.

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect hangers and supports from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 SUPPORT CHANNELS

.1 U shape, size 41 x 41 mm, 2.5 mm thick, surface mounted.

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 Inform Departmental 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 Departmental Representative.

3.2 INSTALLATION

.1 Secure surface mounted equipment with screws or bolts with washer standoffs (6 mm gap).

.2 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.3 Fasten exposed conduit or cables to building construction or support system using straps.

.1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.

.2 Two-hole steel straps for conduits and cables larger than 50 mm.

.4 For surface mounting of two or more conduits use channels at 900 m on centre spacing.

.5 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.6 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.7 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.8 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 00.

.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.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installations.

.2 CAN3-C235-20, Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

PART 2 PRODUCTS

2.1 JUNCTION AND PULL BOXES

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on flat covers.

PART 3 EXECUTION

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

END OF SECTION

GENERAL

1.1 RELATED REQUIREMENTS

.1 Section 26 05 20.

.2 Section 26 05 34.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.2 CSA C22.1:21, Canadian Electrical Code, Part 1 (25th Edition),Safety Standard for Electrical Installations.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Submit samples for floor box in accordance with Section 01 33 00.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

PART 2 PRODUCTS

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Blank cover plates for boxes without wiring devices.

2.2 GALVANIZED STEEL OUTLET BOXES

.1 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

2.3 CONDUIT BOXES

.1 Cast aluminum FD boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.4 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 35 mm 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.

.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 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.4 Identify systems for outlet boxes as required.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18.1-13(R2018) Metal Outlet Boxes, etc.

.2 CSA C22.2 No. 211.2(R2016), Rigid PVC (Unplasticized) Conduit.

.3 CSA C22.2 No. 83.1-07(2017), Electrical Metallic Tubing (EMT)

.4 CSA C22.2 No. 45.1-07(R2017), Rigid Metal Conduit

.5 CSA C22.2 No, 56(2017) – C22.2 No. 56-17, Flexible Metal Conduit

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.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.

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 CSA C22.2 No. 83.1-07(2017), with couplings.

.2 Rigid Metal Conduit: to CSA C22.2 No. 45.1-07(R2017).

.3 Flexible Metal Conduit: to CSA C22.2 No, 56(2017) – C22.2 No.56.

2.3 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18.1, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for NPS 1 25 mm and larger conduits.

2.4 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 Surface mount conduits in Mechanical Rooms, Chases or Non-Inmate Areas.

.3 Minimum conduit size for lighting and power circuits: 19 mm NPS 3/4.

.4 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.5 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.6 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Group conduits wherever possible on surface channels.

.4 Rigid Galvanized in Inmate Areas.

3.4 CONDUITS IN DAMP LOCATIONS

.1 Duct seal conduits to prevent water and condensation from entering raceway.

3.5 CONDUITS CONCEALED

.1 Use EMT conduits with compression couplings.

3.6 CLEANING

.1 Proceed in accordance with Section 01 74 00.

.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 SECTION INCLUDES

.1 Materials and installation for standard and custom breaker type panelboards.

1.2 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 26 05 00 - Common Work Results - Electrical.

.3 Section 26 28 16.02 - Moulded Case Circuit Breakers.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.29-15 (R2019), Panelboards and enclosed Panelboards.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

PART 2 PRODUCTS

2.1 PANELBOARDS

.1 Panelboards: to CSA C22.2 No.29 and product of one manufacturer.

.1 Install circuit breakers in panelboards before shipment.

.2 In addition to CSA requirements manufacturer's nameplate must show fault current that panel including breakers has been built to withstand.

.2 250 V panelboards: bus and breakers rated for 10 kA (symmetrical) interrupting capacity or as indicated.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Copper bus with neutral of same ampere rating as mains.

.7 Mains: suitable for bolt-on breakers.

.8 Trim with concealed front bolts and hinges.

.9 Trim tub and door finish: baked grey enamel.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Main breaker: separately mounted on top or bottom of panel to suit cable entry. When mounted vertically, down position should open breaker.

.4 Lock-on devices for receptacles, emergency, stairway and exit light circuits.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00.

.2 Nameplate for each panelboard size 4 engraved as indicated.

.3 Complete circuit directory with typewritten legend showing location and load of each circuit.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb, true and square, to adjoining surfaces.

.2 Install surface mounted panelboards on plywood backboards in accordance with Section 06 10 00. Where practical, group panelboards on common backboard.

.3 Mount panelboards to height specified in Section 26 05 00 or as indicated.

.4 Connect loads to circuits.

.5 Connect neutral conductors to common neutral bus with respective neutral identified.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Switches, receptacles, wiring devices, cover plates and their installation.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.42-10(R2020), General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CSA C22.2 No.42.1-13(R2017), Cover Plates for Flush-Mounted Wiring Devices (Bi-National standard, with UL 514D).

.3 CSA-C22.2 No.111-18, General-Use Snap Switches (Bi-national standard, with UL 20 and NMX-J-005-ANCE).

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit Shop Drawings in accordance with Section 01 33 00.

PART 2 PRODUCTS

2.1 SWITCHES

.1 20 A, 120 V, single pole, three-way, four-way switches to: CSA-C22.2 No.55 and 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 Brown toggle.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

.4 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA-C22.2 No.42 with following features:

.1 Brown 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.

.2 Safety type duplex receptacles shall be CSA type 5-15R, 125V, U-ground with the following features:

.1 Duplex receptacle T-slot.

.2 Heavy duty, one-piece, chromate plated steel mounting strap secured to body of receptacle at both ends.

.3 Heavy-duty brown urea molded housing.

.4 Break off links for use as split receptacle.

.5 Triple wipe constant power pressure contacts with fingers in contact when receptacle is not in use.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

2.3 OCCUPANCY SENSOR

.1 Multi-technology sensor with infrared and ultrasonic technology.

.2 Ceiling mount.

.3 360 degree coverage, 1000 sq.ft.

.4 White colour housing.

.5 CUL/US, FCC and nom certified.

.6 Self-adjusting settings for sensitivity.

.7 Delayed off setting from 30 seconds to 30 minutes.

2.4 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

.5 Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.6 Maximum security grade wall plates for wiring devices in cells and all inmate areas. Maximum security wall plates shall include a 10 gauge CRS backplate with provision for attachment to outlet box and wall structure, mounting of the device and attachment of the cover. The cover shall be 10 gauge CRS, one piece die-formed, continuous welded with ground smooth edges attached with four security screws.

PART 3 EXECUTION

3.1 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 Mount toggle switches at height in accordance with Section 26 05 00.

.4 Locate light switches on latch side of door.

.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 as indicated.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.3 Cover plates:

.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.2 Install suitable common cover plates where wiring devices are grouped.

.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

.4 Device Identification: 1 Identify all receptacles with self-adhesive marker describing circuit number (i.e. "A-32"). Marker shall be fastened around mounting ears of receptacle.

.1 Identify all receptacle coverplates with clear self-adhesive Mylar tape with black lettering.

3.2 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 00.

.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.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA C22.2 No. 5-2016, Moulded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, thirteenth edition, and the second edition of NMX-J-266-ANCE).

PART 2 PRODUCTS

2.1 BREAKERS GENERAL

.1 Moulded-case circuit breakers, to CSA C22.2 No. 5.

.2 Bolt-on moulded case circuit breaker: quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.3 Circuit breakers to have minimum, 10 KA symmetrical rms interrupting capacity rating.

.4 Arc fault breakers where called for. Refer to panel schedules.

2.2 THERMAL MAGNETIC BREAKERS DESIGN A

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Equipment and installation for ground fault circuit interrupters (GFCI).

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-C22.2 No.144.1-16 (R2020), Ground Fault Circuit Interrupters.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA PG 2.2-2014, Application Guide for Ground Fault Protection Devices for Equipment.

1.3 SUBMITTALS

.1 Submit product data in accordance with Section 01 33 00.

.2 Submit product data and Shop Drawings.

PART 2 PRODUCTS

2.1 MATERIALS

.1 Equipment and components for ground fault circuit interrupters (GFCI): to CAN/CSA-C22.2 No.144.

.2 Components comprising ground fault protective system to be of same manufacturer.

2.2 GROUND FAULT PROTECTOR UNIT

.1 Self-contained with 15 A or 20A, 120 V circuit interrupter and duplex receptacle complete with:

.1 Solid state ground sensing device.

.2 Facility for testing and reset.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Do not ground neutral on load side of ground fault relay.

.2 Pass phase conductors including neutral through zero sequence transformers.

.3 Connect supply and load wiring to equipment in accordance with manufacturer's recommendations.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Arrange for field testing of ground fault equipment by Contractor before commissioning service.

.3 Demonstrate simulated ground fault tests.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Materials and installation for industrial control devices including pushbutton stations, control and relay panels.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.14-18, Industrial Control Equipment.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA ICS 1-2000(R2015), Industrial Control and Systems: General Requirements.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 33 00.

.2 Include schematic, wiring, interconnection diagrams.

1.4 QUALITY ASSURANCE

.1 Submit to Departmental Representative one copy of test results.

PART 2 PRODUCTS

2.1 AC CONTROL RELAYS

.1 Control Relays: to CSA C22.2 No.14 and NEMA ICS 1.

.2 Convertible contact type: contacts field convertible from NO to NC, electrically held. Coil rating: 120 V, 50 VA. Contact rating: 120 V, 15 A.

.3 Sealed contact type: electrically held with 3 poles and front mounted contact block to provide 3 additional poles. Coil rating: 120 V, 50 VA. Contact rating: 120 V, 15 A.

.4 Universal pole type: electrically held with 3 poles, convertible from NO to NC by changing wiring connections. Coil rating: 120 V, 50 VA. Contact rating: 120 V, 15 A.

.5 Fixed contact plug-in type: heavy duty with 3 poles. Coil rating: 120 V, 50 VA. Contact rating: 120 V, 15 A.

2.2 RELAY ACCESSORIES

.1 Standard contact cartridges: normally – open – convertible to normally – closed in field.

2.3 OPERATOR CONTROL STATIONS

.1 Enclosure: CSA Type 12, surface or flush mounting.

2.4 SELECTOR SWITCHES

.1 Maintained, 3 position labelled as indicated heavy duty oil tight, operators wing lever, contact arrangement as indicated, rated 120 V, 15 A, AC.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install pushbutton stations, control and relay panels, control devices and interconnect.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00.

.2 Depending upon magnitude and complexity, divide control system into convenient sections, energize one section at time and check out operation of section.

.3 Upon completion of sectional test, undertake group testing.

.4 Check out complete system for operational sequencing.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 International Electrotechnical Commission (IEC)

.1 IEC 60947-4-1 Ed. 4.0 b:2018, Part 4.1 Electromechanical contactors and motor-starters.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Provide shop drawings: in accordance with Section 01 33 00.

.1 Provide shop drawings for each type of starter to indicate:

.1 Mounting method and dimensions.

.2 Starter size and type.

.3 Layout and components.

.4 Enclosure types.

.5 Wiring diagram.

.6 Interconnection diagrams.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance materials in accordance with Section 01 77 00.

.2 Submit operation and maintenance data for each type and style of motor starter for incorporation into maintenance manual.

.3 Extra Materials:

.1 Provide listed spare parts for each different size and type of starter.

.1 3 contacts, stationary.

.2 3 contacts, movable.

.3 1 contacts, auxiliary.

.4 1 control transformer.

.5 1 operating coil.

.6 2 fuses.

.7 10 % indicating lamp bulbs used.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle in accordance with Section 01 61 00.

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

PART 2 PRODUCTS

2.1 MATERIALS

.1 Starters: to IEC 60947-4-1 with AC4 utilization category.

2.2 MANUAL MOTOR STARTERS

.1 Single or Three phase manual motor starters of size, type, rating, and enclosure type 12 or flush mount, with components as follows:

.1 Switching mechanism, quick make and break.

.2 One, Two or Three overload heaters, manual reset, trip indicating handle.

.2 Accessories:

.1 Toggle: heavy duty labelled as indicated.

.2 Indicating light: heavy duty type and colour as indicated.

.3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FINISHES

.1 Apply finishes to enclosure in accordance with Section 26 05 00.

2.4 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00.

.2 Manual starter designation label, black plate white letters, size 1, engraved as indicated.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Install starters and control devices in accordance with manufacturer's instructions.

.2 Install and wire starters and controls as indicated.

.3 Confirm motor nameplate and adjust overload device to suit.

.4 The electrical contractor shall complete all control wiring required which is not specifically related to the controls systems as outlined in the mechanical specifications. All control wiring outlined in the mechanical specifications as part of the controls systems shall be completed by the controls contractor. The electrical contractor shall supply all control equipment

specifically noted on plans or specifications. All other equipment required shall be supplied by mechanical or other trades. The electrical contractor shall cooperate with the mechanical trades to ensure that all control sequences and equipment are correct. The electrical contractor shall be supplied with all electrical equipment from other trades and shall verify that its characteristics are correct. It will be the responsibility of the electrical contractor to obtain from the mechanical contractor, and all other trades, complete detailed wiring diagrams for all equipment supplied by these trades requiring electrical wiring by the electrical contractor's work and the work of other trades. It is the electrical contractor's responsibility to point out immediately any discrepancies in these diagrams or any reason they cannot be adhered to. All control equipment such as immersion type thermostats, coil freeze protection, pneumatic control devices, etc. shall be installed by the trade responsible for its supply and operation.

.5 It is the responsibility of the electrical contractor to provide all control devices such as pushbutton stations, when they do not form part of a control panel.

END OF SECTION

PART 1 GENERAL

1.1 REFERENCES

.1 Institute of Electrical and Electronics Engineers (IEEE)

.1 IEEE C62.41.2-2002, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.2 ASTM International Inc.

.1 ASTM M19-F1137M-19, Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.3 Canadian Standards Association (CSA International)

.4 ICES-005 May 2018, Radio Frequency Lighting Devices.

.5 Underwriters' Laboratories of Canada (ULC)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Departmental Representative.

.3 Photometric data to include:

.1 Total input watts.

.2 Candela.

.3 Distribution zonal lumen summary.

.4 Luminaire efficiency.

.5 Coefficient of utilization.

.6 Lamp type.

.3 Quality assurance submittals: provide following in accordance with Section 01 45 00.

.1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, and cleaning procedures.

.4 Submit a luminaire (and driver if LED) and lamp shop drawing for each luminaire type.

.5 For LED fixtures, ensure that each of the specified driver features is specifically shown on shop drawings.

.6 Provide test reports for LED modules and drivers.

1.3 QUALITY ASSURANCE

.1 Provide mock-ups in accordance with Section 01 45 00.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00.

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

.3 Disposal and recycling of fluorescent lamps as per local regulations.

.4 Disposal of old PCB filled ballasts.

1.5 GUARANTEE

.1 Replace:

.1 LED drivers that fail or exceed their original noise level rating within 12 months of Substantial Performance of Work.

.2 LED fixtures that fall within 12 months of Substantial Performance of the work.

PART 2 PRODUCTS

2.1 LAMPS

.1 Refer to detail on drawing.

.2 LED sources to be high power, minimum rated 50,000 hour, white, 4000°k, 25 watt, minimum 80CRI, replaceable modules.

2.2 LED DRIVERS

.1 120V, 60Hz, Class I, LED drivers.

.2 Power factor: 790%.

.3 Total Harmonic Distortion (THD): <10% of full load.

.4 Complete with integral 9kV surge suppression protection.

.5 CSA approved and/or ULC listed and labelled.

.6 Capable of step level dimming where indicated.

2.3 FINISHES

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

2.4 OPTICAL CONTROL DEVICES

.1 As indicated in detail sheets.

2.5 LUMINARIES

.1 As indicated in detail sheets.

PART 3 EXECUTION

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Provide adequate support to suit ceiling system.

.3 Support luminaires directly from building structure.

.4 Luminaires in inmate cells, range corridors, shower stalls and all maximum security areas shall be solidly attached to the building structure with concrete anchors and tamper-proof hardware to prevent luminaires from being knocked or pried off by the inmates. Seal all around the luminaire body with epoxy caulking to prevent concealment of contraband behind the luminaire.

3.2 WIRING

.1 Connect luminaries to lighting circuits:

.1 Install flexible or rigid conduit for luminaries as indicated.

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

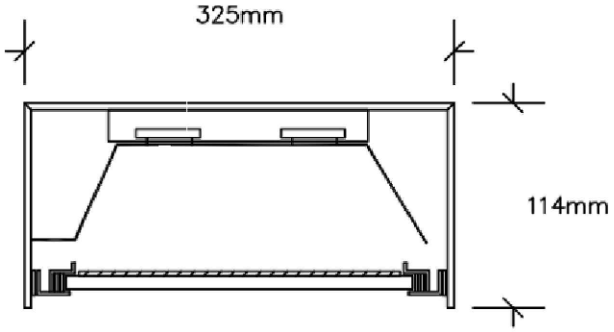
.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 CLEANING

.1 Clean in accordance with Section 01 74 00.

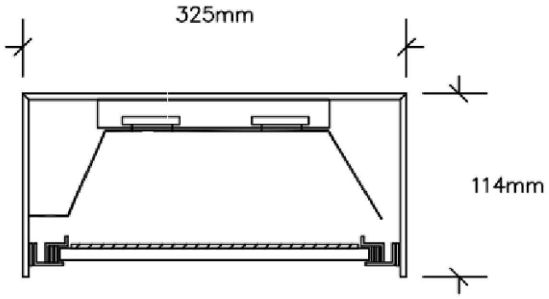
.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION



"CROSS SECTION"

LENGTH:	1200MM
LAMP:	52W INTEGRATED LED BOARD, 3500K (80+ CRI) MINIMUM 3000 LUMEN OUTPUT
DRIVER:	120VOLT DIMMING CONSTANT CURRENT DRIVER
VOLTAGE:	120VOLTS, SINGLE PHASE 60HZ.
GENERAL:	LED, SURFACE, SECURITY VANDAL PROOF FIXTURE WITH FRAME AND LATCHES
HOUSING:	DIE FORMED REINFORCED 1.9MM (12 GA) COLD ROLLED STEEL
LENS:	INTERNAL LENS 4.7MM (0.187 INCH). POLYCARBONATE K12 PRISM. EXTERNAL LENS 9.5MM (0.375 INCH) TEMPERED GLASS
FINISH:	ELECTROSTATICALLY APPLIED WHITE POLYESTER POWDER COATING
SPECIAL FEATURES:	COMPLETE WITH MOUNTING HARDWARE & ACCESSIBLE SCREWS SHALL BE TORX CENTRE PIN TYPE (PROVIDE 3 SPECIAL SCREWDRIVERS FOR OWNERS MAINTENANCE PERSONAL) CSA APPROVAL



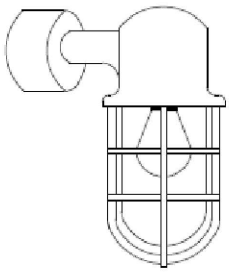
"CROSS SECTION"

LENGTH:	1200MM
LAMP:	73W INTEGRATED LED BOARD, 4000K (80+ CRI) MINIMUM 4985 LUMEN OUTPUT
DRIVER:	120V DIMMING CONSTANT CURRENT DRIVER
VOLTAGE:	120VOLTS, SINGLE PHASE 60HZ
GENERAL:	LED, SURFACE, SECURITY VANDAL PROOF FIXTURE WITH FRAME AND LATCHES, SUITABLE FOR WET LOCATIONS
HOUSING:	DIE FORMED REINFORCED 1.9MM (12 GA) COLD ROLLED STEEL
LENS:	INTERNAL LENS 4.7MM (0.187 INCH). POLYCARBONATE K12 PRISM. EXTERNAL LENS 9.5MM (0.375 INCH) TEMPERED GLASS
FINISH:	ELECTROSTATICALLY APPLIED WHITE POLYESTER POWDER COATING
SPECIAL FEATURES:	ACCESSIBLE SCREWS SHALL BE TORX CENTRE PIN TYPE (PROVIDE 3 SPECIAL SCREWDRIVERS FOR OWNERS MAINTENANCE PERSONAL) CSA APPROVAL

Public Works Canada

TYPE F
LIGHTING FIXTURE

R.106776.001
E-103
MHS DRUGLOO



LAMP: LED 1-15W A-19

VOLTAGE: 120VOLTS, SINGLE PHASE 60HZ

GENERAL: STAINLESS STEEL BOX WITH 4-20 MM THREADED AND INTEGRAL MOUNTING FEET. SUITABLE FOR WALL MOUNTING. SILICONE GASKETS, STAINLESS STEEL HOUSING AND HARDWARE

GLOBE: STANDARD GLASS GLOBE COMPLETE WITH WIRE GUARD

PART 1 GENERAL

1.1 SECTION INCLUDES

.1 Video cameras.

.2 Video handling.

.3 Recording devices.

.4 Transmission methods.

1.2 REFERENCE DOCUMENTS

.1 National Fire Protection Association (NFPA)

.1 NFPA 70, Article 517, National Electric Code.

.2 NFPA 101, Life Safety Code.

.2 Electronic Industries Association (EIA)

.1 REC 12749, Power Supplies.

.2 RS 16051, Sound Systems.

1.3 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-18, Canadian Electrical Code, Part 1 (27th edition) Safety Standard for Electrical Installations.

.2 National Fire Protection Association (NFPA)

.1 NFPA 70, National Electric Code.

.3 Underwriters Laboratories of Canada (ULC)

.1 ULC-S317-1996, Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.

.4 ES/SOW 0101 Procurement and Installation of Electronic Security Systems for use in Federal Correctional Institutions.

.5 ES/SOW 0102 Quality Control for Procurement of Electronic Security Systems for Use in Federal Correctional Institutions.

.6 ES/SOW 0104 Design Criteria for Maintainability and Safety of Electronic Security Systems for Use in Federal Correctional Institutions.

.7 ES/SOW 0502 Electronic Systems/Equipment Test and Evaluation Guidelines for Electronic Security Systems for Use in Federal Correctional Institutions.

.8 SPEC 0200 Closed Circuit Television System for Use in Federal Correctional Institutions.

.9 STD 0802 Control and Display Panels for Use in Federal Correctional Institutions.

.10 STD 0803 Video Display Unit for Use in Federal Correctional Institutions.

.11 ES/STD 0218 for LCD video monitors.

.12 ES/STD 0220 for digital video recorder.

.13 ES/SOW-0110 structured cable.

.14 CSC Specification ES/SPEC-0006 Installation of Conduit and Cables in Federal Institutions.

1.4 DEFINITIONS

.1 CCTV: Closed Circuit Television.

.2 CCVC: Closed Circuit Video.

.3 CCD: Charge Coupled Device.

.4 FOV: Field of View.

1.5 DESIGN PERFORMANCE REQUIREMENTS

.1 Switching:

.1 Provision to switch any camera in system to any monitor in system manually or automatically.

.2 Provision to switch system video recorders to selective monitor outputs in system.

.2 Enter and edit CCTV programs and save them for future use.

.3 Set dwell time for viewing of any camera picture.

.4 Define sequence for viewing cameras on each monitor.

.5 Overall control of CCTV provided through software control, which provides complete integration of security components.

1.6 SUBMITTALS

.1 Product Data: Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings: Submit in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit shop drawings to indicate project layout, camera locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labeling scheme including:

.1 Functional description of equipment.

.2 Technical data sheets of all devices.

.3 Device location plans and cable lists.

.4 Video camera surveillance chart.

.5 Video interconnection detail drawings.

.3 Quality Assurance Submittals: Submit the following in accordance with Section 01 33 00 - Submittal Procedures.

.1 Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Submit UL Product safety Certificates.

.4 Instructions: Submit manufacturer's installation instructions.

.5 Manufacturer's Field Services: Submit copies of manufacturer's field reports.

.4 Maintenance Data: Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Include following:

.1 System configuration and equipment physical layout.

.2 Functional description of equipment.

.3 Instructions on operation, adjustment and cleaning.

.4 Illustrations and diagrams to supplement procedures.

.5 Manufacturer's operation instructions

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Deposit packaging materials in appropriate container on site for recycling or reuse.

.2 Avoid using landfill waste disposal procedures when recycling facilities are available.

.3 Collect and separate plastic, paper packaging and corrugated cardboard.

.4 Dispose of corrugated cardboard, polystyrene and plastic packaging material in appropriate on-site bin.

1.8 WARRANTY

.1 For CCTV materials the 12 month warranty period prescribed in subsection GC 32.1 of General Conditions "C" is extended to 60 months.

.2 Manufacturer's Warranty: Submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.

Part 2 PRODUCTS

2.1 MATERIALS

.1 Video Cameras:

.1 Provide Axis Q9216-SLV Network cameras complete with 3.0 - 8.0 Auto Iris, Varifocal lens for Rooms 145 and 128 (3 required).

.2 Provide Axis M3037-PVE dome camera in corridor , 128 outside the door to Room 146.

.2 Network Switches:

.1 Provide 24 port switcher as described below:

.1 This equipment must be Avaya / Extreme.

.2 The edge switches must be 24 port network switches utilizing 802.1aq SPB allowing for ease of future expansion of the network infrastructure and the capability for multiple connections into different switches utilizing load balanced network paths to provide an extra level of resiliency within the network in case of any switch failure. For more remote site locations with low port capacity requirements, a SPB-compatible 8-port switch must be used.

.3 The edge switches must provide:

.1 Minimum of L3 switching.

.2 10/100/1000 Mbps switching.

.3 Dual 1/10 GBps SFP+ uplinks (as required for link capacity requirements, with migration readiness option for 10Gb future uplinks) resilient, always on connectivity.

.4 Wire-speed performance and non-blocking throughput to support a variety of applications including requirements for low latency, high bandwidth, reliable video surveillance.

.5 Field replacement redundant power supplies for increased resilience.

.6 Maximum POE wattage to support CCTV surveillance cameras deployed with capacity for further additions; must be able to concurrently deliver up to POE+ per port.

.7 Flexibly support for IEE 802.3af POE and IEEE 802.3at POE+ devices per port, optimized for video surveillance (including PTZ devices, HD).

.8 Provide one-touch edge provisioning for edge devices with any move, add or change communicated automatically throughout the network infrastructure.

.9 Capability to add further network capacity as required without impact current operational switching.

.10 Support IEEE 802.1aq SPB.

.11 Advanced QOS and prioritization.

.12 Support for both Ipv4 and Ipv6 management addresses.

.4 The Edge switches must provide for edge only – provisioning natively, automatically informing the rest of the network of the change/addition, eliminating the need, when changes are made, for manual configuration of the core switches and inter-switch trunks.

.3 Monitors:

.1 The monitors shall be integrated and compatible with the video switching and control system. The monitor shall meet the following requirements:

.1 All monitors shall have DC restoration switch.

.2 Both horizontal and AFC time constants.

.3 All internal circuitry, with the exception of the CRT, shall incorporate solids state design throughout.

.4 Operating controls for brightness, contrast, vertical hold, horizontal hold and power on/off shall be accessible from the front of the monitor.

.5 Provide video monitors with a diagonal screen size of 686mm (27 in.) with a resolution of 1920x1080.

.6 Furnish the necessary mounting kits to install all monitors in their final location in the Recovery Room.

.7 Aspect Ratio: 16:9.

.8 Response Time: 5ms or better.

.9 Contrast Ratio: 3000;1.

.10 Input Connectors: D-Sub (SVGA) or HDMI.

.11 178°/178° viewing angle (horizontal/vertical).

.12 Vesa compliant mount.

.13 Rated Continuous 24/7/365 operation.

.14 Monitors to be complete with wall mount brackets.

.4 Accessories:

.1 For the monitors, provide wall mount brackets as follows:

.1 Suitable for 686 mm monitor.

.2 Maximum load: 68 KG.

.3 Pan: 360°.

.4 Tilt: 40° (20° Up, 20° Down).

.5 Finish: Black.

.6 Weight: 13.8 KG.

Part 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and datasheet.

3.2 INSTALLATION

.1 The contractor must provide, install and test a complete and fully functional IP based CCTV system. The CCTV system must meet or exceed

all of the performance outlined. Where there is a conflict between any published specification and this STR; this STR will be the document of reference.

.2 The Contractor must avoid, as much as possible, the use of conduit in inmate accessible areas. The contractor must utilize existing pipe chases, existing conduit in the walls, etc., where possible. New lengths of conduit must be of the minimum necessary length. All newly installed conduits carrying video for this project must be identified, except in inmate accessible areas, by prominent labels with BRIGHT GREEN wording. The contract must use only rigid threaded conduit in inmate accessible areas. These labels must be located at each end of the conduit run, on both sides of the penetration of a wall, and at 3.5 metre intervals along its length. All junction box covers and conduit joints must be painted bright green except where installed in inmate accessible areas.

.3 The contractor must test all existing structured cabling to be reused in this project with a certified CAT6 LAN Analyzer and provide detailed analysis and LANCAT readings for all cables.

.1 Wire map – pass/fair

.2 Propagation Delay – pass/fail

.3 Cable Length – pass/fail – length

.4 Insertion Loss – pass/fail – dB

.5 Return Loss – pass/fail

.6 NEXT – pass/fail

.7 ELFEXT – pass/fail

.4 In secure office areas where drywall construction is used, the contractor must fish associated cabling to support KVM extension devices through the walls. The walls must be finished with an appropriate CAT6 termination plate, labeled to the device. All visible CAT6 RJ 45 plugs must be BRIGHT GREEN. When fishing cable into a wall, the contractor may use flex conduit. Where it is impossible to fish the cable into a follow wall or the wall is solid (e.g. cinderblock) the contract or may use a decorative wire mold to run the necessary cables to the defined location of the equipment with written permission from the project authority. Wire mold must meet the Ontario Electrical Code when supporting power.

.5 All category 6 Ethernet data cables and date jumper cables (minimum 23 gauge), jacks and connector boots installed as part of this project, must be BRIGHT GREEN in colour. All cables must be FT4 rated except where cable is not protected in a conduit or in a plenum ceiling, such cable must meet a FT6 fire rating.

.6 All cabling in equipment cabinets, termination trays, cable trays, junction boxes, and at edge devices must be neatly dressed using Velcro style “hook and loop” re-useable straps. Cable straps must encircle all the dabbles in a given bundle. Any cable secured with a tie-wrap will require replacement of the entire cable.

.7 All cabling in equipment cabinets must be dressed throughout the cabinet. Cables entering a cabinet from the top must be routed to the base of the cabinet and then return to the designated equipment height, the reverse for cables entering the bottom. Vertical cable runs in the cabinet must be in the side panel areas of the cabinet. Vertical cable runs must be strapped every 300mm (12”). Cable straps

must encircle all the dabbles in a given bundle. Vertical cable bundles must route from the cable riser across the width of the equipment cabinet and loop back to the termination point on the patch panel. This will provide enough slack to permit any patch panel to be removed, reversed and re-punched.

.8 An installed cable is any cable that is run through a conduit, run from one area in a building to another area, any cable that travels further than the adjacent equipment cabinet in a series of cabinets. Note: Equipment cabinets must be abutting without side panels to open connection to be considered adjacent.

3.3 VERIFICATION

.1 Perform verification inspections and test in the presence of Engineer.

.1 Provide all necessary tools, ladders and equipment.

.2 Ensure appropriate subcontractors, and manufacturer's representatives and security specialists are present for verification.

.2 Visual verification: Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:

.1 Sturdiness of equipment fastening.

.2 Non-existence of installation related damages.

.3 Compliance of device locations with reviewed shop drawings.

.4 Compatibility of equipment installation with physical environment.

.5 Inclusion of all accessories.

.6 Device and cabling identification.

.7 Application and location of ULC approval decals.

.3 Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:

.1 Measurements of tension and power.

.2 Connecting joints and equipment fastening.

.3 Measurements of signals (dB, lux, baud rate, etc).

.4 Compliance with manufacturer's specification, product literature and installation instructions.

.4 Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:

.1 Operation of each device individually and within its environment.

.2 Operation of each device in relation with programmable schedule and or/specific functions.

.3 Switching of camera to any monitor.

.4 Switching of system video recorder to selective monitor.

.5 Set dwell times.

.6 Demonstrate:

.1 Sequence viewing of cameras on each monitor.

.2 Bypass capability.

.3 Display of stored image.

3.4 LICENSING

.1 Contractor must provide all licenses, installation and integration into the existing Genetec Security Centre 5.5 system including integration into the dual redundant Veracity Coldstore storage solution.

3.5 CLEANING AND ADJUSTING

.1 Remove protective coverings from cameras and components.

.2 Adjust cameras for correct function.

.3 Clean camera housing, system components and lens, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

END OF SECTION