Public Works and
Government Services Canada

Travaux Publics et Services
Gouvernmentaux Canada

Specification

Abbotsford, BC
Kent Institution
AD Unit

A & D REDEVELOPMENT

Requisition No. EZ899-150705/A

Project No. R.018361.001
April 2014

APPROVED BY:

Regional Manager, AES — Date: June 2/2014

Construction Safety Coordinator — Date: 2014 05 04

TENDER:

Project Manager — Date: June 6/2014

Public Works and Government Services Canada - Pacific Region
BC/Yukon Division Real Property Services
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REGISTERED ARCHITECT
JOSEPH K. T. YUEN
BRITISH COLUMBIA
May 1 2014

PROVINCE OF BRITISH COLUMBIA
Y. X. ZHAO
PROFESSIONAL ENGINEER
29743
DESIGNATED STRUCTURAL ENGINEER
for sections 03 05 10, 04 04 99 & 05 21 00 only
Apr 14/14

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2014.06.30

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Bound Separately

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1 SUMMARY OF WORK

.1 Work covered by Contract Documents:
.1 Work under this Contract comprises renovation of A&D area and remedial work as indicated, at Kent Institution, 4732 Cemetery Rd., Agassiz BC.

.2 Complete Work in the following stages:
.1 Complete work in Restricted Visits room prior to starting A&D area.
.2 Start remaining work following completion of new Restricted Visits as approved by Departmental Representative.
.3 Demolition work may take place outside of Restricted Visits room provided perimeter wall of existing Restricted Visits room remains in place until completion of new Restricted Visits room.

.3 Contractor's Use of Premises:
.1 Contractor has controlled use of site within the construction area for Work, storage, and access as directed by the Departmental Representative.
.2 Use of areas inside Kent Institution, is controlled by the Departmental Representative.
.3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.
.4 The renovation work is self contained within the Work area at Unit. Kent Institution site will be operational during work of this Contract.

2 WORK RESTRICTIONS

.1 Notify, Departmental Representative of intended interruption of disconnected services and provide schedule for review. Schedule major disruption of services in existing building during approved times. Notify Departmental Representative 48 hours in advance of unscheduled interruption to mechanical or electrical service throughout course of work.

.2 Where Work involves cutting openings in roof and exterior wall for new work, provide temporary secure, weatherproof hoarding to approval of Departmental Representative. Coordinate interruptions affecting existing building if affected by the disruption. All openings to be secured at end of work shift each day.

.3 Protect duct systems to prevent dust and contaminants migrating outside of the Work area.

.4 Construct barriers in accordance with Temporary Barriers and Enclosures clause.

.5 Security Requirements: refer to Section 01 14 10 - Security requirements.

.6 Hours of work:
.1 Perform work during normal working hours of the site (0730 to 1600), Monday through Friday except holidays.
.2 Work may be performed after normal working hours of Institution, Monday through Friday, on weekends and holidays, with a minimum forty-eight (48) hours advance notice and approval of the Departmental Representative.
.3 Provide schedule for prior approval of Departmental Representative.
.4 Allow for delays due to security protocol when work interferes with Institution security operations.

.7 Access into Institution:

.1 Vehicular access through the Principal Entrance sally port will be restricted during the inmate "count" at breakfast, lunch and dinner hours.

.2 Confirm "count" times with Departmental Representative. Delays may occur when entering and exiting the Institution with vehicles during "count" times and due to security situations and heavy traffic.

.3 A construction escort will be provided by the Departmental Representative, at no cost to the Contract for access to site area inside Kent Institution. Notify Departmental Representative minimum 24 hours in advance of when Construction Escort is required.

3 CONSTRUCTION WORK SCHEDULE

.1 Commence work immediately upon official notification of acceptance of offer and complete the work within thirty (30) weeks from the date of such notification.

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

.3 Submittals:

.1 Submit to Departmental Representative within ten (10) working days of Award of Contract Bar (GANTT) Chart as Master Plan for planning, monitoring and reporting of construction progress.

.2 Identify each trade or operation within each stage listed in paragraph 1.2.

.3 Show dates for delivery of items requiring long lead time.

.4 Departmental Representative will review schedule and return one copy.

.5 Re-submit two (2) copies of finalized schedule to Departmental Representative within five (5) working days after return of reviewed preliminary copy.

.4 Project Scheduling Reporting:

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

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

.5 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.

.3 Before submitting first progress claim submit breakdown of Contract price in detail as directed by Departmental Representative and aggregating contract price. After approval by Departmental Representative cost breakdown will be used as basis for progress payments.

4 SUBMITTAL PROCEDURES

.1 Administrative:

.1 Submit to Departmental Representative submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work.

.2 Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.
.3 Do not proceed with work affected by submittal, until review is complete.
.4 Present shop drawings in SI Metric units.
.5 Where items or information is not produced in SI Metric units converted values are acceptable.
.6 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 shall be considered rejected.
.7 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
.8 Verify field measurements and affected adjacent Work are coordinated.
.9 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative review of submittals.
.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
.11 Keep one reviewed copy of each submission on site.

.2 Shop Drawings:
.1 Drawings to be originals prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

.3 Product Data:
.1 Certain specification Sections specify that manufacturer's standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations and other standard descriptive data will be accepted in lieu of shop drawings, provided that the product concerned is clearly identified. Submit in sets, not as individual submissions.

.4 Samples:
.1 Submit samples in sizes and quantities specified.
.2 Where colour is criterion, submit full range of colours.
.3 Submit all samples as soon as possible after the contract is awarded, to facilitate production of complete colour scheme by the Departmental Representative.

.5 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 location as specified in specific Section .
.3 Prepare mock-ups for Departmental Representative' 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 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

.6 Submission Requirements:
.1 Schedule submissions at least ten days before dates reviewed submissions will be needed.

.2 Submit number of copies of product data, shop drawings which Contractor requires for distribution plus four (4) copies which will be retained by Departmental Representative.
.3 Accompany submissions with transmittal letter in duplicate.
.4 Submit either bond copies or one (1) electronic pdf file of each shop drawing and product data as directed by Departmental Representative.

.7 Coordination of Submissions:
.1 Review shop drawings, product data and samples prior to submission.
.2 Coordinate with field construction criteria.
.3 Verify catalogue numbers and similar data.
.4 Coordinate each submittal with requirements of the work of all trades and contract documents.
.5 Responsibility for errors and omissions in submittals is not relieved by Departmental Representative's review of submittals.
.6 Responsibility for deviations in submittals from requirements of Contract documents is not relieved by Departmental Representative's review of submittals, unless Departmental Representative gives written acceptance of specified deviations.
.7 Notify Departmental Representative, in writing at time of submission, of deviations in submittals from requirements of Contract documents.
.8 Make any changes in submissions which Departmental Representative may require consistent with Contract Documents and re-submit as directed by Departmental Representative.
.9 After Departmental Representative's review, distribute copies.
.10 Shop Drawings Review:
.1 Review of shop drawings by Public Works and Government Services Canada (PWGSC) is for the sole purpose of ascertaining conformance with the general concept.
.2 The Departmental Representative's review does not mean that PWGSC approves the detail design inherent in the shop drawings, responsibility remains with the contractor submitting same, and such review will not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of responsibility for meeting all requirements of the construction and contract documents.
.3 Without restricting the generality of the foregoing, the Contractor is responsible for dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation, and for co-ordination of the work of all subtrades.

5 HEALTH AND SAFETY

.1 Specified in Section 01 35 33 - Health and Safety Requirements.

6 ENVIRONMENTAL PROCEDURES

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

.2 Do not bury rubbish and waste materials on site.

.3 Do not dispose of waste or volatile materials such as oil, paint thinner or mineral spirits into waterways, storm or sanitary systems.

.4 Under no circumstances dispose of rubbish or waste materials on property or CSC waste bins.

7 REGULATORY REQUIREMENTS

.1 References and Codes:
.1 Perform Work in accordance with National Building Code of Canada (NBCC2010) including all 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.

8 QUALITY CONTROL

.1 Inspection:
.1 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.
.2 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.
.3 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.

.2 Independent Inspection Agencies:
.1 Provide independent Inspection/Testing Agencies for purpose of inspecting and/or testing portions of Work as specified in relevant sections. Cost of such services will be borne by the Contractor.
.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 extra cost to Contract. Pay costs for retesting and reinspection.

.3 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.

.4 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.

.5 Reports:
.1 Submit (4) four copies or one scanned pdf copy of inspection and test reports to Departmental Representative.

.6 Tests and Mix Designs:
.1 Furnish test results and mix designs as may be requested.

.7 Mill Tests:
.1 Submit mill test certificates as requested and as required of specification Sections.

.8 Equipment and Systems:
.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems in accordance with Commissioning section 09 10 00.
.2 Refer to specific Section for definitive requirements.

9 TEMPORARY UTILITIES

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

.2 Water Supply:
.1 Existing water supply system may be used for construction purposes provided that damaged components are replaced when damaged. Provide own hoses from source.

.3 Temporary Heating and Ventilation:
.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel/power.
.2 Provide temporary heat and ventilation in enclosed areas as required to:
.1 Facilitate progress of Work.
.2 Protect Work and products against dampness and cold.
.3 Prevent moisture condensation on surfaces.
.4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
.5 Provide adequate ventilation to meet health regulations for safe working environment.
.3 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
.4 The existing air system will be in use during work of this contract inside existing building. Protect ducting system by filters inspected daily and replaced as necessary. During dust generating construction work block off all outlets and seal air tight.
.1 Before Substantial Completion comply with the following conditions:
.1 Remove all temporary duct covers.
.2 Replace used air filters with new filters.
.5 Ventilating:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
.2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
.3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.

.4 Ventilate storage spaces containing hazardous or volatile materials.
.5 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.
.5 Vent direct-fired combustion units to exterior of building.
.7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

.4 Temporary Power and Light:
.1 Electrical power and lighting in existing building may be used for construction purposes at no extra cost, provided that electrical components used for temporary power are replaced when damaged.

.5 Temporary Communication Facilities:
.1 Temporary land line telephone and fax hook up are restricted on site. Conform to Section 01 14 10 Security Requirements for use of cell phones inside institution.

.6 Fire Protection:
.1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.

10 CONSTRUCTION FACILITIES

.1 Installation and Removal:
.1 Provide construction facilities in order to execute work expeditiously.
.2 Remove from site all such work after use.

.2 Scaffolding:
.1 Design, construct and maintain scaffolding in rigid, secure and safe manner, in accordance with WCBBC regulations and Section 01 35 33.
.2 Erect scaffolding independent of walls. Remove promptly when no longer required.

.3 Material lifts:
.1 Provide, operate and maintain lifts required for moving of materials and equipment. Make financial arrangements with Subcontractors for use thereof.
.2 Lifts: operated by qualified operator.

.4 Site Storage/Loading:
.1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
.2 Do not load or permit to load any part of Work with a weight or force that will endanger the Work.

.5 Construction Parking:
.1 Make good damage to local roads used for access to project site.

.2 Parking space outside double fence and temporary parking for delivery vehicles at the construction site is available as directed by the Departmental Representative.

.6 Contractor's Site Office:
.1 Provide office as required to accommodate Contractor's operations. Locate as directed by the Departmental Representative.
.2 Provide a clearly marked and fully stocked first-aid case in a readily available location in accordance with WCB requirements.

.7 Equipment, Tools and Material 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. Limited space is available inside mechanical Room for temporary storage.

.8 Sanitary Facilities:
.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.9 Construction Signs:
.1 Format, location and quantity of site signs and notices to be approved by Departmental Representative.
.2 Signs and notices for safety or instruction to be in English language, or commonly understood graphic symbols.
.3 Maintain signboards, signs and notices for duration of project. Remove and dispose of signs off site when directed by Departmental Representative.
.4 Remove signs from site at completion of project or as directed by Departmental Representative.

11 TEMPORARY BARRIERS AND ENCLOSURES

.1 Enclosure of Structure:
.1 Provide temporary weather tight and secure secure protection for exterior openings until new door and frame assemble is installed and secure. Design enclosures to withstand wind pressure.
.2 Secure assigned construction storage areas with fenced area to secure materials and temporary buildings.
.3 Provide temporary dust screens in existing building where dust generating work occurs adjacent to staff occupied areas.
.4 Construct temporary wood framed plywood wall at new opening in Corridor wall at Restricted Visiting until new door assembly is secure. Provide lockable door in temporary partition. Seal perimeter of wall and door to prevent dust migration.
.5 Seal all doors and frames leading from work area to adjoining staff occupied areas.

.2 Guardrails and Excavations:
.1 Provide secure, rigid guard rails and barricades at open excavations in accordance with WSBC requirements.

.3 Access to Site:
.1 Maintain existing access roads and designated parking area in broom clean condition.

.4 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 hoarding.

.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.

12 COMMON PRODUCT REQUIREMENTS

.1 Reference Standards:

.1 If there is a 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.

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

.3 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.

.2 Quality:

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

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

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

.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

.3 Storage, Handling and Protection:

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

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

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

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

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

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

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

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

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

.4 Transportation:

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

.5 Manufacturer's Instructions:

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

.2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative 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 price to Contract.

.6 Quality of Work:

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

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

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

.7 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.

.8 Concealment:

.1 In finished areas, surface mount pipes, ducts and wiring on walls and ceilings, except where indicated otherwise.

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

.9 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.

.10 Location of Fixtures:

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

.2 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

.11 Fastenings:

.1 Provide metal trim 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.

.12 Fastenings - Equipment:

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

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

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

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

.13 Protection of Work in Progress:

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

.14 Existing Utilities:

.1 Where work involves breaking into or connecting to existing services, carry out work at times directed by Departmental Representative with minimum of disturbance to existing services in use.

.2 Before commencing work, establish location and extent of service lines in areas of work and notify Departmental Representative of findings.

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

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

.5 Record locations of maintained and re-routed services lines.

13 EXAMINATION AND PREPARATION

.1 Existing Services:

.1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.

.2 Remove redundant service lines and as indicated. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

.2 Location of Equipment and Fixtures:

.1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

.2 Locate equipment, fixtures and distribution systems to provide minimum interference and maximum usable space and in accordance with manufacturer's recommendations for safety, access and maintenance.

.3 Inform Departmental Representative of impending installation and obtain approval for actual location.

.4 Submit field drawings to indicate relative position of various services and equipment when required by Departmental Representative.

14 EXECUTION REQUIREMENTS

.1 Preparation:

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

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

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

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

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

.2 Execution:

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

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

.3 Uncover Work to install ill-timed Work.

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

.5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.

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

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

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

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

.10 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with fire-stopping material, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: For continuous surfaces refinish to nearest intersection; for an assembly, refinish entire unit.

15 CLEANING

.1 Project Cleanliness:

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris.

.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, unless approved by Departmental Representative.

.3 Provide on-site containers for collection of waste materials and debris.
.4 Provide and use clearly marked separate bins for recycling. Refer to-Construction/Demolition Waste Management And Disposal.
.5 Clean interior areas prior to start of finish work, and maintain areas free of dust and other contaminants during finishing operations.
.6 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
.7 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
.8 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
.9 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

.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 from site.
.5 Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, and mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.
.6 Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors.
.7 Clean lighting reflectors, lenses, and other lighting surfaces.
.8 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
.9 Wax, seal, vacuum clean, shampoo or prepare floor finishes, as recommended by manufacturer.
.10 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
.11 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
.12 Remove dirt and other disfiguration from exterior surfaces.
.13 Sweep and wash clean paved areas used during work of this contract.
.14 Clean equipment and fixtures to a sanitary condition; clean or replace filters of mechanical equipment.
.15 Remove snow and ice from access to building.

16 CONSTRUCTION/DEMOLITION WASTE MANAGEMENT AND DISPOSAL

.1 Provide on-site facilities for collection, handling, and storage of anticipated quantities of reusable and/or recyclable materials and waste. Separate non-salvageable materials from salvaged items. Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes. Transport and deliver non-salvageable items to licensed disposal facility.

.2 Provide containers to deposit reusable and/or recyclable materials. Locate containers in locations, to facilitate deposit of materials without hindering daily operations. Provide containers to deposit reusable and/or recyclable materials.

.3 Collect, handle, store on-site and transport off-site, salvaged materials in separate condition. Transport to approved and authorized recycling facility and/or users of material for recycling.

.4 Locate waste and salvage bins on site as directed by Departmental Representative.

17 CLOSEOUT PROCEDURES

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

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

.3 Substantial 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. Operation of systems have been commissioned and demonstrated to Department's personnel.
.4 Fire alarm verification report per CAN/ULC-S537, confirmation of proper installation of fire alarm panel to CAN/ULC-S527 signed off by the fire alarm technician and confirmation of fire alarm emergency power capacity. 24-hour battery test as described in CAN/ULC-S537, signed off by fire alarm technician.
.5 Confirmation of emergency power lighting, operating on emergency power for the required amount of time as dictated by the NBCC, signed off by electrician.
.6 Confirmation of hydrostatic testing for sprinkler system.
.7 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. If Work is deemed incomplete by Departmental Representative, complete outstanding items and request reinspection.

18 CLOSEOUT SUBMITTALS

.1 Record Drawings:
.1 As work progresses, maintain accurate records to show all deviations from the Contract Drawings. Note on as-built drawings as changes occur. At completion supply:
.1 Four (4) copies of CD's in AutoCad file format (version: 2014) with all as-built information on the CD's.
.2 Four (4) sets of printed as-built drawings following review.
.3 Submit one copy of check plots to Departmental Representative prior to final printing/copying of as-built drawings.
.4 Convert reviewed as-built Autocad drawings to PDF format for inclusion to electronic interactive O&M manual.
.5 Departmental Representative will supply copies of the original AutoCad files.

.6 Retain original logo and title block on the as-built drawings. Contractor may place on the upper right-hand title block area a small company logo, the text "AS-BUILT" and the date.

.2 Costs for transferring as-built information from marked up working set of drawings to electronic format using ACAD and plotting service is included in the Contract.

.2 Maintenance manual:

.1 On completion of project submit to Departmental Representative four (4) CD R/ disk copies and four paper (in loose leaf type binder) of Operations and Maintenance Manual, made up as follows:

.1 Provide maintenance manual, with as-built drawings, in O&M manual on CDs using pdf, or other approved format for descriptive writing, page size images and page size drawings. Organize manuals into industry standard maintenance manual tabs with links in index to each descriptive section describing the component or maintenance procedure etc.

.2 Organize files into CSI Masterformat numbering system or other approved descriptive titles.

.3 Label disk "Operation and Maintenance Data", project name, date, names of Contractor, subcontractors, consultants and subconsultants.

.4 Include scanned guarantees, diagrams and drawings.

.5 Organize contents into applicable sections of work to parallel project specification break-down. Mark each section by labeled tabs (navigational buttons).

.6 Drawings, diagrams and manufacturer's literature must be legible.

.7 Refer to Mechanical and Electrical Divisions for specific details for Mechanical and Electrical data.

.3 Maintenance Materials, Special Tools and Spare Parts:

.1 Specific requirements for maintenance materials, tools and spare parts are specified in individual sections.

.2 Deliver maintenance materials, special tools and spare parts to Departmental Representative and store in designated area as directed by Departmental Representative.

.3 Prepare lists of maintenance materials, special tools and spare parts for inclusion in Manual specified in Clause 18.2.

.4 Maintenance materials:

.1 Deliver wrapped, identify on carton or package, colour, room number, system or area as applicable where item is used.

.5 Special tools:

.1 Assemble as specified;

.2 Include identifications and instructions on intended use of tools.

.6 Spare parts:

.1 Assemble parts as specified;

.2 Include part number, identification of equipment or system for which parts are applicable;

.3 Installation instructions;

.4 Name and address of nearest supplier.

.4 Warranties and Bonds:

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

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

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.
.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until the Date of Interim Completion is determined.
.5 Verify that documents are in proper form, contain full information, and are notarized.
.6 Retain warranties and bonds until time specified for submittal.

19 DEMONSTRATION AND TRAINING

.1 Demonstration and Training:
.1 Demonstrate operation and maintenance of equipment and systems to maintenance personnel following Substantial Completion and prior to date of Final Certificate of Completion
.2 Departmental Representative will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

END OF SECTION

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.

2 DEFINITIONS

.1 "Contraband" means:
(a) an intoxicant, including alcoholic beverages, drugs and narcotics
(b) 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,
(c) an explosive or a bomb or a component thereof,
(d) currency over any applicable prescribed limit, $25.00, and
(e) any item not described in paragraphs (a) to (d) 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 Public Works and Government Services Canada representative defined in General Conditions.

.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 indicated in the contract documents, that the contractor will be allowed to work". This area may or may not be isolated from the security area of the institution. Limits to be confirmed at construction start-up meeting.

3 PRELIMINARY PROCEEDINGS

.1 At construction start-up meeting:
.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 The contractors's responsibilities:
.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.

4 CONSTRUCTION EMPLOYEES

.1 Submit to the Departmental Representative 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 10 working days 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 except as approved otherwise.

.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 these Photo ID cards be provided for all construction workers. ID cards will then be left at the designated entrance to be picked up upon arrival at the Institution and be displayed prominently on the construction employees clothing at all times while 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.

5 VEHICLES

.1 All unattended vehicles on CSC property must have windows closed; fuel caps locked, doors and trunks locked and keys removed. The keys must be securely in the possession of the owner or an employee of the company that owns the vehicle.

.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 require security clearances and 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 PWGSC Construction Escorts while in the Institution.

.4 If the Director permits trailers to be left inside the secure perimeter of the Institution, the trailer doors must be locked at all times. All windows must be securely locked bars when left unoccupied. Cover all windows with expanded metal mesh. When not in use lock all storage trailers located inside and outside the perimeter.

6 PARKING

.1 The 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.

7 SHIPMENTS

.1 To avoid confusion with the institution's own shipments, address all shipments of project material, equipment and tools in the Contractor's name and have a representative on site to receive any deliveries or shipments. CSC or PWGSC staff will **NOT** accept receipt of deliveries or shipments of any material equipment or tools.

8 TELEPHONES

.1 The installation of telephones, facsimile machines and computers with Internet connections is not permitted within the Institution perimeter unless prior approved by the Director.

.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 2-way radios.

9 WORK HOURS

.1 Conform to Division 1.

.2 Work is not 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 waved by the Director.

10 OVERTIME WORK

.1 Conform to Division 1.

.2 Provide 48 hours advance notice to Director for all work to be performed after normal working hours of the Institution. Notify Director immediately if emergency work is required, such as to complete a concrete pour or make the construction site safe and secure.

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 by the Institution.

.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. Secure and lock scaffolding when not erected and when erected Secure in a manner agreed upon with the Institution designate.

.6 Report all missing or lost tools or equipment immediately to the Departmental Representative/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 work day or shift upon entering and exiting the Institution.

.2 At any time when contractor is on Institution property.

.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. Maintain up to date inventory of all used blades/cartridges.

.9 If propane or natural gas is used for heating the construction, the institution will require that the contractor supervise the construction site during non-working hours.

12 KEYS

.1 Security Hardware Keys.
- .1 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 SMO will provide a receipt to the Contractor for security hardware keys.
- .3 Provide a copy of the receipt to the Departmental Representative.

.2 Other Keys
- .1 Use standard construction cylinders for locks for his use during the construction period.
- .2 Issue instructions to 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.
- .4 Upon putting operational security keys into use, the PWGSC construction escort shall obtain these keys as they are required from the SMO and open doors as required by the Contractor. The Contractor shall issue instructions to his employees advising them that all security keys shall always remain with the PWGSC construction escort.

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.

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.

15 SMOKING RESTRICTIONS

.1 Smoking is not permitted inside correctional facilities or outdoors within the perimeter of a correctional facility and persons must not possess unauthorized smoking items within the perimeter of a correctional facility.

.2 Persons 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 permitted outside the perimeter of a correctional facility in an area designated by the Director.

16 CONTRABAND

.1 Weapons, ammunition, explosives, alcoholic beverages, drugs and narcotics are prohibited on institutional property.

.2 The 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 should 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.

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, he 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.

18 **ACCESS TO AND REMOVAL FROM INSTITUTIONAL PROPERTY**

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

19 **MOVEMENT OF VEHICLES**

.1 Escorted commercial vehicles may not be allowed to enter or leave the institution through the vehicle access gate during the regular "inmate count" occurring at breakfast, lunch and dinner hour as established by the Institution. Confirm "count" times with Director or Departmental Representative to reduce down times for deliveries to Institution and movement of contractors vehicles through Institution vehicle access gate.

.2 Construction vehicles will not be allowed to 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 PWGSC construction escorts 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 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. Arrange with Director for parking of contractor's vehicles at minimum security Institutions.

.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.

20 MOVEMENT OF CONSTRUCTION EMPLOYEES ON INSTITUTIONAL PROPERTY

.1 Subject to the requirements of good security, the Director will permit the Contractor and his 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.

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.

22 STOPPAGE OF WORK

.1 The director may request at any time that the contractor, his 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.

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 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.

END OF SECTION

1 REFERENCES

.1 Government of Canada:
- .1 Canada Labour Code - Part II.
- .2 Canada Occupational Health and Safety Regulations.

.2 American National Standards Institute (ANSI):
- .1 ANSI A10.3-2006, – Safety Requirements for Powder-Actuated Fastening Systems ANSI for Construction and Demolition Operations

.3 Canadian Standards Association (CSA):
- .1 CSA Z797-2009 Code of Practice for Access Scaffold.

.4 HRSDC Fire Protection Engineering Section:
- .1 FCC No. 301-1982, Standard for Construction Operations.

.5 National Building Code of Canada (NBCC 2005):
- .1 Part 8, Safety Measures at Construction and Demolition Sites

.6 Province of British Columbia Building Code (2006):
- .1 Part 8, Safety Measures at Construction and Demolition Sites.

.7 Province of British Columbia:
- .1 Workers Compensation Act Part 3 - Occupational Health & Safety.
- .2 Occupational Health & Safety Regulations.

2 RELATED SECTIONS

.1 Section 01 01 50 - General Instructions for; Submittals procedures, Section Temporary utilities, Construction facilities and Temporary barriers and enclosures.

.2 Section 02 41 17 - Demolition and Removal Work.

3 WORKERS' COMPENSATION BOARD COVERAGE

.1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.

.2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

4 COMPLIANCE WITH REGULATIONS

.1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.

.2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.

5 SUBMITTALS

.1 Make submittals in accordance with Section 01 01 50 General Instructions for Submittals.

.2 Submit the following:
.1 Health and Safety Plan.
.2 Copies of reports or directions issued by federal and provincial health and safety inspectors.
.3 Copies of incident and accident reports.
.4 Complete set of Material Safety Data Sheets (MSDS), and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
.5 Emergency Procedures.

.3 The Departmental Representative will review the Contractor's site-specific project Health and Safety Plan and emergency procedures, and provide comments to the Contractor within 5 days after receipt of the plan. Revise the plan as appropriate and resubmit to Departmental Representative for review.

.4 Medical surveillance: where prescribed by legislation, regulation or safety program, submit certification of medical surveillance for site personnel prior to commencement of work, and submit additional certifications for any new site personnel to Departmental Representative.

.5 Submission of the Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
.1 Be construed to imply approval by the Departmental Representative.
.2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
.3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

6 RESPONSIBILITY

.1 Assume responsibility as the Prime Contractor for work under this contract and appoint a qualified coordinator for the purpose of ensuring the coordination of health and safety activities for the location in accordance with sections 118 and 119 of Part 3 of the Workers Compensation Act.

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

.3 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.

7 HEALTH AND SAFETY COORDINATOR

.1 The Health and Safety Coordinator (Registered Occupational Hygienist, Certified Industrial Specified Hygienist) must:
.1 Be responsible for completing all health and safety training, and ensuring that personnel that do not successfully complete the required training are not permitted to enter the site to perform work.
.2 Be responsible for implementing, daily enforcing, and monitoring the site-specific Health

and Safety Plan.
.3 Be on site during execution of work.

8 GENERAL CONDITIONS

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

.2 Ensure that non-authorized persons are not allowed to circulate in designated construction areas of the work site.
.1 Provide appropriate means by use of barricades, fences, warning signs, traffic control personnel, and temporary lighting as required.
.2 Secure site after working hours in accordance with Section 01 14 10 - Security Requirements.

9 PROJECT/SITE CONDITIONS

.1 Work at site will involve:
.1 Working in areas where inmates may be present who are under supervision by CSC staff. Conform to Security Requirements Section 01 41 10 Contact With Inmates clause and other security requirements pertaining to a CSC institution.

10 REGULATORY REQUIREMENTS

.1 Comply with specified codes, acts, bylaws, standards and regulations to ensure safe operations at site.

.2 In event of conflict between any provision of the above authorities, the most stringent provision will apply. Should a dispute arise in determining the most stringent requirement, the Departmental Representative will advise on the course of action to be followed.

11 FILING OF NOTICE

.1 Submit a Notice of Project, form 52E49, to WorkSafeBC in accordance with OH&S Regulation 20.2, at least 24 hours before start of work.

.2 Submit copy to Departmental Representative.

12 HEALTH AND SAFETY PLAN

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

.2 Prepare and comply with a site-specific project Health and Safety Plan based on hazard assessment, including, but not limited to, the following:
.1 Primary requirements:
.1 Contractor's safety policy.
.2 Identification of applicable compliance obligations.
.3 Definition of responsibilities for project safety/organization chart for project.
.4 General safety rules for project.
.5 Job-specific safe work, procedures.
.6 Inspection policy and procedures.

.7 Incident reporting and investigation policy and procedures.
.8 Occupational Health and Safety Committee/Representative procedures.
.9 Occupational Health and Safety meetings.
.10 Occupational Health and Safety communications and recordkeeping procedures.

.2 Summary of health risks and safety hazards resulting from analysis of hazard assessment, with respect to site tasks and operations which must be performed as part of the work.
.3 List hazardous materials to be brought on site as required by work.
.4 Indicate engineering and administrative control measures to be implemented at the site for managing identified risks and hazards.
.5 Identify personal protective equipment (PPE) to be used by workers.
.6 Identify personnel and alternates responsible for site safety and health.
.7 Identify personnel training requirements and training plan, including site orientation for new workers.

.3 Develop the plan in collaboration with all subcontractors. Ensure that work/activities of subcontractors are included in the hazard assessment and are reflected in the plan.

.4 Revise and update Health and Safety Plan as required, and re-submit to the Departmental Representative.

.5 Departmental Representative's review: the review of Health and Safety Plan by Public Works and Government Services Canada (PWGSC). PWGSC's review shall not relieve the Contractor of responsibility for errors or omissions in final Health and Safety Plan or of responsibility for meeting all requirements of construction and Contract documents.

13 EMERGENCY PROCEDURES

.1 List standard operating procedures and measures to be taken in emergency situations. Include an evacuation plan and emergency contacts (i.e. names/telephone numbers) of:
.1 Designated personnel from own company.
.2 Regulatory agencies applicable to work and as per legislated regulations.
.3 Local emergency resources.
.4 Departmental Representative.

.2 Include the following provisions in the emergency procedures:
.1 Notify workers of the nature and location of the emergency.
.2 Evacuate all workers safely.
.3 Check and confirm the safe evacuation of all workers.
.4 Notify the fire department or other emergency responders.
.5 Notify adjacent workplaces which may be affected if the risk extends beyond the workplace.
.6 Notify Departmental Representative.

.3 Provide written rescue/evacuation procedures as required for, but not limited to:
.1 Work at high angles.
.2 Work in confined spaces or where there is a risk of entrapment.
.3 Work with hazardous substances.
.4 Underground work.

14 HAZARDOUS PRODUCTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage and disposal of hazardous materials, and regarding labeling and provision of Material Safety Data Sheets (MSDS) acceptable to the Departmental Representative and in accordance with the Canada Labour Code.

.2 Where use of hazardous and toxic products cannot be avoided:
.1 Advise Departmental Representative beforehand of the product(s) intended for use. Submit applicable MSDS and WHMIS documents in accordance with clause 5.2.4.

15 ELECTRICAL SAFETY REQUIREMENTS

.1 Comply with authorities and ensure that, when installing new facilities or modifying existing facilities, all electrical personnel are completely familiar with existing and new electrical circuits and equipment and their operation.
.1 Before undertaking any work, coordinate required energizing and de-energizing of new and existing circuits with Departmental Representative.
.2 Maintain electrical safety procedures and take necessary precautions to ensure safety of all personnel working under this Contract, as well as safety of other personnel on site.

16 ELECTRICAL LOCKOUT

.1 Develop, implement and enforce use of established procedures to provide electrical lockout and to ensure the health and safety of workers for every event where work must be done on any electrical circuit or facility.

.2 Prepare the lockout procedures in writing, listing step-by-step processes to be followed by workers, including how to prepare and issue the request/authorization form. Have procedures available for review upon request by the Departmental Representative.

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

17 OVERLOADING

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

18 FALSEWORK

.1 Design and construct falsework in accordance with CSA S269.1.

19 SCAFFOLDING

.1 Design, construct and maintain scaffolding in a rigid, secure and safe manner, in accordance with CSA Z797-2009 Code of Practice for Access Scaffold and BC Occupational Health and Safety Regulations.

20 CONFINED SPACES

.1 Carry out work in confined spaces in compliance with provincial regulations.

21 POWDER-ACTUATED DEVICES

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

22 FIRE SAFETY AND HOT WORK

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

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

23 FIRE SAFETY REQUIREMENTS

.1 Store oily/paint-soaked rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.2 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

24 FIRE PROTECTION AND ALARM SYSTEM

.1 Do not obstruct, shut-off or leave inactive at the end of a working day or shift, the fire protection and alarm systems.

.2 Do not use fire hydrants for purposes other than firefighting.

.3 Be responsible/liable for costs incurred from the fire department and the Departmental Representative, resulting from false alarms.

25 UNFORESEEN HAZARDS

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

26 POSTED DOCUMENTS

.1 Post legible versions of the following documents on site:
- .1 Health and Safety Plan.
- .2 Sequence of work.
- .3 Emergency procedures.
- .4 Site drawing showing project layout, locations of the first-aid station, evacuation route and marshalling station, and the emergency transportation provisions.
- .5 Notice of Project.
- .6 Floor plan(s).

.7 Notice as to where a copy of the Workers' Compensation Act and Regulations are available on the work site for review by employees and workers.
.8 Workplace Hazardous Materials Information System (WHMIS) documents.
.9 Material Safety Data Sheets (MSDS).
.10 List of names of Joint Health and Safety Committee members, or Health and Safety Representative, as applicable.

.2 Post all Material Safety Data Sheets (MSDS) on site, in a common area, visible to all workers and in locations accessible to tenants when work of this Contract includes construction activities adjacent to occupied areas.

.3 Postings should be protected from the weather, and visible from the street or the exterior of the principal construction site shelter provided for workers and equipment, or as approved by the Departmental Representative.

27 MEETINGS

.1 Attend health and safety pre-construction meeting and all subsequent meetings called by the Departmental Representative.

28 CORRECTION OF NON-COMPLIANCE

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

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

.3 The Departmental Representative may issue a "stop work order" if non-compliance of health and safety regulations is not corrected immediately or within posted time. The Contractor will be responsible for any costs arising from such a "stop work order".

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions: Hours and schedule of work, dust screens, waste management and safety barriers.

.2 Section 01 14 10 - Security Requirements.

.3 Section 01 35 33 - Health and Safety Requirements.

.4 Section 03 05 10 - Cast-in-Place Concrete.

.5 Section 04 04 99 - Masonry.

.6 Section 10 56 27 - Mobile Shelving Storage-Manual.

1.2 REGULATORY REQUIREMENTS

.1 Comply with WCB Industrial Health and Safety Regulations and Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.3 REFERENCES

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

.2 Federal Legislation.
- .1 Canadian Environmental Assessment Act (CEAA), 1992, c. 37.
- .2 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .3 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.4 EXISTING CONDITIONS

.1 Take over areas where demolition/removal work is indicated based on the condition at time of examination prior to tendering.

.2 Hazardous materials including Asbestos Containing Materials (ACM) and lead based paint coatings have been removed from the A & D Redevelopment work area:

.1 ACM materials existed in floor vinyl flooring and mastic, drywall joint compound, in mastic adhesive in 12 x 12 ceiling tiles and grey putty in windows at Visitor Phone room have been removed.

.2 Lead based coatings exist on steel doors and frames, steel cage, drywall ceiling, concrete masonry units (CMU) and steel bars on exterior windows. Only the drywall ceiling has been removed.

.3 Refer to Appendix I and II for analysis results and sample locations.

.3 If Hazardous Containing Materials (HCM) are encountered in course of removal work or cutting and boring activities, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received from the Departmental Representative:

.1 Test CMU walls prior to demolition to determine if hollow cavities contain vermiculite insulation. If present remove in accordance with WorkSafeBC (WSBC) moderate risk safe work procedures and transport and dispose of in accordance with TDGA and BCMOE.

.2 Two steel door and frame assemblies are being salvaged for reuse and it is presumed the existing paint coatings contain lead (0.19 mg/cm) and must be handled in accordance with WSBC requirements for handling on lead containing paint coatings. It is recommended these doors be transported to an approved shop off site for paint removal and priming.

.4 Removal of HCM encountered during demolition work that is not identified in these documents as removed prior to start of this Contract or is concealed from view, will be additional Work and paid either as an extra to the contract price in accordance with General Conditions, or removed under a separate contract by the Departmental Representative.

.5 The existing premises will be occupied by Institution staff and is operational outside the A&D work area, during work of this Contract. Maintain access around protected work areas.

1.5 PROTECTION

.1 Prevent movement, settlement or damage of services, adjacent parts of existing walls, ceilings and parts of building not being removed or altered.

1.6 DEFINITIONS

.1 Alternate Disposal: reuse and recycling of materials by designated facility, user or receiving organization which has valid Certificate of Approval to operate. Alternative to landfill disposal.

.2 Hazardous Containing Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, including but not limited to: corrosive agents, flammable substances, asbestos containing materials, lead based coatings or other material that can endanger human health, well being or environment if handled improperly.

.3 Recycle: process by which waste and recyclable materials are transformed or collected for purpose of being transferred into new products.

.4 Recycling: process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for purpose of using in altered form.

.1 Recycling does not include burning, incinerating, or thermally destroying waste.

.5 Reuse: repeated use of product in same form but not necessarily for same purpose.

.6 Salvage: removal of materials from deconstruction/disassembly for purpose of reuse or recycling offsite.

.7 Source Separation: acts of keeping different types of waste materials separate, beginning from first time they became waste.

1.7 ENVIRONMENTAL PROTECTION

.1 Do not dispose of waste or volatile materials into watercourses, storm or sanitary sewers.

.2 Employ reasonable means necessary to protect salvaged materials from vandalism, theft, adverse weather, or inadvertent damage.

.3 Organize site and workers in manner which promotes efficient flow of materials through disassembly, processing, stockpiling, and removal.

.4 Remove and transport toxic or dangerous materials from site in accordance with provincial authority.

2 Products N/A

3 Execution

3.1 SITE VERIFICATION OF CONDITIONS

.1 Employ necessary means to assess site conditions to determine quantity and locations of hazardous materials.

.2 Investigate site and building to determine removal work, processing and storage logistics required prior to beginning of Work. Confirm location of existing hazardous containing materials remaining on site. Conform to Clause 1.4.

.3 Dismantle and remove parts of building as indicated or directed by Departmental Representative and dispose of removed material off property in accordance with local authorities having jurisdiction and in accordance with Section 01 01 50 General Instructions - Construction Waste Management and Disposal clause.

.4 Inspect site with Departmental Representative to verify extent and location of items designated for removal and disposal and items to remain.

.4 Locate and protect building systems. Preserve active systems in operating condition, serving remainder of site and building.

3.2 PREPARATION

.1 Provide scanning of concrete floor in area of excavation, using approved sonar equipment, to locate any conduit, or rebar etc. Submit 2D and 3D pictures of encountered obstructions.

.2 Perform testing if HCM is encountered or identified by Departmental Representative in accordance with Clause 1.4.

.3 Conform to schedule for all removal work.

3.3 REMOVAL WORK

.1 At end of each day's work, leave work in safe and secure condition, clean up and remove debris and materials not being reinstalled.

3.4 SELECTIVE REMOVAL, DEMOLITION AND SALVAGE

.1 Mobile shelving:

.1 Disassemble, remove mobile shelving units, carriage base, operating hardware and store in designated storage area at institution, for salvage and installation as specified in Section 10 56 27.

.2 Coordinate with mobile storage supplier/installer to determine which components are salvageable and reusable in new arrangement.

.3 Replace damaged components as a result of disassembly and moving components to storage.

.2 Remove any remaining existing flooring, vinyl composition floor tile, carpet finish and adhesive in A&D area that remains following the HazMat removal under separate contract. (Not a part of this contract.)

.3 Restricted Visiting Area:

.1 Demolition and new work in this room is scheduled for early completion prior to removing perimeter walls of existing Restricted Visits area as approved by the Departmental Representative.

.2 Removal work outside of the existing Restricted Visits room may coincide with Work inside the new Restricted Visits room. The existing Restricted Visits room perimeter wall must remain in place until the new Restricted Visits room is completed. A portion of the CMU walls in this room may need to be removed to facilitate the new CMU wall construction. Provide wood frame and plywood hoarding at openings between the existing and new Restricted visits room until the new CMU walls are complete.

.3 Remove interior glazed screen/counter and cubicle assembly and salvage singular plastic sheet partition and four modules for reuse in Restricted Visits new arrangement. Remove remaining components from site. If all cubicles are removed, salvage and store cubicle components for reuse in new arrangement. Cubicles at East end of room can remain to facilitate construction of new Restricted Visits room. Protect cubicles to remain from damage.

.4 Remove and salvage for reuse, corridor door D-105, frame and hardware from existing Restricted Visits room.

.5 Saw cut and remove a portion of masonry corridor wall at Restricted Visiting area to accommodate the new and salvaged door/frame assemblies and new masonry work. Saw cut openings in sequence with new masonry work as indicated. Take precautions to support masonry wall and steel structure above if bearing on masonry wall, until new Work is installed and capable of supporting loads. See drawing A706 and Section 04 04 99.

.6 Conform to schedule specified in Section 01 01 50 General Instructions.

.4 Remove plumbing fixtures, drains etc and lines in accordance with Division 22 and plumbing code. Cap plumbing lines below concrete floor level and fill holes with new concrete in accordance with Section 03 05 10.

.5 Remove any remaining ceramic tiled floor finish, mortar beds etc down to concrete slab.

.6 Remove wall radiator covers and protect finned piping and valves from damage during construction.

.7 Remove electric operated rolling shutter door and counter unit. Disconnect electrical lines in accordances with Canadian electrical Code and Division 26.

.8 Saw cut and remove sections of, concrete floor to access underfloor plumbing lines to facilitate the new plumbing arrangement and sloped floors in new washrooms. Excavation and backfilling specified in Section 31 23 10.

.9 Core drill/saw cut holes in masonry walls, steel structure and concrete floor to accommodate new service lines.

.10 Remove suspension and framing to facilitate the new work. Coordinate with electrical and mechanical removal work. Gypsum board ceiling finish containing ACM has been removed under a previous contract. The ceiling suspension system must be removed.

.11 Saw cut masonry opening at exterior wall to accommodate the new door/frame assembly and new masonry work. Saw cut openings in masonry wall as indicated. Take precautions to support masonry wall and shore steel structure above if bearing on masonry wall until new Work is installed and capable of supporting loads. See drawing A706. Hoard opening in accordance with Section 01 01 50 General Instructions clause 11.

.12 Provide openings in walls and floor to accommodate the electrical and mechanical services lines.

.13 Remove steel doors, frames, hardware and hand over selected door assemblies to Departmental Representative. Store on site as directed. Salvage one security door D106 including frame and security hardware for reuse and store as directed. Remove glazed screens in pressed steel frames and door assemblies not being reused or salvaged and remove from site. Salvage all hardware from removed doors not being reused or salvaged and store as directed by Departmental Representative.

3.5 REPAIRS

.1 Patch and repair walls, concrete floors, wall and ceiling finishes damaged by demolition/removal work except where new finishes will cover these areas as indicated on drawings and throughout this specification. New materials to match existing in quality, colour and appearance except as specified otherwise.

3.6 REMOVAL FROM SITE

.1 Dispose of removed materials and equipment not reusable or salvageable to approved disposal facilities in accordance with applicable regulations.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 02 41 17 - Demolition and Removal Work.

.2 Section 03 35 23 - Floor Grinding and Sealing.

.3 Section 31 23 10 - Excavation and Backfilling.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International):
.1 CAN/CSA A3001-09 - Cementitious materials for use in concrete.
.2 CAN/CSA-A23.1/A23.2-M2009, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete
.3 CSA G30.18-M92, Billet Steel Bars for Concrete Reinforcement.
.4 CSA W186-M1090(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.2 American Society for Testing and Materials (ASTM International):
.1 ASTM C260-06, Air-Entraining Admixtures for Concrete
.2 ASTM 05a Chemical Admixtures for Concrete..

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

1.3 SUBSTITUTES

.1 Substitution of different size bars permitted only upon written approval of Departmental Representative.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 - General Instructions for Waste Management and Disposal.

.2 Ensure emptied containers are sealed and stored safely.

.3 Divert unused concrete materials from landfill to local facility as reviewed by Departmental Representative.

.4 Provide appropriate area on job site where concrete trucks and be safely washed.

.5 Divert admixtures and additive materials from landfill to approved official hazardous material collections site as reviewed by Departmental Representative.

.6 Unused admixtures and additive materials must not be disposed of into sewer systems, into lakes, streams, onto ground or in other location where it will pose health or environmental hazard.

2 Products

2.1 CONCRETE MATERIALS

.1 Cement: to CAN/CSA-A3001.

.2 Water, fine aggregates, normal density coarse aggregates: to CAN/CSA A23.1.

.3 Air entraining admixture: to CAN/CSA-23.1.

.4 Chemical admixtures: to CAN/CSA-A23.1 as approved by Departmental Representative.

2.2 FORMWORK MATERIALS

.1 Formwork lumber: plywood and wood formwork materials to CAN/CSA A23.

.2 Form release agent: chemically active release agents containing compounds that react with free lime present in concrete to provide water insoluble soaps, preventing set of film of concrete in contact with form.

2.3 REINFORCING MATERIALS

.1 Reinforcing bars: billet steel, grade 400, deformed bars to CAN/CSA G30.18 unless indicated otherwise.

.2 Chairs, bolsters, bar supports, spacers: adequate for, strength and support of reinforcing construction conditions.

2.4 CONCRETE ACCESSORIES

.1 Polyethylene dampproof membrane:
.1 To CAN/CGSB 51.34, 0.15 mm polyethylene film.
.2 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by polyethylene film manufacturer, 50 mm wide for lap joints and perimeter seals.

2.5 CONCRETE MIXES

.1 Proportion normal density to CAN/CSA A23.1, Clause 14 using GU (Normal) cement with minimum 10% fly ash content.

.2 Provide certification that mix proportions selected will produce concrete of specified quality and yield and that strength will comply with CAN/CSA A23.1, Clause 17.5. Site mixing equipment, truck or stationery type to conform to CAN/CSA A23.1 and previous paragraphs.

.3 Mixes.
.1 Proportion normal density concrete in accordance with CAN/CSA-A23.1, Alternative 1 to give the following properties:
.1 Cement: Type GU Portland Cement.
.2 Minimum compressive strength of 25 Mpa at 28 days,
.3 Class of exposure C-4,
.4 Air content 2,
.5 20 mm nominal size of coarse aggregate.

.4 Slump at time and point of discharge: To CSA-A23.1 Clause 4.3.2.3. When superplasticizers are used, the slump may be increased and kept below the point where segregation will occur. Include cost of super plasticizers. Smaller aggregate size may be used where necessary to increase slump.

.5 Obtain Departmental Representative's approval before using chemical admixtures other than those specified

.6 Use of calcium chloride or acids not permitted.

.7 Concrete mix designs shall be submitted to a material consultant for approval and to Departmental Representative for review prior to any concrete work.

2.6 REINFORCING STEEL FABRICATION

.1 Fabricate reinforcing to CAN/CSA A23.1.

.2 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on steel placing drawings.

.3 Fabricated steel bars welded together to CSA G30.5 using bars to CSA G30.18, grade 400.

3 Execution

3.1 WORKMANSHIP

.1 Obtain Departmental Representative's approval before placing concrete. Provide forty-eight (48) hours notice to approved testing agency prior to placing of concrete.

.2 Place concrete in accordance with CAN/CSA A23.1, Clause 19.

.3 Ensure reinforcement are not disturbed during concrete placement.

.4 Do not place load upon new concrete until authorized by Departmental Representative.

.5 Pumping of concrete is permitted only after approval of equipment and mix.

.6 Dowels:
.1 With Departmental Representative's approval, grout dowels in drilled holes. Drilled holes to be minimum 25 mm larger in diameter than dowels used.
.2 Set dowels and fill holes with Hilti adhesive as noted in general Notes on Drawing.

3.2 FORMWORK INSTALLATION

.1 Verify lines, levels and wall locations before proceeding with formwork and ensure dimensions agree with drawings.

.2 Construct forms to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CAN/CSA A23.1.

.3 Leave formwork in place for following minimum periods of time after placing concrete.
.1 Two days for curbs.

3.3 INSERTS

.1 Set sleeves, ties, anchor bolts and other inserts, in concrete floors and curbs, as required by other trades.

3.4 DAMPPROOF MEMBRANE

.1 Install dampproof membrane under concrete slabs within building, lap 150 mm at joints and seal with mastic cement or tape. Tie in with existing dampproof membrane.

.2 Seal punctures using dampproof membrane material extending 150 mm past all punctures and sealed with mastic cement or tape.

3.5 PLACING REINFORCEMENT

.1 Place reinforcing steel to CAN/CSA A23.1.

.2 Obtain Departmental Representative's approval of reinforcing steel and placing before placing concrete.

.3 Clean reinforcing before placing concrete.

.4 Provide minimum rebar splice lengths as indicated on drawings:

.5 Provide minimum 75 mm concrete cover to reinforcement.

3.6 FINISHING

.1 Finish concrete to CAN/CSA A23.1, Clause 24.

.2 Floor slabs to receive applied flooring or finish: finish as per Clause 3.6, paragraphs .1 to .5.

3.7 DEFECTIVE CONCRETE

.1 Remove defective concrete and embedded debris and repair as directed by Departmental Representative.

.2 Fill all honeycombing or voids flush with adjoining surfaces.

3.8 PLAIN FLOOR FINISH - INTERIOR

.1 Roll or tamp concrete to force coarse aggregate into concrete mix and then screed.

.2 Float surface with wood or metal floats and bring surface to true grade.

.3 Steel trowel to smooth and even surface flush with existing slab.

.4 Follow with second steel troweling to produce smooth burnished surface to within 3 mm tolerance when measured in any direction using 3 m straight edge.

.5 Sprinkling of dry cement or dry cement and sand mixture over concrete surfaces is not acceptable.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions.

.2 Section 01 14 10 - Security Requirements.

.3 Section 01 35 33 - Health and Safety Requirements.

.4 Section 03 05 10 - Cast-in-Place Concrete.

1.2 PRODUCT DATA

.1 Submit product data to Departmental Representative for review. Data to show description and operation of equipment, energy requirements, noise levels expected, grinding grits, polishing resins and concrete sealing products etc.

1.3 MAINTENANCE DATA

.1 Submit maintenance data to Departmental Representative for cleaning of sealed floors and recommended schedule of floor treatment.

1.4 SAFETY

.1 Before beginning Work , provide Departmental Representative satisfactory proof that every worker has had instruction and training in handling and exposure to silica, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing.

.2 Under the Workplace Hazardous Materials Information System (WHMIS) in force across Canada, workers handling, using, or exposed to dry or wet cement must be educated in hazards and controls.

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

2 Products

2.1 MATERIALS

.1 Sealers: non-flammable, non-toxic, breathable, abrasion resistant, water based formulation purpose made for application over existing concrete resulting in a water repellent, and harden surface within seven days. Acceptable Product: Convergent Concrete Technologies - Pentra-Sil.

.2 Penetrant/coating: high performance lithium-silica and polymer penetrant, solvent free, water based solution providing stain resistance against oils, selected acids, fats and grease. Acceptable Product: Convergent Concrete Technologies - Pentra-Guard.

3 Execution

3.1 INSTALLATION

.1 Grind concrete floors, using approved equipment, in four successive stages with a 30 grit, 40 grit, 60 grit and 80 grit grinding discs to provide a clean and dust contaminant free surface ready for polishing.

.2 Polish floors using 100, 150 and 200 resin ready for sealing.

.3 Apply one coat of penetrating sealer over finished floor in accordance with manufacturer's instructions. Apply two applications of top coat using penetrant/coating to meet surface requirements to match mock-up sample to Departmental representative's approval.

.4 Advise Departmental Representative when floor surface can be put into use and provide maintenance data.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 05 50 00 - Metal fabrications.

.2 Section 08 11 20 - Detention Doors, Frames and Security Hardware.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA A165 SERIES-04(R2014), CSA Standards on Concrete Masonry Units covers: A165.1, A165.2, A165.3.
- .2 CSA A179-04(R2014), Mortar and Grout for Unit Masonry.
- .3 CSA A179-04(2014), Connectors for Masonry.
- .4 CSA-A371-04(R2014), Masonry Construction for Buildings
- .5 CAN/CSA G30.18-09, Billet-Steel Bars for Concrete Reinforcement.
- .6 CSA-S304.1-04(R2010), Masonry Design for Buildings.
- .7 CSA A82-06(2011), Fired Masonry Brick Made from Clay or Shale.

.2 ASTM International (ASTM)
- .1 ASTM D2240 - 05(2010) Standard Test Method for Rubber Property - Durometer Hardness.
- .2 ASTM C207 - 06(2011) Standard Specification for Hydrated Lime for Masonry Purposes.
- .3 ASTM C144 - 11 Standard Specification for Aggregate for Masonry Mortar.
- .4 ASTM A1064 / A1064M - 13 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

1.3 SUBMITTALS

.1 Submit Samples and Product Data in accordance with Section 01 01 50 - General Instructions - Submittal Procedures clause.

.2 Submit representative samples for each type masonry unit and full sized units as directed.

.3 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheets.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets and indicate VOC's for coatings and galvanized protective coatings and touch-up products.
- .3 Indicate VOC's for mortar, grout, parging, colour additives and admixtures.
- .4 Indicate sizes, spacing, location and quantities of reinforcement and connectors.

1.4 COLD WEATHER REQUIREMENTS

.1 Comply with Clause 3.15 of CAN/CSA-S304.

.2 When air temperature is below 5° C take following precautions in preparing and using mortar:
- .1 Heat sand slowly and evenly. Do not use scorched sand, having a reddish cast, in mortar.
- .2 Heat water to 70° C maximum; 20 deg. C minimum.

.3 After combining heated ingredients maintain temperature of mortar between 5° C and 50 deg. C until used.
.4 Protect mortar from rain and snow.

.3 Maintain dry beds for masonry and use dry masonry units only.

1.5 HOT WEATHER REQUIREMENTS

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

.2 Comply with Clause 6.7 of CSA A371.

1.6 PROTECTION

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

.2 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

.3 Provide temporary bracing of masonry work during and after erection until permanent lateral support is in place.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions for Construction/Demolition Waste Management and Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities approved by Departmental Representative.

.3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2 Products

2.1 MASONRY UNITS

.1 Standard concrete block units: to CAN3-A165 Series (CAN3-A165.1).
.1 Classification: H / 15 / A / M.
.2 Size: modular, 190 mm wide for walls except as noted otherwise.
.3 Special shapes: Provide purpose-made "H" shapes for lintels and bond beams. Provide additional special shapes as indicated.

2.2 REINFORCEMENT AND CONNECTORS

.1 Bar reinforcement: to CSA-A371 and CAN/CSA G30.18, Grade 400R.

.2 Wire reinforcement: to CSA-A371 and ASTM A1064 , 3.8 mm truss or ladder type.

.3 Connectors shall be corrosion resistant: hot dip galvanized to CSA-A370 and CSA-S304.

2.3 MORTAR MATERIALS

.1 Mortar and grout: to CSA A179.

.2 Lime: Type S to ASTM C207 and CSA A179.

.3 Sand: clean white quartzite or silica type to ASTM C144.

.4 Admixtures for mortar colour: metallic oxide pigment

2.4 MORTAR TYPES

.1 Mortar: to CSA A179M.
.1 For all interior concrete block masonry: type S based on mortar proportion by volume.
.2 For all exterior concrete block masonry: type S based on mortar proportion by volume.

2.5 GROUT

.1 Grout: to Table 3 of CAN/CSA A179, minimum compressive strength 20 Mpa at 28 days, 10 mm maximum sized aggregate and slump of 200 - 250 mm air content, 5-8%.

2.6 ACCESSORIES

.1 Masonry flashing and air barrier membranes:
.1 SBS modifies asphalt, 1.9 mm thickness adhesive applied air barrier membrane.

.2 Weep Vent:
.1 Purpose-made PVC, galvanized steel, polypropylene fibre filter, colour to blend with masonry.
.2 Fluid and air conducting, non-absorbent, mold and mildew resistant, non-woven, polymer mesh.
.3 100 percent post-consumer plastics with a flame-retardant binder.

.3 Through wall flashing: laminated copper and kraft paper with asphalt and fiberglass scrim.

2.7 REINFORCING AND TYING

.1 Metal ties, wire and bar type reinforcement, bolts and anchors: to CSA-S304.

.2 Horizontal reinforcement:
.1 Structural masonry at interior and exterior walls: 3.8 mm steel wire, knurled, ladder type, to ASTM A1064.

.3 Corrosion protection: to Clauses 4.2.1 and Table 2 of CAN3-A370, for metal anchors and horizontal reinforcing in exterior walls.

3 Execution

3.1 INSTALLATION

.1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .1 Bond: running stretcher bond with vertical joints in perpendicular alignment and centred on adjacent stretchers above and below alternating course. Soldier courses where indicated.
- .2 Coursing height:
  - .1 CMU: 200 mm for one CMU and one joint
- .3 Tooled joints:
  - .1 Raked horizontal joints and flush vertical joints to match with existing CMU.

.2 Build masonry plumb, level, and true to line, with vertical joints in alignment.

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

.4 Dismantle individual masonry units from walls being renovated and rebuild with new structural elements as indicated. Salvage bricks from exterior wall where required to rebuild exterior wythe to match existing brick.

3.2 CONSTRUCTION

.1 Exposed masonry:
- .1 Remove chipped, cracked, and otherwise damaged units, in exposed masonry and replace with undamaged units.
- .2 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects. Make cuts straight, clean, and free from uneven edges.

.2 Building-In:
- .1 Install masonry connectors and reinforcement where indicated.
- .2 Build in items required to be built into masonry.
- .3 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
- .4 Brace door jambs to maintain plumb.

.3 Concrete block lintels and bond beams:
- .1 Install reinforced concrete block lintels over door openings in masonry as indicated.
- .2 End bearing: as indicated on drawings.

.4 Joining of Work:
- .1 Where necessary to temporarily stop horizontal runs of masonry, and in building corners:
  - .1 Step-back masonry diagonally to lowest course previously laid.
  - .2 Do not "tooth" new masonry.
  - .3 Fill in adjacent courses before heights of stepped masonry reach 1200 mm.

.5 Support of loads:
- .1 Use grout to CSA A179.

.6 Build in flashings in masonry in accordance with CSA-A371.

.1 Install flashings under exterior veneer masonry bearing on lintels and foundation walls. Install flashings under weep hole courses.
.2 Lap joints 150 mm and seal with adhesive.

.7 Install weep hole vents in vertical joints immediately over flashings, in exterior wythes of masonry veneer wall construction, at maximum horizontal spacing of 600 mm on centre.

3.3 REINFORCING AND CONNECTING

.1 Install masonry connectors and reinforcement in accordance with CSA-A370, CSA-A371 and CSA-S304.1 unless indicated otherwise.

.2 Horizontal Reinforcing:
.1 Install in all CMU walls continuous in every second course beginning at 2nd course (400 mm above floor), horizontal truss or ladder type reinforcement comprising two 3.8 mm rods, each rod 25 mm from each face, and lapped 150 mm at each splice.

.3 Vertical Reinforcing:
.1 Place reinforcing bars in grout filled cores of all masonry walls as indicated, at intersections, corners and sides of openings.
.2 Drill into concrete slabs and masonry walls, embed bars into wall/floors and grout fill cores as indicated.

3.4 BONDING AND TYING

.1 Tie new masonry to existing masonry walls in accordance with NBCC2010, CSA-S304.1, CSA-A371 and as indicated.

3.5 GROUTING

.1 Grout masonry in accordance with CSA-S304.1, CSA-A371 and CSA-A179 as indicated.

3.6 ANCHORS

.1 Supply and install metal anchors, reinforcing dowels and dowels as indicated.

3.7 LATERAL SUPPORT AND ANCHORAGE

.1 Supply and install lateral support and anchorage in accordance with CSA-S304.1 and as indicated.

3.8 SITE TOLERANCES

.1 Tolerances in notes to Clause 5.3 of CSA-A371 apply.

3.9 FIELD QUALITY CONTROL

.1 Inspection and testing will be carried out by Testing Service as directed by the Departmental Representative.

3.10 CLEANING

.1 Allow mortar droppings on concrete masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block and finally by brushing.

3.11 PROTECTION

.1 Protect masonry and other work from marking and other damage. Protect completed work from mortar droppings. Use non-staining coverings.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 04 04 99 - Masonry.

.2 Section 05 50 00 - Metal Fabrications.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM)
.1 ASTM A 36/A 36M-12, Specification for Carbon Structural Steel.
.2 ASTM A325M-13 Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength Metric.

.2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
.1 CISC/CPMA1-73b, Quick-Drying, One-Coat Paint for Use on Structural Steel.

.3 Canadian Standards Association (CSA)
.1 CSA G40.20-13/G40.21-13: General requirements for rolled or welded structural quality steel/Structural quality steel.
.2 CSA S16-09 - Design of steel structures, Includes Update No. 1 (2010), Update No. 2 (2010), Update No. 3 (2013).
.3 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel Structures.
.4 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

1.3 QUALITY ASSURANCE

.1 Supply affidavit prepared by fabricator of structural steel joists stating that materials and products used in fabrication conform to this specification.

1.4 DESIGN OF STEEL FRAMING

.1 Design steel framing to details shown on drawings in accordance with CAN/CSA-S16.

.2 No drilling or cutting for hanger or support devised is permitted unless approved by the design engineer.

1.5 SUBMITTALS

.1 Submit shop details in accordance with Section 01 01 50 - General Instructions for Submittals clause.

.2 Submit drawings stamped and signed by qualified professional engineer licensed in BC.

.3 Provide particulars, on shop drawings for framing at existing joists. Include member size, and properties.

.4 Professional Engineer responsible for the shop drawings: inspect the installation of the work for conformance with the design and the shop drawings, and upon completion and where required by NBCC, provide to the Departmental Representative completed Schedules:

.1 S-B: Assurance of Professional Design an Commitment for Field Review by Supporting Registered Professional.
.2 S-C: Assurance of Professional Field Review and Compliance by Supporting Registered Professional.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Construction/Demolition Waste Management And Disposal clause.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.4 Dispose of unused paint material at official hazardous material collections site approved by Departmental Representative.

.5 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.

2 Products

2.1 MATERIALS

.1 Structural steel: to CSA-G40.21 Grade 300W.

.2 Welding materials: to CSA W59-M and certified by the Canadian Welding Bureau.

.3 Shop paint primer: to CISC/CPMA-1.

2.2 FABRICATION

.1 Fabricate steel framing and accessories as indicated in accordance with CSA-S16 and in accordance with reviewed shop drawings.

.2 Weld in accordance with CSA-W59.

2.3 SHOP PAINTING

.1 Clean, prepare and shop prime surfaces of steel framing to CSA-S16.

.2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter.

.3 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.4 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

3 Execution

3.1 GENERAL

.1 Structural steel: to CSA-G40.21 Grade 300W.

.2 Welding materials: to CSA W59 .

.3 Anchor bolts

.4 Shop paint primer: to CISC/CPMA 1.

.5 Companies to be certified under Division 2.1 of CSA W47.1 for fusion welding of steel structures.

.6 Provide certification that welded joints are qualified by Canadian Welding Bureau.

3.2 FIELD QUALITY CONTROL

.1 Inspection and testing of materials and workmanship will be carried out by testing laboratory approved by Departmental Representative.

3.3 ERECTION

.1 Erect steel framing at existing joists as indicated in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

.2 Field cutting or altering of existing joist or new framing that are not shown on shop drawings: to approval of Departmental Representative.

.3 Clean and touch up shop primer to welds, burned or scratched surfaces at completion of erection.

3.4 FIELD PAINTING

.1 Touch up all damaged surfaces and surfaces without shop coat with primer to CISC/CPMA 1 except as specified otherwise.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 03 05 10 - Cast-in-Place Concrete for Installation of anchors in concrete.

.2 Section 04 04 99 - Masonry for Installation of anchors in concrete.

.3 Section 05 21 00 - Steel Framing - Existing Joists.

.4 Section 08 80 50 - Glazing.

.5 Section 09 91 23 - Finish painting.

.6 Section 08 11 20 - Detention Doors, Frames and Security Hardware.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM)
.1 ASTM A53 / A53M - 12 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
.2 ASTM A167 - 99(2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
.3 ASTM A 307-12, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile.
.4 ASTM A325 - 10e1, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
.5 ASTM A 653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
.6 ASTM A1011 / A1011M - 13 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.
.7 ASTM F1267 - 12 Standard Specifications For Expanded Metal - Steel.

.2 Canadian Standards Association (CSA)
.1 CSA G40.20-13/G40.21-13: General requirements for rolled or welded structural quality steel/Structural quality steel..
.2 CSA S16-09 - Design of steel structures, Includes Update No. 1 (2010), Update No. 2 (2010), Update No. 3 (2013).
.3 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
.1 CISC/CPMA1-73b, Quick-Drying, One-Coat Paint for Use on Structural Steel.
.2 CISC/CPMA2 -75, Quick-Drying, Primer for use on Structural Steel..

1.3 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 01 50 - General Instructions, Submittals clause.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section Section 01 01 50 - General Instructions, Submittals clause. Indicate VOC's:
.1 For finishes, coatings, primers and paints.

.2 Shop Drawings
.1 Submit shop drawings in accordance with Section 01 01 50 - General Instructions, Submittals clause.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
.3 Professional Engineer responsible for the shop drawings for wall stiffening at rolling steel shutter door:
.1 Inspect the installation of the work for conformance with the design and the shop drawings. Joist bracing specified in Section 05 2100.

1.4 QUALITY ASSURANCE

.1 Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.2 Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
.1 Deliver, store, handle and protect materials in accordance with Section 01 01 50 - General Instructions, Common Product Requirements clause.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Construction/Demolition Waste Management And Disposal clause.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material in appropriate on-site containers for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2 Products

2.1 MATERIALS

.1 Steel sections and plates: to CSA-G40.21, Grade 300W Class C and 350W Class C for HSS members.

.2 Welding materials: to CSA W59.

.3 Stainless steel sheet: to ASTM A167, Type 304 with No. 2b finish for counters and seats and #4 finish for columns.

.4 Bolts and anchorbolts: to ASTM A307; corrosion resistant types to ASTM A325M, Type 3. Provide all required anchoring devices including anchor clips, bar and strap anchors, expansion bolts and shields, and other devices designed to support and secure work.

.5 Woven wire mesh: 50 x 50 square mesh, 10 ga wire.

.6 Expanded sheet steel mesh: commercial sheet steel to ASTM A1011 and to ASTM A1267 type II, flattened expanded, class 1 uncoated, Style: 20 - #13, opening size SWD-17 mm x LWD-45 mm ± 1 mm, designed for penetration resistance, sheet thickness 1.78 mm, 72-77% open area and 3.7 kg/m². Acceptable Product: Exmet C3/4-13F.

.7 Galvanizing: hot dipped galvanizing with minimum zinc coating of 600 g/m2 to ASTM A123. All ferrous metal fabrication for exterior locations to be galvanized after fabrication.

.8 Drilled adhesive anchors: injection adhesive anchor consisting of fast curing 2-part adhesive injected into drilled hole, followed by insertion of bolt, rod or reinforcing bar.

.9 Expansion anchors: stud type expansion anchor driven into drilled hole, expands when nut torques. Size to suit loading.

.10 Security fasteners:
.1 Provide security screws, security nuts, rivets, spanner screws or other equally secure approved devices for affixing various items, ie Torx five lobe, socket pin head, phillips pin head, hex pin head or equivalent.
.2 Spanner screws to have slots that require a special spanner tool to remove screws.
.3 Round head screws not acceptable except at locations approved where material is not thick enough to permit counter-sinking.
.4 Use security screws where indicated.

.11 Shop coat primer: to CAN/CGSB-1.40M.

.12 Galvanize touch-up primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.2 FABRICATION

.1 Build work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Fabricate items from steel unless indicated otherwise; use galvanized steel for exterior items, unless indicated otherwise.

.3 Where possible, fit and shop assemble work, match mark, ready for erection.

.4 Use self-tapping shake-proof countersunk flat headed screws on items requiring assembly by screws or as indicated. Use screws for interior work. Use welded connections for exterior work, unless approved otherwise by Departmental Representative.

.5 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush with sharp edges and corners rounded to 3 mm radius. Where continuous welds may cause distortion of fabrication use stitch welds and plastic filler, grind and sand smooth.

2.3 MISCELLANEOUS STEEL BRACKETS AND ANGLES

.1 Supply for installation by respective trades. Drill for countersunk screws and anchor bolts.

.2 Prime paint interior steel and hot dip galvanized exterior steel.

.3 Provide steel lintel for exterior brick wythe at new door opening.

2.4 HOLDING ROOMS

.1 Steel frame: fabricated from 52 x 52 HSS with 3 mm wall thickness at outer perimeter of all rooms and with single common HSS at corners between each unit at floor walls and ceiling and at perimeter of door jamb and head frames. Weld a 6 mm x 52 mm flat bar threshold to HSS frames at doors.

.2 Grille Walls and Ceiling:

.1 Form curved steel flat bars, 6 mm x 52 mm, welded to configuration as indicated. Curved bars welded to 22 mm steel rod separators at adjoining curved flat bars and at HSS perimeter frame. Weld ends of curved flat bars to flat bar/HSS tube frames at top and bottom of each module. Ceiling section made up of same curved flat bar panels as walls. Weld four steel tabs to grille to accommodate fastening of tempered glass panel above center holding room ceiling.

.2 Fabricate two screen panels beside hinged grille door on front wall. Weld 12 x 25 mm steel bar permanent stop to HSS frame. Fabricate removable stops from 25 x 25 mm steel angles with 6 mm Φ SM, flush mounted Robertson head screws spaced maximum 300 mm oc on vertical frames and 200 mm oc at top and bottom frames . Drill and tap to HSS tubular frame. Allow for glass thickness of 6 mm with 3 mm space each side for glazing tape. Anchor HSS frame to floor with 6 mm tab plates.

.3 Plate Walls:

.1 Weld 6 mm steel plate to perimeter frame to form wall panels between Holding rooms, using 50 mm long stitch welds at 100 mm apart. Fill gaps between stitch welds with two component filler and sand flat.

.4 Fastening:

.1 Provide steel tab plates welded to HSS frame for bolting to masonry wall and concrete floor. Tab plates minimum 6 mm thickness. Two tabs at floor and four tabs at wall in each holding room.

.2 Fasteners: expansion type inserts with 10 mm Φ hex head bolts.

.5 Grille Doors:

.1 Constructed of same curved flat bars as grille walls, with 6 mm steel plate lock pocket to accommodate the security lock.

.2 Security lock mounted to removable cover plate sized to suit security lock and lock pocket.

.3 Mount door to HSS frame with one pair of prison hinges welded in place. Security lock and mounting plate, prison hinges, escutcheon and strike specified in Section 11 19 20.

.6 Fabricate in knocked down panels for installation on site. Weld fastening tabs to panels to facilitate installation on site.

.7 Prime paint.

2.5 BENCH AND COUNTER TOPS

.1 Fabricate stainless steel top, formed as indicated.
.1 Form back where tops butt walls with continuous 90 degree 10 mm leg.
.2 Leading edge and exposed ends formed with triple return over 38 x 83 mm wood edge.
.3 Refer to details for different profiles of stainless steel tops for benches and countertops for millwork counters.
.4 Supply stainless steel tops for millwork counters to millwork trade for installation.

.2 Fabricate steel support legs for benches and counters, of 75 mm φ standard steel pipe with 175 mm square steel plate x 4 mm thickness weld to each end of pipe.

.3 Prime paint ferrous steel surfaces.

2.6 OVERNIGHT STORAGE DOORS

.1 Fabricate doors from 38 x 38 x 3 mm thickness steel angle perimeter frame with miter corners all welded square true to plane. Leaf thickness 2 mm.

.2 Weld flattened expanded sheet steel to inside face of outer angle. Weld steel piano hinge to steel angle and drill holes in leaf to accept countersunk wood screws.

.3 Weld 38 x 38 x 3 mm plate with 12 mm φ hole weld to both angles, in alignment, to accommodate padlock. Radius exposed corners of plates. Surface mount a barrel bolt, horizontally, on bottom leg of gate to hold gate frames flush.

.4 Provide steel barrel bolt at top of one gate, vertically, concealed from view, and drill 12 φ hole in top leg.

.5 Pop rivet barrel bolts to gate frame.

.6 Prime paint

2.7 TEMPORARY STORAGE Rm. - DOOR D103

.1 Fabricate sliding door from 52 x 52 x 3 mm wall thickness steel HSS perimeter door stile with HSS mid rail all welded square true to plane. Weld and grind smooth at corners.
.1 Weld 50 x 50 x 3.6 mm woven wire infill to each half of door welded to perimeter 25 x 25 x 3 mm steel angles welded to HSS with corners welded tight. Woven wire edges concealed by angle from exterior of room.
.2 Stitch weld 38 mm wide x 4.8 mm thick steel guide to underside of HSS full length of bottom door stile. Radius exposed corners of leading ends of guide 20 mm and grind smooth welds.
.3 Size of door determined by wall opening allowing for clearance at receiver jamb, bottom guide plus 10 mm and aligned with opening at head of door and at trailing edge.
.4 Fabricate a 6 mm Φ staple to suit padlock welded to face of HSS stile at mid height of door. Exact location of staple to suit door receiver staple and padlock.
.5 Pull: 12 mm diameter steel rod channel shaped pull, 150 mm long x 50 mm short legs, welded to HSS door stile about 150 mm above locking staple.

.2 Fabricate door receiver from 3 mm thickness steel plate brake formed or welded to form channel shape approximately 300 mm long with 25 mm flanges 55 mm apart and predrilled holes at two locations, spaced 250 mm apart. Radius top and bottom corners of flanges 20 mm.

.1 Custom fabricate a 6 mm Φ staple to suit padlock welded near leading edge of receiver. Drill and plug weld staple to flange leg.

.3 Valence:

.1 break form 1.0 mm sheet steel to 'L' shape, to conceal track. Hem exposed lower edge.

.2 Valence size approximately 150 mm high x 90 mm deep x full length of track. Close exposed end, brake form and fasten at top.

.4 Powder coat exposed surfaces of mesh door, receiver and valence.

.5 Hardware:

.1 Overhead track: box track 1.6 mm thickness galvanized steel to ASTM A526, 45 mm wide x 58 mm high with track brackets spaced at 600 oc. Include track end closures and rubber stops track mounted. Track length to suit 2 times door width. RW # 31 track and 1x31 brackets.

.2 Trolley: pendant stile with four cluster 55 Φ, cold rolled steel bearing rollers, 12.7 mm Φ threaded pendent x minimum 100 mm long (to suit door HSS stile size). RW 7-6111.

.3 Guide Roller (floor mounted): 50 Φ grey iron wheel, steel frame, one pair required, RW # 1-0241.

.4 Locking: Padlock NIC.

.5 Finish: plated or powder coating to manufacturer's standard.

.6 Hardware indicated is manufactured by Richard Wilcox. Other products of similar design and quality are acceptable.

2.8 WALL BRACING

.1 Fabricate 125 x 45 mm x 9.9 kg/m steel channel framing, one on each side of rolling shutter door from floor to us of structure. Weld 10 mm baseplate 150 mm square with four 12 mm φ drilled bolts.

.2 Fabricate steel channel jamb at rolling door head welded or bolted to vertical channels. Fasten vertical channels to structure above. Design framework to support intended loads of non-bearing wall and rolling shutter door assembly as specified in para. 1.3.2.3.

.3 Fabricate cross members for fastening to overhead steel structure.

.4 Prime paint.

2.9 WINDOW BARS

.1 Fabricate bars from 44 mm sq. HSS with 3 mm wall thickness and a 25 mm Φ loose steel rod inside each tube, retained by a spacer ring and dimpled steel washer top and bottom within each HSS bars. Steel rod to rotate freely.

.2 Weld each HSS to 12 mm thickness steel plate top and bottom continuous around butt joint and drill16 mm Φ hole into plate between each HSS bar.

.3 Grind welds smooth and prime paint.

2.10 COLUMN WRAP

.1 Fabricate column wrap from 1.6 mm stainless steel with overlapping flush joins of height indicated.

2.11 FINISHES

.1 Galvanizing: hot dipped galvanizing with minimum zinc coating of 600 g/m² to ASTM A123. All ferrous metal fabrication for exterior locations to be galvanized after fabrication.

.2 Shop coat primer: to CAN/CGSB-1.40M.

.3 Galvanize touch-up primer: zinc rich, ready mix to CAN/CGSB-1.181.

.4 Powder coating: to manufacturer's standard.

2.12 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.

2.13 SHOP PAINTING

.1 Remove scale rust, grease and other surface coating and apply one shop coat of primer to all ferrous metal items after fabrication, with exception of galvanized or concrete encased items.

.2 Use primer unadulterated, as prepared by manufacturer. Paint on dry surfaces, free from rust, scale, grease. Do not paint when temperature is lower than 7°C.

.3 Clean surfaces to be field welded; do not paint.

3 Execution

3.1 ERECTION

.1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections. Hold in place until concrete embedment are cured.

.2 Provide suitable means of anchorage as indicated or as acceptable to the Engineer, such as dowels, anchor clips, bar anchors, expansion bolts and shields, toggles.

.3 Make field connections with high tensile bolts, to CAN/CSA-S16 or weld.

.4 Hand items over for casting into concrete, building into masonry and to appropriate trades together with setting templates.

.5 Touch-up rivets, field welds, bolts and burnt or scratched surfaces after completion of erection using primer.

.6 Touch-up galvanized surfaces with zinc primer where burned by field welding.

3.2 MISCELLANEOUS STEEL BRACKETS AND ANGLES

.1 Supply to respective trades and install miscellaneous metal items in accordance with reviewed shop drawings and details.

.2 Supply masonry section with steel loose angle lintels of sizes required to suit masonry openings.

.3 Provide 150 mm bearing at ends.

3.3 SECURITY MESH WALL REINFORCEMENT

.1 Fasten security mesh to steel studs with stitch welds at maximum 300 mm oc along all framing members.

.2 Butt join panels at solid bearing and fasten each panel to studs with stitch welds.

.3 Refer to Wall Type schedule for walls with security mesh. Note location of mesh on particular stud face.

3.4 HOLDING ROOMS

.1 Install knocked down panels to layout indicated, level and plumb and fasten together using bolts at fastening tabs. Fasten to wall and floor using expansion inserts with 10 mm Φ hex bolts at fastening tabs and at door threshold plate use c'sunk headed screws, into predrilled holes.

.2 Torque all bolts and nuts and use Lock-Tite on threads to prevent easy removal.

3.5 WALL BRACING

.1 Install 125 x 45 mm x 9.9 kg/m steel channel framing, one on each side of rolling shutter door fastened to floor and roof structure:

.1 Drill into concrete and bolt base plate to floor with four 12 mm Φ bolts.

.2 At u/s steel beam bolt channel top plate to lower flange of existing beam. Where no structure exists directly above, frame 125 mm channels laterally across two joists and tack weld. Fasten vertical channel to cross channel. Allow for dead load deflection in joist at connection to channel.

3.6 BENCHES AND COUNTER TOPS

.1 Install benches and counters, plumb and in alignment, on steel legs as indicated.

.1 Fasten to floor with 10 mm Φ hex head bolts into 50 mm long expansion inserts and to underside of counter/seat with 35 mm long wood screws.

.2 Drill holes to accommodate fastening.

.3 Fasten seat/bench ledger to wall with expansion anchors at masonry walls and into plywood panel or studs using appropriate fasteners.

3.7 OVERNIGHT STORAGE DOORS

.1 Fasten storage doors to cabinet with wood screws, aligned and square. Exposed screws with security type Torx heads.

.2 Adjust doors for correct function.

3.8 TEMPORARY STORAGE Rm. DOOR D103

.1 Install steel track assembly to wall above opening fastened to 38 x 140 mm solid wood nailer with lag screws. Ensure track is level.

.2 Mount two pendent trolley assemblies to top stile of mesh door and tighten securely. Mount each trolley 100 mm from each end of door. Adjust trolley to ensure top stile of door is level.

.3 Mount steel channel door receiver to wall fastened into steel studs using minimum two screws with countersunk heads. Align receiver with locking hasp mechanism at leading door stile. Align lower edge of track slightly below lower edge of wood nailer (6 mm ± 3 mm)

.4 Install roller guides to floor using expansion anchors drilled into concrete. Guide rollers to contact door when in open and closed position. Locate guides as close as possible to wall to avoid a trip hazard. Guides can be offset slightly. Guides to retain steel fin at underside of HSS door bottom stile, allowing for a 2 mm lateral tolerance ± 1mm.

.5 Mount door assembly to track and install door stop bumper and track closure at each open end.

.6 Fasten valence to wood nailer full length of track using wood screws at 300 mm oc. Lower edge of valence to align with top of door stile. Adjust door for correct function.

3.9 WINDOW BARS

.1 Install window bar assembly as indicated. Drill into masonry lintel and concrete floor to 75 mm depth and install 12 mm Φ hex head bolts into expansion inserts.

.2 Touch up scratched surfaces with prime paint.

3.10 COLUMN WRAP

.1 Install stainless steel wrap over columns to 1500 mm above floor. Adhere stainless steel to gypsum board with recommended adhesive. Drill holes at centerline of overlap joint and install a pop rivet at top, bottom and midpoint using ss pop rivets.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions for Waste Management And Disposal.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CSA O121-M1978(R2003), Douglas Fir Plywood.
- .2 CAN/CSA-O141-05, Softwood Lumber.

.2 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2003.

.3 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.4 AWPA M4-06 - Standard for the Care of Preservative -Treated Wood Products.

.5 AWPA P5-10: Standard for Waterborne Preservatives.

.6 American Society for Testing and Materials (ASTM)
- .1 ASTM A123 / A123M - 09 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- .2 ASTM F1667 - 11a Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

1.3 QUALITY ASSURANCE

.1 Lumber identification: by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.2 Plywood identification: by grade mark in accordance with applicable CSA standards.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General instructions for Waste Management And Disposal.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused wood materials from landfill to recycling composting facility approved by Engineer.

2 Products

2.1 LUMBER MATERIAL

.1 Lumber: unless specified otherwise, softwood, S4S, moisture content 19% or less in accordance with following standards:
- .1 CAN/CSA-O141 Softwood lumber.
- .2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring and backing in walls:
- .1 Dimension sizes: kiln dried framing or better grade, finger-jointed lumber is acceptable.

.3 Blocking, nailers and strapping: S4S Hem-Fir or S-P-F species, NLGA No. 2 or better Grade:
- .1 Board sizes: "Standard" or better grade.
- .2 Dimension sizes: "Standard" light framing or better grade.

.4 All wood for lumber in contact with concrete, pressure preservative treated .

2.2 PANEL MATERIALS

.1 Douglas fir plywood (DFP): to CSA O121, standard construction.

2.3 PANEL MATERIALS END USES

.1 Backing in walls: Plywood, DFP, sheathing grade, square edge, 20.5 mm thickness except where specified otherwise.

2.4 ACCESSORIES

.1 Nails, spikes and staples: ASTM F1667.

.2 Bolts: 12.5 mm diameter unless indicated otherwise, complete with nuts and washers.

.3 Proprietary fasteners: toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, explosive actuated fastening devices, recommended for purpose by manufacturer.

.4 Galvanizing: to ASTM A123 / A123M, use galvanized fasteners for exterior work and in pressure-preservative treated lumber. Screw fasteners with applied epoxy or polymer coating is also acceptable.

2.5 WOOD PRESERVATIVE

.1 Pressure preservative treated lumber to AWPA P-5 indicate commodity standard number using CCA or other approved preservative.

.2 Treat material as indicated and as follows:
- .1 Wood members in contact with concrete.

3 Execution

3.1 INSTALLATION

.1 Comply with requirements of NBC, supplemented by the following paragraphs.

.2 Construct continuous members from pieces of longest practical length.

.3 Install plywood in walls to space-out and support wall mounted fixtures, and other work as required.

.4 Align and plumb faces of furring and blocking to tolerance of 1:600.

.5 Install rough bucks, to rough openings as required to provide backing for finish carpentry and other work. Fasten bucks to jamb studs using screws.

.6 Fasten blocking and nailers to steel stud framing using wood screws.

.7 Install wood nailers, blocking, backing for wood supports as required and secure using galvanized steel fasteners.

3.2 FURRING, STRAPPING AND BLOCKING

.1 Install furring, strapping and solid backing in walls and structures as required to space-out and support casework, cabinets, applied finishes, facings, wall mounted door stops, electrical and mechanical fixtures and other items as indicated. Use solid blocking or 20.5 mm plywood securely fastened to framing members.

.2 Install KD 38 x 140 applied nailer with planed surface to support sliding door track (D103). Fasten to steel stud wall using steel stud screws with countersunk heads, spaced 300 oc staggered in two rows

.3 Align and plumb faces of furring and blocking to tolerance of 1:600.

3.3 FIELD TREATMENTS OF PRESERVATIVE-TREATED PRODUCTS

.1 Comply with AWPA-M4.

.2 Re-treat surfaces of PT lumber and plywood exposed by cutting, trimming or boring with liberal brush application of preservative before installation.

.3 Use approved preservative to manufacturers instructions.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 05 50 00 - Metal fabrications, for steel supports and stainless steel tops.

.2 Section 06 10.11 - Rough carpentry.

.3 Section 07 92 10 - Joint Sealing.

.4 Section 09 91 23 - Painting and finishing.

1.2 DESCRIPTION OF WORK

.1 Supply and install cabinets and millwork trim as indicated on drawings.

1.3 REFERENCES

.1 Architectural Woodwork Institute / Architectural Wood Manufacturer's Association of Canada (AWI/AWMAC)
.1 Architectural Woodwork Standards, 1st Edition, 2009.

.2 American Society for Testing and Materials (ASTM):
.1 ASTM A123 / A123M - 09 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
.2 ASTM F1667 - 05 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

.3 Canadian Standards Association (CSA):
.1 CSA O115-M82(R2001), Hardwood and Decorative Plywood.
.2 CSA O121-M78(R1998), Douglas Fir Plywood.
.3 CAN/CSA O141-05, Softwood Lumber.
.4 CSA-O112 Series M1977, Adhesive, Contact, Brushable.

.4 National Electrical Manufacturers Association (NEMA):
.1 NEMA LD3-2000, High Pressure Decorative Laminates.

.5 National Hardwood Lumber Association (NHLA):
.1 Rules for the Measurement and Inspection of Hardwood and Cypress January 2004.

.6 National Lumber Grades Authority (NLGA):
.1 Standard Grading Rules for Canadian Lumber 2010.

.7 Environmental Choice Program (EPC):
.1 CCD-045-95, Sealants and Caulking Compounds.
.2 CCD-046-95, Adhesives.
.3 CCD-047-05, Architectural Surface Coatings.

1.4 SUBMITTALS

.1 Submit shop drawings, product data, samples and maintenance data in accordance with Section 01 01 50 General Instructions for submittal requirements.

.1 Samples:
.1 Submit duplicate 300 x 300 mm samples of each type of solid wood or plywood to receive stain or natural finish.

.2 Shop drawings:
.1 Clearly indicate all suppled and installed cabinets showing sizes, details of construction, profiles, jointing, fastening and other related details.

.3 Product Data:
.1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets. Indicate VOC's for adhesives, solvents and cleaners.

.4 Provide maintenance data for plastic laminate work for incorporation into manual.

1.5 PRODUCT HANDLING

.1 Cover finished surfaces with heavy kraft paper or put in cartons during shipment. Protect installed surfaces by approved means. Do not remove until immediately before final inspection.

.2 Do not store or install materials in areas where relative humidity is less than 25% or greater than 60% at 22°C.

2 Products

2.1 MATERIALS

.1 Softwood lumber: to CAN/CSA-0141 and National Lumber Grades Authority (NLGA), requirements, with maximum moisture content of 12% for interior work, to AWMAC custom grade construction, D-fir species for all concealed areas.

.2 Douglas fir plywood: to CSA 0121:
.1 Concealed areas: 19 mm plywood to AWMAC guidelines.

.3 Hardwood lumber: moisture content 12% or less in accordance with following standards:
.1 National Hardwood Lumber Association (NHLA),.
.2 Species: Clear white birch to match birch plywood.

.4 Hardwood plywood: to CSA O115-M of thickness indicated, rotary cut white birch species veneer of Architectural A-1 grade for exposed fronts and faces, A-2 for shelves, B-1 for interior gables and B-4 for backs. Use plywood core. Baltic Birch for drawer cases.

.5 Nails and staples: to ASTM F1667 ; galvanized for interior highly humid areas and for treated lumber; plain finish elsewhere.

.6 Wood screws: steel, electro-plated.

.7 Plastic Laminate:
.1 Based on solid colour range with selected texture finish conforming to the following:
.1 Laminated plastic for flatwork: to CAN/CSA-A172, Grade GP, Standard Duty, 1.15 mm thick for horizontal surfaces.
.2 Core:
.1 D-Fir plywood, 19 mm thickness, double layer.
.3 Laminated plastic adhesive: Low VOC contact adhesive.
.4 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.

.8 Casework hardware furnished and installed under this Section as follows:

.1 Counter/cupboard door hinges: self closing, 3-way adjustable unit (European type) for overlay construction.

.2 Pulls: 100 mm long "D" shaped chrome plated brass/steel or stainless steel, brushed finish.

.3 Drawer slides: self-closing, baked-on epoxy coated steel slides with nylon rollers, parallel close feature, with tolerance adjustment on one side and 100% extension, 45 kg capacity.

.4 Adjustable shelf hardware:

.1 Pilaster strips and four clips per shelf. Semi-recess mounted, finish in dull chrome.

.5 Casework hardware furnished and installed under this Section as follows:

.1 Counter/cupboard door hinges: self closing, 3-way adjustable unit for overlay construction or offset concealed type.

.2 Pulls: 100 mm long "D" shaped chrome plated brass/steel or stainless steel, brushed finish.

.3 Drawer slides: self-closing, baked-on epoxy coated steel slides with nylon rollers, parallel close feature, with tolerance adjustment on one side and 100% extension, 45 kg capacity.

.4 Cabinet locks: to ANSI A156.11, Grade 2, solid brass 7-pin tumbler, utility cylinder lock, 20 mm φ x 29 mm long threaded body with nut, 22 mm long cam removable for rekeying (Stanley-Best Access 5E7, 180° rotation):

.5 Nickel plated extruded brass cylinder body 626 finish.

.6 Locked and unlocked by key.

.7 Cylinder length: 22 mm.

.8 Door and drawer thickness 20 mm. Provide two keys for each cabinet with locks.

.9 All cabinet locks keyed as directed by the Departmental Representative.

.6 Adjustable shelf hardware:

.1 Pilaster strips and four clips per shelf. Semi-recess mounted Finish in dull chrome. Clips to retain upper shelves in place (seismic clips).

.9 Applied finish: low VOC clear lacquer, satin finish. Acceptable product: Cloverdale Paint Ecologic water-borne clear lacquer 458 Series.

2.2 CASEWORK

.1 Fabricate caseworks to AWI/AWMAC custom quality grade.

.2 A & D OFFICE FRONT COUNTER

.1 AWMAC custom grade.

.2 Construction: birch plywood, 19 mm thickness counter case, drawer fronts, doors, gables, fronts and faces.

.3 Counter top and integral surfaces: stainless steel on two layers of19 mm plywood.

.4 Exposed drawer fronts, doors and exposed faces: birch veneer with A-1 grade for exposed fronts and faces and grade B-1 on interior faces.

.5 Interior shelves: white birch veneer plywood, B-1 grade. Drawers Baltic Birch.

.6 Exposed edge banding: 3 mm solid birch or matching pvc.

.7 Hardware: wire pulls, drawer slides, adjustable shelf hardware, hinges and drawer locks.

.3 A & D OFFICE BACK COUNTER/CUPBOARD

.1 AWMAC custom grade.

.2 Construction: birch plywood, 19 mm thickness counter and cupboard case,

drawers, doors, gables, fronts and faces.
.3 Counter top and integral surfaces: plastic laminate on two layers of19 mm plywood. Stainless steel top to Section 05 50 00.
.4 Exposed drawer fronts, doors and exposed faces: birch veneer with A-1 grade for exposed fronts and faces and grade B-1 on interior faces.
.5 Interior shelves: white birch veneer plywood, B-1 grade. Drawers Baltic Birch.
.6 Exposed edge banding: 3 mm solid birch or matching pvc.
.7 Hardware: wire pulls, drawer slides, door hinges and adjustable shelf hardware,

.4 RUNNING TRIM
.1 AWMAC custom grade.
.2 Material and finish: Birch species.

.5 BENCHES AND COUNTERS WITH STAINLESS STEEL TOP
.1 AWMAC custom grade.
.2 Construction: D-Fir plywood, double layer 19 mm thickness. Softwood plank support on underside and softwood trim on edges. Coordinate top and edge profile with Section 05 55 00.
.3 Stainless steel top to Section 05 50 00.
.4 Exposed ply surfaces: paint to Section 09 91 23.
.5 Make provision for stainless steel top, pipe supports and fasteners as indicated.

2.3 DRAWERS

.1 Fabricate drawers to AWMAC custom grade supplemented as follows:
.1 Drawer case: front, sides and back of Baltic birch, 12 mm thickness with convex routed top edges, sanded smooth.
.2 Bottoms: Baltic Birch, 9 mm thickness.
.3 Drawer fronts: Birch plywood 19 mm thickness as indicated.

2.4 COUNTER TOPS

.1 Stainless steel:
.1 One piece counter top with integral edging as Specified in Section 05 50 00.

.2 Laminated Plastic:
.1 Where joints are unavoidable, on tops longer than 3000, use draw bolts and splines.
.2 Comply with CAN3-A172, Appendix "A".
.3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. use continuous lengths up to 3000 mm. Keep joints 600 mm from cutouts. P. Lam tops may be applied either in the shop or on site.
.4 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 deg. Do not mitre laminate edges.

.3 Seal reverse side of plywood core of plastic laminate work.

2.5 EDGE BANDING

.1 Plywood drawer case: convex edges, sanded smooth.

.2 Counter tops:
- .1 Stainless steel.
- .2 Laminated plastic or hardwood bullnose.

.3 Plywood panels: 3 mm Birch or PVC edge to match veneer.

2.6 FABRICATION

.1 Set nails and countersink screws, apply matching wood filler to indentations, sand smooth and leave ready to receive finish.

.2 Shop install cabinet hardware for doors, shelves and drawers.

.3 Provide cutouts for inserts and as indicated.

.4 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

2.7 FINISHING

.1 Except as indicated otherwise Birch veneered and trim surfaces of cabinets: factory applied, low VOC clear lacquer in satin finish.

.2 Site finishing of wood trim specified in Section 09 91 23.

3 Execution

3.1 INSTALLATION OF ALL CASEWORK AND TRIM

.1 Install prefinished millwork and casework at locations shown on reviewed shop drawings.

.2 Position accurately, shim level, plumb and straight.

.3 Fasten and anchor millwork/casework securely. Provide heavy duty fixture attachments for wall mounted cabinets. Coordinate with carpentry trade where backing is required inside walls.

.4 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects. Install trim to conceal spaces between walls and cabinets.

.5 At junction of counter top unit and adjacent wall finish, apply small bead of silicone sealant.

.6 Fit hardware accurately and securely in accordance with manufacturer's directions.

.7 Adjust all cabinet hardware for correct function.

3.2 STANDING AND RUNNING TRIM

.1 Fit backs of casing snugly to wall surfaces to eliminate cracks at junction of casing with walls. Shim as required. Nail trim to casing frame.

.2 Make joints, in runs longer than 3.6 m using a 45° scarfe type joint.

.3 Install trim in single lengths without splicing.

3.3 PROTECTION

.1 Cover finished surfaces, susceptible to damage, with heavy kraft paper until ready for inspection. Do not remove until immediately before final cleaning.

3.4 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Perform care and cleaning with CAN3-A172, Annex B.

.3 Remove traces of primer, caulking and filler materials; clean cabinets and millwork.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions.

1.2 REFERENCES

.1 CAN/ULC-S705.1-01-am3, Spray applied Rigid Polyurethane Foam, medium density.

.2 CAN/ULC-S705.2-05, Spray applied Rigid Polyurethane Foam, medium density, installer's responsibilities.

.3 CAN/ULC-S124M-06, Standard Method of Test for the Evaluation of Protective Coverings for Foamed Plastic.

.4 CUFCA-BC, Canadian Urethane Foam Contractors Association.

1.3 TEST REPORTS

.1 Submit test reports, verifying qualities of insulation meet or exceed requirements of this specification, in accordance with Section 01 01 50.

1.4 PROTECTION

.1 Provide temporary enclosures to prevent spray and noxious vapours from contaminating air beyond application area.

.2 Protect workers as recommended by insulation manufacturer.

.3 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

.4 Dispose of waste foam daily in accordance with local authority having jurisdiction and decontaminate empty drums in accordance with foam manufacturer's instructions.

1.5 QUALITY ASSURANCE

.1 SPF applicator: only approved applicators of SPF systems, licensed by CUFCA and employing certified installers may.

.2 Inspection service provided and paid for by the Engineer.

1.6 SAFETY REQUIREMENTS

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:
.1 Workers must wear gloves, respirators, eye protection, protective clothing when applying foam insulation.
.2 Workers must not eat, drink or smoke while applying foam insulation.

.2 Conform to Section 01 35 33 Safety Requirements.

1.7 PROTECTION

.1 Provide temporary drop sheets to prevent spray from contaminating air beyond application area.

.2 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of insulation materials.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Construction/Demolition Waste Management And Disposal.

.2 Remove from site and dispose of all packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Fold up metal banding, flatten and place in designated area for recycling.

.5 Dispose of waste foam daily in location designated by Departmental Representative and decontaminate empty drums in accordance with foam manufacturer's instructions.

.6 Divert metal drums from landfill to metal recycling facility as approved by Departmental Representative and to CAN/ULC-S705.2.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Apply insulation only when surfaces and ambient temperatures are within manufacturers' prescribed limits.

2 Products

2.1 MATERIALS

.1 Insulation: medium density closed cell spray-on polyurethane to CAN/ULC-S705.1, meeting the following requirements:
- .1 Five year aged RSI value of 0.96 per 25 mm thickness.
- .2 Water Absorption % by Volume: To ASTM D2842, 0.40 %.
- .3 Compressive strength 170 kPa.
- .4 Vapour Permeability: to ASTM E96, 56 ng/Pa.s.m², at 50 mm thickness.
- .5 Flame spread rating <290.
- .6 VOC's: To CAN/ULC-S774: Pass.

.2 Primers: in accordance with manufacturers recommendations for surface conditions.

3 Execution

3.1 APPLICATION

.1 Apply insulation to clean surfaces in accordance with CAN/ULC-S705.2 and manufacturer's printed instructions. Use primer and mechanical fasteners where recommended by manufacturer.

.2 Concealed spaces at exterior wall:

.1 Apply polyurethane sprayed foam insulation to fill wall cavity void. Apply in several applications to build up to thickness.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Fire stopping and smoke seals within mechanical assemblies (i.e inside ducts, dampers) and electrical assemblies (i.e. inside cable trays) are specified in Division 22, 23, 26 and 27 respectively.

1.2 DESCRIPTION OF WORK

.1 Apply firestop sealant and systems around all penetrations through openings in fire rated wall, floor and ceiling assemblies.

.2 Seal around ducts and conduits penetrating fire separations.

1.3 REFERENCES

.1 ULC-S115-2005 Standard Method of Fire Tests of Firestop Systems.

1.4 PRODUCT DATA

.1 Submit product data in accordance with Section 01 01 50 General Instructions - for submittals.

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

2 Products

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with ULC-S115.
.1 Systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.
.2 Fire stop system rating: to match wall/floor/roof assembly of one hour rating.

.2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No. 40 U19.

.3 Prefabricated flange units, with outer metal flange die-stamped from 0.3 mm thick 316 stainless steel, with inset of premoulded silicone elastomeric ring, factory moulded, U.L.C. or W.H. listed as a through penetration fire stop. Flange hinged for fixing over pipe and then secured tight with self-tapping screw.

.4 Fire-resistance rating of installed fire stopping assembly not less than the fire- resistance rating of surrounding wall assembly.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal; do not use cementitious or rigid seal at such locations.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: prefabricated silicone elastomeric seal; do not use a cementitious or rigid seal at such locations.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

3 Execution

3.1 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. 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.

3.2 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Tighten self-tapping screw on flange unit to ensure adequate tight and permanent seal.

3.3 INSPECTION

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

3.4 SCHEDULE

.1 Fire stop and smoke seal at:
.1 Penetrations through fire-resistance rated walls and ceilings.
.2 Around mechanical and electrical assemblies penetrating fire separations.
.3 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.

.2 East and West walls of A&D area are fire rated masonry walls. Firestop all penetrations.

3.5 CLEAN UP

.1 Remove excess materials and debris and clean adjacent surfaces immediately after application.

END OF SECTION

1 General

1.1 SUMMARY

.1 This Section specifies caulking and sealants not specified in other Sections.

.2 Refer to other sections for other caulking and sealants.

1.2 REFERENCES

.1 ASTM International:
.1 ASTM C 919-02, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-19.13-M87 Sealing Compound, One-component, Elastomeric, Chemical Curing.
.2 CAN/CGSB-19.17-M90 One-Component Acrylic Emulsion Base Sealing Compound.
.3 CAN/CGSB-19.24-M90 Multi-component, Chemical Curing Sealing Compound.

1.3 SUBMITTALS

.1 Submit duplicate samples of each type of material and colour to be used in accordance with Section 01 01 50 General Instructions for submittals.

1.4 ENVIRONMENTAL AND SAFETY REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Sealant and substrate materials to be minimum 5°C.

.4 Should it become necessary to apply sealants below 5°C, consult sealant manufacturer and follow their recommendations.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal; packaging material 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 Engineer.

.8 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

1.6 PROJECT CONDITIONS

.1 Environmental Limitations:
- .1 Do not proceed with installation of joint sealants under following conditions:
  - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
  - .2 When joint substrates are wet.

.2 Joint-Width Conditions:
- .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
- .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

2 Products

2.1 SEALANT MATERIALS

.1 Use caulking that does not emit strong odours, contain toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off gas time.

.3 Where sealants are qualified with primers use only approved primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Urethanes One Part.
- .1 Self-Leveling to CAN/CGSB-19.13, Type 1, colour as selected.

.2 Urethanes One Part.
- .1 Non-Sag to CAN/CGSB-19.13, Type 2, MCG-2-40, colour as selected.

.3 Silicones One Part.
- .1 To CAN/CGSB-19.13.

.2 Sealant type: one-part, acetoxy silicone sealant, cures to a flexible rubber when exposed to moisture present in the air, containing a fungicide, suitable for use in bathrooms, spas and similar applications where joints need protection against fungi and bacteria.

.4 Acoustical Sealant.
.1 To ASTM C 919, Single component, non-skinning, non-hardening synthetic rubber, dark gray colour, designed for use in gypsum board partitions to inhibit air movement and buffer vibration.

.5 Acrylic Latex One Part.
.1 To CAN/CGSB-19.17.

.6 Preformed Compressible and Non-Compressible back-up materials.
.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
.1 Extruded closed cell foam backer rod.
.2 Size: oversize 30 to 50%.
.2 Neoprene or Butyl Rubber.
.1 Round solid rod, Shore A hardness 70.
.3 High Density Foam.
.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by manufacturer.
.4 Bond Breaker Tape.
.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building: Sealant type: one component urethane, non-sag.

.2 Interior control and expansion joints in floor surfaces: Sealant type: one component urethane self leveling.

.3 Perimeter of bath fixtures and countertops (e.g. sinks, showers, basins): one-part, acetoxy silicone sealant.

.4 Exposed interior joints in drywall to dissimilar materials: Sealant type-acrylic latex.

.5 Concealed joints at top of walls at structural deck: acoustic Sealant.

.6 Colour of sealants: selected by Engineer from manufacturer's standard range to match adjacent surfaces.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

3 Execution

3.1 PROTECTION

.1 Protect installed Work of other trades from staining or contamination.

3.2 PREPARATION OF JOINT SURFACES

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant.
.1 Apply sealant in accordance with manufacturer's written instructions.
.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
.3 Apply sealant in continuous beads.
.4 Apply sealant using gun with proper size nozzle.
.5 Use sufficient pressure to fill voids and joints solid.
.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.
.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.
.1 Cure sealants in accordance with sealant manufacturer's instructions.
.2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup.
.1 Clean adjacent surfaces immediately and leave work neat and clean.
.2 Remove excess and droppings, using recommended cleaners as work progresses.
.3 Remove masking tape after initial set of sealant.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 07 92 10 - Joint Sealing; caulking of joints between frames and other building components.

.2 Section 08 11 20 - Detention Doors, Frames and Security Hardware.

.3 Section 08 71 10 - Door Hardware, including weatherstripping.

.4 Section 08 80 50 - Glazing.

.5 Section 09 91 23 - Painting.

1.2 REFERENCE STANDARDS

.1 ASTM International:
.1 ASTM A 653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A 794/ 794M-12 - Standard Specification for Commercial Steel (CS), Sheet, Carbon (0.16 % Maximum to 0.25 % Maximum), Cold-Rolled.
.3 ASTM A659/659M-12 - Standard Specification for Commercial Steel (CS), Sheet and Strip, Carbon (0.16 Maximum to 0.25 Maximum Percent), Hot-Rolled.

.2 Canadian General Standards Board (CGSB):
.1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Steel Door Manufacturers' Association, (CSDMA):
.1 CSDMA, Specifications for Commercial Steel Doors and Frames, 2006.
.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 2009.

.4 CSA International:
.1 CSA G40.20-13/G40-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA W59-03(R2009), Welded Steel Construction (Metal Arc Welding) (Metric Version).

1.3 SUBMITTALS

.1 Submit shop drawings and test reports in accordance with Section 01 01 50 - General Instructions for submittals.
.1 Clearly indicate each type of door and frame, material core thickness, mortises, reinforcements, anchorages, glazing, location of exposed fasteners and hardware arrangements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions; Construction/Demolition Waste Management And Disposal clause.

.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 for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Divert unused wood materials from landfill to either recycling, reuse or composting facility.

2 Products

2.1 MATERIALS

.1 Sheet Steel (WGCS): tension leveled steel to ASTM A924, galvanized to ASTM A653 Coating designation ZF120 paintable galvaneal finish.

.2 Hot Rolled Carbon Steel Sheet (HRCS): commercial quality, to ASTM A659/A659M, for concealed reinforcement for materials, 2.7 mm minimum thickness.

.3 Cold rolled carbon steel sheet (CRCS) commercial quality, TO ASTM A794, shop prime coated.

2.2 COMPONENTS

.1 Frames:
- .1 Single interior door frames: 1.6 mm base thickness steel.
- .2 Glazing frames: 1.6 mm base thickness steel.

.2 Doors:
- .1 Interior door: 1.2 mm base thickness steel.

.3 Frame floor anchors and channel spreaders: minimum 1.6 mm thick base steel.

.4 Guard boxes: minimum 0.8 mm thick base steel.

.5 Twist in stud anchor with base anchor for door frames in stud walls.

.6 Hinge, lock, strike, flush bolt and surface applied hardware reinforcing: 3.5 mm minimum base metal thickness.

.7 Door bumpers: black neoprene single stud.

.8 Primer: to CAN/CGSB-1.181, zinc rich.

2.3 DOOR TYPES

.1 (HCM) Doors: flush steel with full honeycomb core of 25 mm size bonded resin - impregnated kraft reinforcement, longitudinal edges mechanically locked and adhered, top and bottom edges with 1.6 mm projection welded channel, with reinforcement and prepared for hardware.

.2 Security Doors: to Section 08 11 20 - Detention Doors, Frames and Security Hardware.

2.4 FABRICATION

.1 Fabricate doors and frames as detailed; in accordance with Canadian Steel Door and Frame Manufacturer's Association (CSDFMA), "Canadian Manufacturing for Steel Doors and Frames"; for hollow steel construction; ULC requirements, reviewed shop drawings and specified standards, except where specified otherwise. Fabricate frames for glazing in similar manner as for door frames.

.2 Mortise, reinforce, drill and tap doors and frames and reinforcements to receive hardware using templates provided by finish hardware supplier. Refer to Section 08 71 10 for mounting heights.

.3 Touch up galvanized finish damaged during fabrication.

.4 Locate screw fixed glazing stops to secure side of glazed screens and side lights using Robertson head fasteners on secure side of wall.

.5 Prepare doors for cylinder, thumbturn lever where mortised doors are scheduled.

2.5 FRAMES - WELDED

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

.6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

.7 Install 3 bumpers on strike jamb for each single door.

.8 Glazing Stops for:
.1 Glazed screens: 1.2 mm base metal thickness commercial grade steel, screw fixed, with provision for 6 mm glazing.

2.6 DOORS

.1 Assemble components using spot or arc welding.

.2 Doors: swing type, flush as indicated.

.3 Lock seam exposed edges are permissible for HCM doors.

.4 Touch up doors with primer where galvanized finish damaged during fabrication.

3 Execution

3.1 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation. Install door frames anchored to steel stud framed walls accordance with reviewed shop drawings. Mount frames to ensure 20 mm clearance under doors noted as undercut on mechanical drawings.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreaders at third points of door opening to maintain frame width. Remove temporary spreaders after frames are built-in.

.4 Make allowance for deflection to ensure structural loads are not transmitted to frames.

3.2 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
- .1 Hinge side: 1.0 mm.
- .2 Latch side and head: 1.5 mm.
- .3 Finished floor: 20 mm.

.3 Adjust operable parts for correct function.

.4 Install steel glazing stops.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 08 11 14 - Steel Doors and Frames.

.3 Section 08 71 10 - Door Hardware (commercial)

.4 Section 09 91 23 - Painting.

1.2 REQUIREMENTS

.1 Examine plans and finish schedule and details to determine full extent of work required.

.2 Carry out all work to ensure that exposed screws are security type and that no items can be removed without special equipment.

.3 Provide new doors, frames and hardware assembly shown on new floor plan as doors; D-100, D-102 and D-108.

.4 Provide security hardware for three Holding Rooms: hinges and deadbolt locks.

.5 Install two doors shown on demolition plan as D-105 and D-106, salvaged from removal work, and install at new location shown on new floor plan numbered as D-105 and D-106.

1.3 SUBMITTALS

.1 Shop Drawings:
.1 Submit shop drawings in accordance with Section 01 01 50 - General Instructions; Submittal Procedures clause.
.2 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, louvred, arrangement of hardware and finishes.
.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing finishes.
.4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.

.2 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.4 REFERENCE STANDARDS

.1 ANSI/NAAMM/HMMA 863-04 Guide Specifications For Detention Security Hollow Metal Doors & Frames

2 Products

2.1 MATERIALS

.1 Shop paint primer touchup: compatible with existing primer.

.2 Fasteners:
.1 Security screws and bolts with security heads (five lobe and centre post) to prevent removal except with special tools; non-corrosive type.
.2 Approved Product: Torx-Plus Tamper Resistant.
.3 Fasteners that are not required to be removed can be flat head, having an extra head that will twist off when fully secured, leaving the main head countersunk flush without slots, so that screw cannot be backed out by means of a screw driver or wrench.
.4 Where thickness of metal will not allow screws to be countersunk, use round head security screws with hexagonal break-off heads.

2.2 DOOR & FRAME

.1 Fabricate doors and frames to NHMMA/AAMM 863 and the following:
.1 Door size: 1066 W x 2134 H x 50 mm thickness with internal steel reinforcement.
.2 Door skin thickness: 1.9 mm (14g).
.3 Door frame thickness: 1.9 mm (14g).
.4 Door Glazing: 6 mm tempered glass, 125 mm W x 600 mm H (stop to stop). Glass rough opening 200 mm from leading door edge and 1300 mm from door bottom edge.
.5 Deadbolt security lock specified in clause 2.3.

.2 Door to meet independent performance test to ASTM F1450 and certified they meet the following results (based on an 860 x 2100 mm sized door (with narrow light).
.1 Static Load test: centrally applied load of 4000kg at quarter points on door. Maximum deflection not to exceed 30 mm, with permanent set not to exceed 10 mm after release of load.
.2 Rack Load test: concentrated load of 2645 kg applied to one unsupported corner of door while opposite end of door is held stationary. Maximum deflection 50 mm.
.3 Impact load test: door and frame are mounted together and subjected to multiple 271 joule impact from a pendulum ram at five locations, located 150 mm in from door edge at ℄ of each hinge and lockset and at location inline with bottom hinge and 150 mm in from opposite edge of door. Apply number of impacts at each location as follows:
.1 200 at lock.
.2 75 at each hinge location.
.3 100 at bottom of door opposite lowest hinge.
.4 Following impact tests door must be operable.

2.3 DOOR HARDWARE

.1 Security Deadbolt Locks:
.1 Salvage security lockset from existing Inmate effect Storage and reuse on door D-108. Lockset is RH, mounting plate hinge side.
.2 Provide new security deadbolt lock for door D-102 (RH, mounting plate on hinge side) to match deadbolt lock used for door D-102.
.3 Provide new security lockset for salvaged door D-106 (RH) to match existing lockset at Door D-105. D-106 becomes LH with mounting plate on pull side. Folger Adams deadbolt lock Series 80.

.2 Security FM template hinges:
- .1 Size: 114x 114 x 4.8 mm.
- .2 Material: Investment Cast Stainless Steel.
- .3 Style: Full Mortise, Hospital Tip, Pin: Concealed & Non Removable.
- .4 Bearing: Anti-Friction Bearings.
- .5 Weight: 0.75kg.
- .6 Finish: US32D.
- .7 Capacity: 136 kg Door (3 hinges).
- .8 Mounting Screws: 6mm-20 x 12.7 mm Flat Head Security Torx (five lobe).

.3 Door pull:
- .1 Size: 229 mm long x 2.18 mm Projection.
- .2 Material: Stainless Steel, Investment Cast.
- .3 Style: Raised (Loop).
- .4 Weight: 0.95kg.
- .5 Finish: US32D.
- .6 Mounting Screws: Security Oval Hd 10 mm -16 x 20 mm.

.4 Door Stop:
- .1 Size: 50 mm ϕ x 89 mm L bumper, 16 mm ϕ x 65 mm L shank.
- .2 Material: silicone rubber body, threaded steel shank.
- .3 Style: wall or floor mounted
- .4 Weight: 0.45kg
- .5 Finish: Black
- .6 Mounting: drilled into concrete and embedded with epoxy grout.

.5 Commercial door closer specified in Section 08 71 10.

2.4 GRILLE DOOR HARDWARE

.1 Security Deadbolt Lock: (Folger Adams 80 series)

.1 Mechanical operation - Locks and unlocks by key from one side. Key removal in locked position only.

.2 Case - Malleable iron case, 6 mm thick cold drawn steel cover.

.3 Working parts are corrosion resistant.

.4 Heavy duty lever tumblers - 6 spring temper brass tumblers, activated by heavy phosphor bronze springs. Precision fit to locking fence.

.5 Large, solid deadbolt - Galvanized steel, 38 mm x 20 mm.

.6 Bolt throw - 16 mm.

.7 Bolt projection - 32 mm.

.8 Finish - primed.

.9 Keys: paracentric bronze. Total one per holding room door.

.10 Flat strike plate with four screws.

.2 Security deadbolt mounting plate (on pull side).

.1 4.8 mm gauge mild steel plate mounted to lock with security fasteners and one(1) double wing cylinder escutcheon. Coordinate with Section 05 50 00 for lock pocket configuration.

.3 Prison hinges: (Welded to grille door)
- .1 Size: 127 x 152 x 12.7 mm.
- .2 Material: Cold-Rolled Steel.
- .3 Style: Full Surface, Pin: Hardened Alloy Steel, Concealed & Non-removable.

.4 Bearing: Heavy-Duty Thrust Bearing.
.5 Weight: 2.84kg.
.6 Finish: Prime Paint.
.7 Capacity: 272 kg Door (2 hinges)

2.5 CLEANING AND PAINTING

.1 All steel doors and frames to be thoroughly cleaned of all loose mill scale, rust, spatter, slag, oil, dirt and other foreign materials.

.2 All welds to be ground smooth.

.3 Apply one (1) coat touch-up primer to all bare steel surfaces. Top coat paint finish specified in Section 09 91 23.

3 Execution

3.1 ERECTION

.1 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.2 Provide suitable means of anchorage acceptable to Departmental Representative such as welding, anchor clips, bar anchors, expansion bolts and shields. Use 5 lobe security screws throughout.

.3 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer, after completion of erection.

.4 Modify doors and frames to accept new and salvaged hardware at new location.

3.2 INSTALLATION

.1 Install grille door and HM door, frame and hardware in accordance with reviewed shop drawings, templates, and manufacturer's instructions.

.2 Install existing doors frames and hardware salvaged from removal work in accordance with the original manufacturer's instructions.

.3 Adjust operable parts for correct function.

3.3 CLEANING AND TOUCH UP

.1 Clean all steel work to remove all loose dirt, oil and other foreign materials and touch up any damaged primer coat.

3.4 HARDWARE SCHEDULE

.1 Quantities shown in schedule are for one opening only. Include all security hardware for each door listed, except as noted. See drawings for door layout and arrangement. The following door schedule is repeated in Section 08 71 10:

Item	Door #	Rm to Rm	Door Type	Frame Type	Hardware Description
1	D-100	Exterior to Admission / Discharge AD 100	Detention	2 mm PS	1-1/2 pr institutional butts 1 security deadbolt lock key both sides. 1 escutcheon 1 lock mounting plate with escutcheon with weather cap. (Pull side) 2 pulls See Section 08 71 10 for the following hardware: *1 door bottom seal* *1 set weatherstripping* *1 door closer HO 90°* *1 poly kickplate*
2	D-102	Admission / Discharge AD 100 to Inmate Effects storage AD104	Detention	2 mm PS	1-1/2 pr institutional butts 1 security deadbolt lock key both sides salvaged from existing Admission/Discharge door D-106. 1 escutcheon 1 lock mounting plate with escutcheon. (Pull side) 2 door pulls 1 door bumper See Section 08 71 10 for the following hardware: *1 door closer* *2 poly kickplates*
3	D-108	Inmate Effects Storage AD104 to A&D Office AD 101	Detention	2 mm PS	1-1/2 pr institutional butts 1 security deadbolt lock key both sides. 1 escutcheon 1 lock mounting plate with escutcheon. (Pull side) 2 door pulls 1 door bumper See Section 08 71 10 for the following hardware: *1 door closer* *2 poly kickplates*

Item	Door #	Rm to Rm	Door Type	Frame Type	Hardware Description
4	D-104	Inmate Effects storage AD104 to Staff Washroom AD-103	HM	PS	See Section 08 71 10 for the following hardware: *1 ½ pair 114 x 104 mm template hinges* *1 mortised lockset Best Access storeroom function* *1 door closer*
5	D-105	Corridor AD-106 to Restricted Visiting	Existing Detention (from exist. Restricted Visits Rm)	Exist. 2 mm	1-1/2 pr. existing FM 1 existing security deadbolt lock key one side. 1 existing lock mounting plate with escutcheon. (Pull side) 1 door pull See Section 08 71 10 for the following hardware: *1 door closer*
6	D-106	Corridor AD-106 to Restricted Visiting	Existing Detention (from exist. Restricted Visits Rm)	steel	1-1/2 pr. existing FM hinges 1 new security deadbolt lock key one side. 1 new lock mounting plate with escutcheon. (Pull side) 1 door pull See Section 08 71 10 for the following hardware: *1 door closer*
7	3 Holding Rooms	Admission / Discharge AD 100 to Holding Rooms AD-100A, AD-100B, AD-100C,	Detention Grille doors	PS	3 pr. prison hinges 3 security deadbolt lock key one side. 1 new lock mounting plate with escutcheon. (Pull side)

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions: Submittal Procedures clause and Construction/Demolition Waste Management And Disposal.

.2 Section 09 21 16 - Gypsum Board Assemblies.

.3 Section 09 91 23 - Painting.

1.2 SUBMITTALS

.1 Product Data:
.1 Submit product data in accordance with Section 01 01 50 - General Instructions; Submittal Procedures clause.
.2 Indicate type of door, material, steel core thicknesses, arrangement of hardware and finishes.

.2 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions; Construction/Demolition Waste Management And Disposal clause.

.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 for recycling in accordance with Waste Management Plan.

2 Products

2.1 ACCESS DOORS

.1 Manufactured from sheet steel of 2 mm thickness door, mounted in 1.6 mm thickness formed exposed 20 mm frame flange or drywall bead flange, with one pair spring hinges and cam locks. Two latches on large opening and single cam latch on smaller opening.
.1 Construction: Rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 175 to 180°. .
.2 Materials: Prime painted galvanized coated steel.
.3 Latching: screw driver operated cam latch.
.4 Size 300 X 300 for hand access and minimum 610 x 610 mm for body access.
.5 Acceptable product: Maxam Metal Products Limited, Van-Met Access Doors - Style - exposed flange.

.2 Coordinate with Divisions 21, 23 and 27 for size and location of access doors.

3 Execution

3.1 INSTALLATION

.1 Install access door into gypsum board ceiling, walls etc, in accordance with manufacturer's instructions.

3.2 LOCATION

.1 Location: Ensure that equipment is within view and accessible for operating, inspecting, adjusting, servicing without using special tools.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions: Submittal Procedures, Construction/Demolition Waste and Disposal, Closeout Submittals.

.2 Section 05 50 00 - Metal Fabrication.

.3 Division 26 - Electrical: wiring and power connection.

1.2 REFERENCES

.1 ASTM A 653/A653M - 11, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB).
.1 CAN/CGSB-1.38-2000, Interior Enamel Undercoat.
.2 CAN/CGSB-1.213-95, Etch Primer (Pretreatment Coating) for Steel and Aluminum.

1.3 PERFORMANCE REQUIREMENTS

.1 Provide Rolling steel counter door with power operator and secondary crank operation.

1.4 SUBMITTALS

.1 Product Data:
.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 01 50 - General Instructions; Submittal Procedures clause.

.2 Shop Drawings:
.1 Submit shop drawings in accordance with Section 01 01 50 - General Instructions; Submittal Procedures clause.
.2 Indicate type of coiling counter door, arrangement of hardware, operating mechanism and required clearances.

.3 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for overhead coiling counter door and hardware for incorporation into manual specified in Section 01 01 50 - General Instructions; Closeout Submittal clause.

.2 Submit a written 2 year warranty for materials and workmanship.

1.6 QUALITY ASSURANCE

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Installation by factory approved installers.

.2 Design counter doors for maximum 10 cycles per day and 10,000 cycles for life of the door. Rolling door to operate at a speed of 150 mm per second.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.2 Dispose of corrugated cardboard, polystyrene, plastic packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

.3 Remove from site and dispose of packaging materials at appropriate recycling facilities

.4 Divert unused metal materials from landfill to metal recycling facility approved by Engineer.

2 Products

2.1 COILING COUNTER DOOR

.1 Curtain:
.1 Slats: interlocked flat-faced slats, 31.8 mm high by 9.5 mm deep, 0.76 mm thickness ASTM A 653, Commercial Quality, galvanized steel with a bottom bar constructed of tubular extruded steel measuring 50.8 mm high by 31.8 mm deep.
.2 Fabricate continuous interlocking slat sections with high strength malleable steel endlocks riveted to slat ends per UL requirements.
.3 Slat finish: coating System to include an ASTM A 653 galvanized base coating, bonderized coating for prime coat adhesion, and factory applied thermosetting powder coating applied with a minimum thickness of 2.5 mils. Color selected by the Departmental Representative from standard color chart.
.4 Bottom Bar Finish:
.5 Steel: factory applied baked-on thermosetting powder coat to match the curtain section.

.2 Head and jamb frame:
.1 Stainless Steel: 1.6 mm thickness stainless steel formed shapes.
.2 Finish: Stainless steel: No. 4 finish.

.3 Countertop: stainless steel top specified in Section 05 50 00.

.4 Tube Motor Shaft Assembly:
.1 Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 2.5 mm per meter of width.
.2 Brackets: Fabricate from reinforced 3 mm steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures for hood.
.1 Finish: phosphate treatment followed by baked-on gray polyester powder coat; minimum 0.025 mm cured film thickness; ASTM D3363pencil hardness: H or better.

.5 Hood and mechanism covers: 0.6 mm galvanized steel with reinforced top and bottom edges.

.1 Finish: coating System to include an ASTM A 653 galvanized base coating, bonderized coating for prime coat adhesion, and factory applied thermosetting powder coating applied with a minimum thickness of 2.5 mils. The color shall be selected by the architect and shall be chosen from [standard color chart] [custom color selection].

.6 Locking: slide bolt on coil side of bottom bar at each jamb extending into slots in guides with provision for padlock. Provide interlock switches on motor operated units.

2.2 OPERATION

.1 Tube Motor Operator: rated for a maximum of 10 cycles per day, cULus recognized, rated (50nm) or (100nm) as recommended by door manufacturer for size and type of door, 115 Volts, 1 Phase, 60 Hertz. Provide complete with electric tube motor, maintenance free electric brake, emergency manual crank hoist and control station(s). Protect motor against overload with an auto-reset thermal sensing device. Equip operator with an emergency manual crank hoist.

.1 Disconnect chain shall not be required to engage or release the manual crank hoist.

.2 Operator capable of 10-14 RPM with fully adjustable, mechanical internal worm limit switch mechanism to synchronize the operator with the door:

.1 Automatic closure activated by a local panic button.

.2 Doors to maintain an average closing speed of not more than 300 mm per second during closing. When closure is activated by panic button, electric sensing edge and push button are inoperable.

.3 Doors: fail-safe and close upon power failure.

.4 Resetting of spring tension or mechanical dropouts is not required. Upon restoration of power and door controls immediately reset by opening with the standard push button. The control station(s) and supply of the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions specified in Division 26.

.3 Control Station: Flush mounted, "Open/Close" key switch with "Stop" push button; NEMA 1B. Mount to face of jamb frame.

.4 Panic button: flush mounted switch to "Close" counter door without activating reverse switch.

.2 Provide operator to function with constant pressure close operation.

.1 Tube Motor Operation: Provide the following device to enable momentary contact close operation.

.1 Provide a 2-wire electric sensing edge seal extending full width of door bottom bar. Contact before door fully closes to cause door to immediately stop downward travel and reverse direction to the fully opened position. Provide a self-coiling cable connection to control circuit.

3 Execution

3.1 EXAMINATION

.1 Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.

.2 Inform Departmental Representative if unsatisfactory conditions exists. Commence installation if substrates are acceptable.

3.2 INSTALLATION

.1 Install counter doors in accordance with manufacturer's printed instructions and revised shop drawings.

3.3 ADJUSTMENT

.1 Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.4 FIELD QUALITY TEST

.1 Site Test: Test doors for normal operation and automatic closing. Coordinate with Departmental Representative to witness test.

3.5 CLEANING

.1 Clean surfaces soiled by work as recommended by manufacturer and remove surplus materials and debris from the site.

3.6 DEMONSTRATION

.1 Demonstrate proper operation to Departmental Representative and instruct in maintenance procedures.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions: Submittal Procedures clause and Construction/Demolition Waste Management And Disposal.

.2 Section 07 62 00 - Metal Flashing and Trim.

.3 Section 07 92 10 - Joint Sealing.

.4 Section 08 11 14 - Steel Doors and Frames.

.5 Section 08 80 50 - Glass and Glazing.

1.2 REFERENCED STANDARDS

.1 CAN/CSA-A440-05 Windows.

.2 CAN/CGSB-12.1-M90 Tempered or Laminated Safety Glass.

.3 ASTM C509-06 Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.

.4 ASTM A153/A153M-05 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.3 SUBMITTALS

.1 Submit shop drawings, test reports and maintenance data in accordance with Section 01 01 50.

.1 Indicate materials and details in scale full size for head, jamb and sill, profiles of components, trim, junction between combination units, elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes, fasteners, and caulking.

.2 Provide operation and maintenance data for aluminum windows for incorporation into manual.

2 Products

2.1 MATERIALS

.1 Materials: to CAN/CSA-A440 supplemented as follows:

.1 All aluminum windows by same manufacturer.

.2 Sash: thermally broken.

.3 Main frame: aluminum, thermally broken with nail-on flange.

.4 Glass and glazing materials in accordance with Section 08 80 50, Clause 2.1.3 and its paragraphs.

.5 Sealants: in accordance with Section 07 92 10, colour selected by Departmental Representative.

2.2 WINDOW TYPE AND CLASSIFICATION

.1 Window Types:
.1 Fixed main frame and upper sash, extruded aluminum glazing stop and single laminated glazing.
.2 Main frame with lower vertical sliding sash and upper fixed sash. Opening size to suit x-ray scanner as determined by Departmental Representative.

2.3 FABRICATION

.1 Fabricate in accordance with CAN/CSA-A440 supplemented as follows:
.1 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
.2 Face dimensions detailed are maximum permissible sizes.

.2 Brace frames to maintain squareness and rigidity during shipment and installation.

.3 Finish steel clips and reinforcement with 380 g/m2 zinc coating to CSA G164.

.4 Manufacturer's nameplates on windows are not acceptable.

2.4 ALUMINUM FRAME FINISHES

.1 Provide thermosetting acrylic paint finish meeting or exceeding test requirements of CAN/CSA-A440 or American Architectural Manufacturers Association specification AAMA 603.8 - Voluntary Performance Requirements and Test Procedures for Pigmented Organic Coatings on Extruded Aluminum. Colour as selected by the Departmental Representative.

2.5 ISOLATION COATING

.1 Isolate aluminum from following components, by means of isolation coating:
.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

2.6 GLAZING

.1 Factory glaze windows in accordance with CAN/CSA-A440 with single laminated safety glass, using standard neoprene glazing splines or butyl tape in accordance with manufacturer's instructions.

2.7 HARDWARE

.1 Provide Inside latching device.

3 Execution

3.1 WINDOW INSTALLATION

.1 Install windows in accordance with CAN/CSA-A440. Install trim at three sides of frame on both sides.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Supply and installation of hardware for:
- .1 Section 06 23 00 - Cabinet hardware.
- .2 Section 08 50 50 - Windows.
- .3 Section 08 11 20 - Detention Doors, Frames and Security Hardware except for commercial hardware installed on Detention Doors as noted in this section.

.2 Installation only of hardware for:
- .1 Section 08 11 14 - Steel Door Frames.

1.2 REFERENCE STANDARDS

.1 Standard hardware location dimensions in accordance with the Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by the Canadian Steel Door and Frame Manufacturer's Association

.2 ANSI/BHMA A156.1-2013, Standard for Butts and Hinges.

.3 ANSI/BHMA A156.4-2008, Standard for Door Controls (Closers).

.4 ANSI/BHMA A156.6-2010, Architectural Door Trim.

.5 ANSI/BHMA A156.7-2009, Template Hinge Dimensions.

.6 ANSI/BHMA A156.13-2012 Standard for Mortised Locks and Latches Series 1000.

.7 ANSI/BHMA A156.16- 2013 Auxiliary Hardware.

.8 ANSI/BHMA A156.18-2012 Materials and Finishes.

.9 ANSI/BHMA A156.22-2012, Standard for Door gasketing Systems.

1.3 MAINTENANCE DATA

.1 Brief maintenance staff regarding proper care, cleaning and general maintenance.

.2 Provide maintenance data, parts list, and manufacturer's instructions for each type door closers, locksets, and door holders for incorporation into maintenance manual specified in Section 01 01 50.

1.4 MAINTENANCE MATERIALS

.1 Supply 2 sets of wrenches for door closers in accordance with requirements specified in Section 01 01 50.

1.5 DELIVERY AND STORAGE

.1 Store finishing hardware in locked, clean and dry area.

.2 Package each item of hardware including fastenings separately or in like groups of hardware. Label each package as to item definition and location.

.3 Maintain inventory list with hardware schedule.

1.6 GUARANTEE

.1 Provide a manufacturer's written guarantee stating that the door closers specified in this Section are guaranteed against malfunction for a period of 60 months from the date of Interim Certificate of Completion.

1.7 WASTE DISPOSAL AND MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Waste Management And Disposal clause.

.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.

2 Products

2.1 HARDWARE ITEMS

.1 Only door hardware meeting the requirements of specified standards are acceptable for use on this project, except as specified otherwise.

.2 Use one manufacturer's products only for all similar items.

.3 Hardware material finish codes: ANSI/BHMA A156.18 as indicated.

2.2 DOOR HARDWARE

.1 Co-ordinate door hardware listing with Door, Frame and Hardware Schedule.

.2 Hinges and butts:
.1 Hinges: to ANSI/BHMA A156.1 type, numbers and sizes listed in hardware schedule, full mortise template hinges finished to 626.
.2 Hinges on selected doors to be **"NRP"** Type (non-removable-pin) as scheduled.
.3 All hinges with minimum leaf thickness of 3.4 mm and of 5 knuckle 2 ball bearing.

.3 Lock sets:
.1 Mortise locksets: to ANSI/BHMA A156.13 , Series 1000 mortise lock, Grade 1 operational, Grade 2 security, designed for function and keyed as stated in Hardware Schedule. Acceptable product Best Access Series 45H.
.2 Lever handles: plain design with Return.
.3 Escutcheons: round roses for locksets without deadbolts.
.4 Normal strikes: box type, lip projection not beyond jamb.

.5 Cylinders: key into keying system as directed.
.6 Finish to 626.

.4 Closers: provide adjustable backcheck for 90° to 180° opening. Finish to be 628 satin aluminum, powder coated finish.
.1 Surface mounted overhead door closers: to ANSI/BHMA A156.4, door mounted, top jamb or parallel mounted, non-handed, non-sized with site adjustable spring tension from size 2-6, with heavy duty forged steel arms, full rack and pinion hydraulic action, adjustable closing speed, adjustable back-checking action, high strength cast iron cylinder walls with stable hydraulic fluid to make winter/summer adjustments unnecessary.
.2 Provide through bolts for attachment to doors. Closer housing of smooth rectangular design approximately 90 mm high.
.3 Finish to C28 in lacquer or polyester powder coat finish.
.4 Provide closers with the following accessories as noted in schedule.
.1 PA: Parallel arm.
.2 HO: Hold Open with Stop Arm
.5 Products with universal mounting and adjustments to take into account changing door configurations.

.5 Normal strikes: box type, lip projection not beyond jamb, ANSI dimensions, finish to match lockset.

.6 Weatherstripping:
.1 Door bottom seal: weather seal with drip cap of 32 mm high aluminum frame and replaceable nylon brush weather seal, surface mounted on exterior door as indicated in schedule. Pemko 3452CN.
.2 Jamb seals: adjustable trim of aluminum extrusion minimum 20 x 6 mm with EPDM sponge insert, Pemko # 305R.
.3 Thresholds: to indicated width x full width of door opening, aluminum extruded mill finish, fluted surface, fitted to door frame opening size and profile, with thermal break, maximum 12 mm rise, one or two piece.

.7 Architectural door trim:
.1 Door stops: to ANSI/BHMA A156.16, L02141 floor mounted, L02101 wall mounted concealed fastening and for exterior doors 75 mm high stops with two fasteners, 626 or 630 finish.
.2 Poly sheet kick plate: 10 mm thickness polyethylene x 1000 h x 50 mm less than door width, installed one or both sides of door as indicated.

2.3 KEYING

.1 Order all <u>permanent</u> cylinders for all locks.
.1 Provide BEST INTERNATIONAL LTD. 7-pin removable core system to match keyway for Kent Institution.
.2 Departmental Representative will arrange for installation of permanent cylinders after final completion of Contract. Submit keying schedule for approval.
.3 Provide new mortised lockset, with removable core cylinder and construction core.

2.4 DOOR SCHEDULE

.1 Quantities shown in schedule are for one opening only. Include all commercial hardware for each door listed, except as noted. See drawings for door layout and arrangement. The following door schedule is repeated in Section 08 11 20:

Item	Door #	Rm to Rm	Door Type	Frame Type	Hardware Description
1	D-100	Exterior to Admission / Discharge AD 100	Detention	2 mm PS	1 door bottom seal 1 set weatherstripping 1 door closer HO 90° 1 poly kickplate See Section 08 11 20 for the following security hardware: *1-1/2 pr institutional butts* *1 security deadbolt lock key both sides.* *1 escutcheon* *1 lock mounting plate with escutcheon with weather cap. (Pull side)* *2 pulls*
2	D-102	Admission / Discharge AD 100 to Inmate Effects storage AD104	Detention	2 mm PS	1 door closer 2 poly kickplates See Section 08 11 20 for the following security hardware: *1-1/2 pr institutional butts* *1 security deadbolt lock key both sides salvaged from existing Admission / Discharge door D-106.* *1 escutcheon* *1 lock mounting plate with escutcheon. (Pull side)* *2 door pulls* *1 door bumper*

Item	Door #	Rm to Rm	Door Type	Frame Type	Hardware Description
3	D-108	Inmate Effects Storage AD104 to A&D Office AD 101	Detention	2 mm PS	1 door closer 2 poly kickplates See Section 08 71 10 for the following security hardware: *1-1/2 pr institutional butts* *1 security deadbolt lock key both sides.* *1 escutcheon* *1 lock mounting plate with escutcheon. (Pull side)* *2 door pulls* *1 door bumper*
4	D-104	Inmate Effects storage AD104 to Staff Washroom AD-103	HM	PS	1 ½ pair 114 x 104 mm template hinges 1 mortised lockset Best Access storeroom function 1 door closer
5	D-105	Corridor AD-106 to Restricted Visiting	Existing Detention (from exist. Restricted Visits Rm)	Exist. 2 mm	1 door closer See Section 08 11 20 for the following security hardware: *1-1/2 pr. existing FM* *1 existing security deadbolt lock key one side.* *1 existing lock mounting plate with escutcheon. (Pull side)* *1 door pull*
6	D-106	Corridor AD-106 to Restricted Visiting	Existing Detention (from exist. Inmate Effects Storage Rm)	PS	1 door closer See Section 08 11 20 for the following security hardware: *1-1/2 pr. existing FM hinges* *1 new security deadbolt lock key one side.* *1 new lock mounting plate with escutcheon. (Pull side)* *1 door pull*

Item	Door #	Rm to Rm	Door Type	Frame Type	Hardware Description
7	3 Holding Rooms	Admission / Discharge AD 100 to Holding Rooms AD-100A, AD-100B, AD-100C,	Detention Grille doors	PS	See Section 08 11 20 for the following security hardware: *3 pr. prison hinges* *3 security deadbolt lock key one side.* *1 new lock mounting plate with escutcheon. (Pull side)*

3 Execution

3.1 INSTALLATION

.1 Install hardware in accordance with manufacturer's printed instructions.

.2 Re-adjust doors and hardware to function properly just prior to interim acceptance of building.

3.2 DEMONSTRATION

.1 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 Use, application and storage of wrenches for door closers, locksets, and power operating hardware.

.2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.3 CLEANING

.1 Perform cleaning after installation to remove construction and accumulated environmental dirt.

.2 Clean hardware with damp cloth and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions.

.3 Remove protective material from hardware items where present.

.4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 05 50 00 - Metal Fabrications.

.2 Section 08 11 14 - Steel Doors and Frames.

.3 Section 08 11 20 - Detention doors, Frames and Security Hardware.

.4 Glazing of:
.1 Framed mirrors - Section 10 28 10.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
.2 CAN/CGSB-12.8-97 Insulating Glass Units.
.3 CAN/CGSB12.12-M90 Plastic Safety Glazing.
.4 CAN/CGSB-19.13-M87 Sealing Compound, One-Component, Silicone Base, Solvent Curing.

.2 UL Environmental Standard.
.1 Sustainability for Sealants and Caulking Compounds, Standard 2761, Edition 1 October 03, 2011.

.3 Glass Association of North America (GANA).
.1 GANA Glazing Manual - 50th Anniversary Edition (2008).
.2 Laminated Glazing Reference Manual, 2009 Edition.

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements:
.1 Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.
.2 Size glass to withstand wind loads, dead loads and positive and negative live loads acting normal to plane of glass to a design pressure for locality as measured in accordance with ANSI/ASTM E330.
.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

1.4 SUBMITTALS

.1 Submit shop drawings or catalogue illustrations of accessories in accordance with Section 01 01 50 - General Instructions for submittals.

.2 Provide maintenance data for plastic glazing for incorporation into Operation and Maintenance Manual specified in Section 01 01 50 - General Instructions for closeout submittals.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions; Construction/Demolition Waste Management And Disposal clause.

.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 for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Divert unused wood materials from landfill to either recycling, reuse or composting facility.

2 Products

2.1 GLASS MATERIALS

.1 Float glass (annealed): to CAN/CGSB 12.3M, glazing quality of thickness indicated.

.2 Insulating glass units:
.1 Factory sealed double glazed units for exterior windows and doors: to CAN/CGSB 12.8M, double glazed sealed unit with two panes of 6 mm tempered safety glass with 12 mm air space, to 24 mm total thickness.

.3 Safety glass:
.1 Tempered: to CAN2 12.1M, Type 2, tempered, Class B float of minimum 6 mm thickness, category I.
.2 Laminated glass to CAN2 12.1M, of minimum 7 mm thickness (two layers of minimum 3 mm annealed glass with 1.52 (0.060") mm PVB interlayer).

2.2 GLAZING AND SEALING COMPOUND MATERIALS

.1 Sealant compound: glazing sealant: purpose made for glazing use, compatible with hermetically sealed insulating glass units sealants, colours selected by Departmental Representative where exposed to view.

.2 Glazing tape: Preformed macro-polyisobutylene tape with continuous integral Neoprene shim, paper release, black colour, width x thickness recommended by sash manufacturer to suit installation.

.3 Setting blocks: Setting blocks: Neoprene or EPDM, 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.

.4 Spacer shims: neoprene, 40-60 Shore "A" durometer hardness as required.

3 Execution

3.1 WORKMANSHIP

.1 Install products using the recommendations of manufacturers of glass, sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those in the "GANA Glazing Manual".

.2 Remove protective coatings and clean contact surfaces with solvent and wipe dry.

.3 Apply primer-sealer to contact surfaces.

.4 Place setting blocks as per manufacturer's instructions.

.5 Install glass, rest on setting blocks, ensure full contact and adhesion at perimeter.

.6 Install removable stops, without displacing tape or sealant.

.7 Provide edge clearance of 3 mm minimum for glass in accordance with manufacturer's instructions.

.8 Insert spacer shims to centre glass in space. Place shims at 600 mm oc and keep 6 mm below sight line.

.9 Apply cap bead of clear silicone sealant at exterior void and between stop and glazing.

.10 Apply sealant to uniform and level line, flush with sight line and tooled or wiped with solvent to smooth appearance.

.11 Do not cut or abrade laminated, heat treated and tempered glass.

3.2 INSTALLATION: INTERIOR/EXTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with IGMAC and GANA Glazing Manual for glazing installation methods.

.2 Cut glazing tape to length; install on glazing light. Seal corners by butting tape and sealing junctions with sealant.

.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 fixed stop with sufficient pressure to attain full contact.

.5 Install removable stops without displacing glazing tape. Exert pressure for full continuous contact.

.6 Trim protruding tape edge.

.7 Exterior glazing: fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

3.3 HOLDING ROOM GLAZING

.1 Screen panel:
.1 Install 6 mm tempered glass screen as indicated on drawings. Install glazing as per clause 3.2 and fasten 25 x 25 x 3 mm steel angles screwed to HSS frame with screws as specified in Section 05 50 00.

.2 Ceiling glazing:
.1 Mount 6 mm tempered glass in aluminum channel sash frame, with mitred corners, embedded in silicone sealant or with vinyl glazing splines. Install framed glass sash, above center Holding Room, on top of grillework and fasten in place with 12 x 12 mm clip angles srewed to channel frame and HSS frame at four locations. Glass sash frame to overlap steel HSS frame 10 mm on all sides.

3.4 FINISHING

.1 Immediately remove sealant and compound droppings from finished surfaces. Remove labels after work is completed.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 05 50 00 - Metal Fabrications for expanded sheet steel.

.2 Section 08 11 14 - Steel Doors and Frames.

.3 Section 08 31 19 - Access Doors.

.4 Section 09 22 16 - Non-Structural Metal Framing

.5 Division 23 - Trim for recessed mechanical fixtures.

1.2 REFERENCED STANDARDS

.1 ASTM C475 / C475M - 12 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.2 ASTM C840 - 13 Standard Specification for Application and Finishing of Gypsum Board.

.3 ASTM C 919 - 12 Standard Practice for Use of Sealants in Acoustical Applications.

.4 ASTM C954 - 11 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.5 ASTM C1002 - 07(2013) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.6 ASTM C1047 - 10a Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.7 ASTM C1186 - Specification for Flat Non-Asbestos Fibre-Cement Sheets

.8 ASTM C1396 / C1396M - 14 Standard Specification for Gypsum Board.

.9 ASTM C1288 - 99(2010) - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets,

.10 ASTM E119 - 12a - Standard Test Methods for Fire Tests of Building Construction and Materials

2 Products

2.1 GYPSUM BOARD

.1 Plain: to ASTM C 1396, 12.7 mm thick for walls and 15.9 mm thickness for ceilings and columns, standard board1220 mm wide x maximum practical length, ends square cut, edges tapered.

2.2 CEMENT BOARD

.1 Non-combustible when tested in accordance with ASTM test Method E136 and CAN4_S114 for noncombustibility and maximum flame spread rating of 5 and smoke developed classification of 10 to CAN/ULC-S102.

.1 Wall panel: to ASTM C 1288, of 90% Portland cement and sand with selected additives. Contains no asbestos, gypsum, glass fibers or formaldehyde, minimum 10.7 mm thickness, 915 mm wide x length 1530 or to suit application, smooth face.

.1 Surface Burning Characteristics: tested in accordance with ASTM test method E-84: Flame Spread- 0; Fuel Contributed- 0; Smoke Developed- 5.

2.3 FASTENINGS AND ADHESIVES

.1 Steel drill screws: to ASTM C 1002, ASTM C 954, galvanized for exterior use and in shower areas and washrooms.

.2 Stud adhesive: to CAN/CGSB 71.25M.

2.4 ACCESSORIES

.1 Casing beads, corner beads fill type: 0.5 mm base thickness commercial grade sheet steel to ASTM C1047 with ZF75 wiped zinc finish

.2 Acoustic sealant: to ASTM C 919.

.3 Gypsum board joint compound: ASTM C 475, asbestos-free.

.4 Cement board joint treatment:

.1 Fibreglass tape x 50 mm wide.

.2 Filler compound: Tile thinset as recommended by Cement Board manufacturer.

3 Execution

3.1 ERECTION

.1 Refer to drawings for wall type assemblies with gypsum board.

.1 For wall types with expanded sheet steel mesh and cement board, apply gypsum board on opposite side of stud wall that mesh and cement board are applied. Some walls with mesh have gypsum board both sides. Refer to wall types for material configuration and location as indicated on floor plan A 200.

.2 Studs with mesh in walls are heavy gauge and spaced less than 400 oc. See section 09 22 16 and wall types on Floor Plan.

.2 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.

.3 Install cement board, tape and fill joints in accordance with cement board manufacturer's instructions.

.4 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C 840 except where specified otherwise.

.5 Install work level to tolerance of 1:1200.

.6 Frame with furring channels, perimeter of openings for access doors, light fixtures, diffusers, grilles. Check clearances with equipment suppliers.

.7 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.8 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.

.9 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.10 Furr HSS columns, to receive 2 layers of gypsum board where indicated.

3.2 GYPSUM BOARD APPLICATION

.1 Do not apply gypsum board until framing and strapping, anchors, blocking, electrical and mechanical work are approved.

.2 Apply single layer of specified gypsum board to framing using screw fasteners. Maximum spacing of screws 300 mm oc.

.3 Apply 12 mm diameter bead of acoustic sealant to walls/ceilings, to perimeter of Staff Washroom walls, continuously around periphery of each face of gypsum board to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, pipes, in partitions where perimeter sealed with acoustical sealant.

.4 Apply double layer of gypsum board at all exposed HSS columns as indicated, using adhesive, laminating compound and screws.

3.3 ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm oc.

.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.

3.4 ACCESS DOORS

.1 Install access doors to access electrical and mechanical junction boxes and valves etc., specified in respective Sections.

.2 Rigidly secure frames to furring or framing systems.

3.5 TAPING AND FILLING

.1 Finish face panel joints and internal angles of exposed gypsum board with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.2 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.3 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:

.1 Level of finish for concealed surfaces:

.1 Level 1: Embed tape for joints and interior angles in joint compound. Surfaces to be free of excess joint compound; tool marks and ridges are acceptable.

.2 Level of finish for exposed painted surfaces:

.1 Level 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories.

.4 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.5 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General instructions for Waste Management And Disposal.

.2 Section 06 11 10 - Rough Carpentry; for blocking and wall backing.

.3 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
.1 ASTM A 653/A653 M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A1003 / A1003M - 13b Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
.3 ASTM C 645-13, Specification for Nonstructural Steel Framing Members.
.4 ASTM C 754-11, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Canadian Standards Association (CSA)
.1 CSA W59-03(R2003), Welded Steel Construction (Metal Arc Welding).

1.3 SYSTEM REQUIREMENTS

.1 Performance Requirements: Fabricate and install systems as indicated but not less than that required to comply with ASTM C754 under the following conditions:
.1 Gypsum board partitions:
.1 Standard systems: Maximum deflection of l/240 of partition height.
.2 Interior suspended ceilings and bulkheads: Maximum deflection of l/360 of distance between supports.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Waste Management And Disposal, and with Waste Reduction Workplan.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal all paper, plastic, polystyrene, corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Immediately remove from site and transport to reclamation point.

2 Products

2.1 MATERIALS

.1 Non-loadbearing channel stud framing:
.1 Lightweight interior studs: to ASTM C645, depths indicated or scheduled, roll formed using minimum 0.53 mm base metal thickness hot-dipped galvanized or electro-galvanized sheet steel, with knurled faces for screw attachment of finishes to follow, knock-out service holes at 460 mm centers.
.2 Heavy duty interior studs: to ASTM A 653/A653M, grade D, ZF75 zinc coating designation, to depths indicated or scheduled, roll formed using minimum 1.6 mm base metal thickness sheet steel, for attachment of sheet steel by welding, knock-out service holes at 460 mm centers.

.2 Floor and top brackets:
.1 For lightweight interior studs: to paragraph 2.1.1, thickness to match studs, widths to accept stud depths x 32 mm flange height.
.2 For heavy duty interior studs: to paragraph 2.1.2, thickness to match studs, widths to accept stud depths x 32 mm flange height.

.3 Metal channel stiffener: 19 mm size x 2 mm base metal thickness and as detailed 1.4 mm thick cold rolled steel channel profile coated with rust inhibitive coating.

.4 Fasteners:
.1 Hardened steel power driven nails or drilled in Tapcon type screws for fastening into concrete.
.2 Welding in accordance with Section 05 50 00.

3 Execution

3.1 ERECTION

.1 Install metal framing systems to ASTM C 754. Restrain system to support gravity and lateral loads.

.2 Align partition tracks at floor and u/s structural elements (deck, joists and beams) and secure at 610 mm o.c. maximum except as noted otherwise.

.3 Place lightweight steel studs vertically at 406 mm o.c. in top and bottom track, and not more than 50 mm from abutting walls, and at each side of openings and corners.
.1 Cross brace steel studs as required to provide rigid installation.
.2 Fasten top track to ceiling suspension system or structure as indicated.
.3 Allow for 3 mm clearance for deflection between top track and stud.
.4 Fasten each stud to top and bottom tracks with screws, pop-rivets, by crimping or other approved method.

.4 Place heavy duty studs, supporting security mesh, vertically at 302 mm o.c. in top and bottom track, and not more than 50 mm from abutting walls, and at each side of openings and corners.
.1 Fasten bottom track to concrete using approved anchors, spaced 610 mm oc.
.2 Fit studs within top track without fastening allowing for 6 mm clearance for deflection.

.3 Fasten top track to structure.

.4 Fasten expanded sheet steel mesh panels to walls indicated, welded to HD studs along each stud and at maximum 300 mm oc and at bottom track. Install expanded sheet steel panels with long dimension of panel perpendicular to studs. Butt ends of panels at studs to accommodate stitch welds. All joins between sheet panels to occur at studs.

.5 Erect studs to 1:1000 tolerance.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Cut studs short, by 3 mm and for structural steel deflection use double, nesting top track below structural steel elements. Structural steel deflection must occur within top tracks and must not transfer deflection loads onto studs. Fasten top track to structural steel component and install nesting track into top track without fastening and allowing for 6 mm deflection.

.8 Co-ordinate erection of studs with installation of special supports or anchorage for work specified in other Sections.

.9 Provide continuous horizontal channel reinforcement at 1220 mm above finished floor.

.10 Provide either 40 mm stud, solid 19 mm plywood in accordance with Section 06 11 10, or furring channel secured between studs for attachment of fixtures and wall mounted door stops, attached to steel stud partitions.

.11 Install steel studs or furring channel between studs for attaching electrical and other device boxes.

.12 Extend partitions to structure above except where noted otherwise on drawings.

3.2 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General instructions for Waste Management And Disposal.

.2 Section 09 21 16 - Gypsum Board Assemblies.

.3 Section 23 37 13 - Diffusers, Grilles, & Registers; trim for recessed mechanical fixtures.

.4 Section 26 50 00 - Lighting Equipment; rim for recessed light fixtures.

1.2 REFERENCE STANDARDS

.1 ASTM C635 / C635M - 13a Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

.2 ASTM C636/C636M-13 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

.3 ASTM E580 / E580M - 14 Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

.4 CAN-ULC S102-10 - Standard Test Method for Burning Characteristics of Building Materials and Assemblies.

1.3 DESIGN CRITERIA

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

.2 Seismic Performance: Provide acoustical ceiling system that has been engineered by an independent party and found to be compliant with the NBCC Part 4 or to 2003 International Building Code, Seismic Category D.

1.4 SAMPLES

.1 Submit duplicate 300 x 300 mm samples of acoustical units in accordance with Section 01 01 50.

1.5 MAINTENANCE MATERIALS

.1 Deliver acoustical units for maintenance use amounting to 2% of gross ceiling area for each pattern and type required for project in accordance with Section 01 01 50. Store where directed and identify contents.

.2 Maintenance materials to be same production run as installed materials.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions; Construction/Demolition Waste Management And Disposal clause.

.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 for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Divert unused wood materials from landfill to either recycling, reuse or composting facility.

2 Products

2.1 MATERIALS

.1 Intermediate duty system to ASTM C635.

.2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated.

.3 Suspension system: non fire rated, made up as follows:
.1 Two directional exposed tee bar grid.

.4 Exposed tee bar grid components: shop painted satin sheen white. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.

.5 Hanger wire: galvanized soft annealed steel wire, 2.6 mm diameter.

.6 Hanger inserts: purpose made.

.7 Accessories: splices, clips, wire ties, retainers and wall moulding flush reveal, to complement suspension system components, as recommended by system manufacturer.

.8 Acoustic units for suspended ceiling system, to CAN/CGSB-92.1M:
.1 Type 3, mineral composition with standard painted finish.
.2 Pattern D fissure size "F", non-directional, with tegular edge and 24 mm wide reveal across middle of tile.
.3 Flame spread rating of 25 or less.
.4 Smoke developed 50 or less.
.5 Noise reduction coefficient (NRC) designation of 0.50 to 0.60.
.6 STC rating: minimum 35.
.7 Light reflectance: minimum 75%.
.8 Edges: square.
.9 Colour: factory white finish.
.10 Size: Imperial 610 x 1220 x 19 mm thick.
.11 Shape: flat.

3 Execution

3.1 ACOUSTICAL CEILING INSTALLATION

.1 Install suspension system to manufacturer's instructions and according to ASTM C636, and ASTM E580 for seismic restraint. Ensure that hangers do not obstruct or damage tile during removal and replacement of individual tiles.

.2 Do not erect ceiling system until work above ceiling has been approved by Departmental Representative.

.3 Lay out system according to reflected ceiling plan.

.4 Ensure suspension system is co-ordinated with location of related components.

.5 Install wall mould to provide correct level ceiling heights.

.6 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers, grilles and speakers.

.7 Support light fixtures diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.8 Frame openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.9 Interlock cross members to main runners to provide rigid assembly.

.10 Make finished ceiling systems square to adjoining walls and level to tolerance of 1:1000.

.11 Install acoustical panels in ceiling suspension system.

.12 Scribe acoustical units to fit adjacent work. Butt joints tight, install wall mould at junction of acoustical ceilings and other construction to entire length of such junctions.

.13 Provide tegular edge at all edges of tile cut to size and supported by wall angles. Duplicate tegular edge, in depth and width profile, using sharp utility knife and steel straight edge. Paint exposed cut edges white to match tile finish with approved paint.

3.2 CLEANING

.1 Touch up scratches, abrasions, voids and other defects in system finish.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions: Submittal Procedures clause and Construction/Demolition Waste Management And Disposal.

.2 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

.1 ASTM E 84-05, Standard Test Method for Surface Burning Characteristics of Building Materials. CLASS A

.2 ASTM D5420, Gardner Impact Exceeds 160 inch pounds

.3 CAN-ULC S102-07 - Standard Test Method for Burning Characteristics of Building Materials.

1.3 SUBMITTALS

.1 Provide maintenance data for wall covering for incorporation into maintenance manual specified in Section 01 01 50.
.1 Submit a layout diagram indicating the location of each panel and joining method.

.2 Submit duplicate 152 x 76 mm samples of wall covering for colour selection by Departmental Representative in accordance with Section 01 01 50.

.3 Quality Assurance Submittals: Submit the following:
.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
.2 Manufacturer's Instructions: current published manufacturer's installation and maintenance instructions.

1.4 CLOSEOUT SUBMITTALS

.1 Submit the following Operation and Maintenance Data:
.1 For installed products in accordance with Section 010150 General Instructions Closeout Submittals.
.2 Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

1.5 QUALITY ASSURANCE

.1 Installer Qualifications:
.1 Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
.1 Training: Installer has attended the wall covering installation training clinic.

.2 Mock-ups:
.1 Provide sample of wall covering showing internal corner joint, lap joins and termination at wall base.

.2 Sample can be mocked-up at construction site, using specified products and manufacturer approved installation methods and may be incorporated into final construction as approved by Departmental Representative.

.3 Obtain Departmental Representative's acceptance of finish color, texture and pattern, and workmanship standards.

.3 Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.6 DELIVERY AND STORAGE

.1 Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

.2 Deliver, store and handle vinyl wall covering in accordance with Section 010150 - General Instructions for basic material requirements.

.3 Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

.4 Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

.5 Store panels in temperature controlled environments. Leave protective film on panel until ready to use.

.6 Store panels flat and pre-conditioned a minimum of 24 hours in ambient temperatures similar to the prevailing operational conditions.

.7 Store panels on a level flat surface off the ground (risk of condensation on the panels if stored on damp surfaces). Storage on uneven surfaces could cause the panels to distort prior to installation.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Air temperature and structural base temperature at wall covering installation area must be between 18 to 26°C for 72 h before, during and 48 h after installation.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions; Construction/Demolition Waste Management And Disposal clause.

.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 for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.5 Divert unused wood materials from landfill to either recycling, reuse or composting facility.

2 Products

2.1 MATERIALS

.1 Hygienic vinyl wall covering: 100% pure vinyl, extruded, semi-rigid, homogenous PVC sheet containing no plasticizers or fillers
.1 Thickness: 2.5 mm, panel width: 1.22mm, panel height: either 2.5m or 3m, weight 1.2 x 2.4 m panel: 10.4 kg and 1.2 x 3 m panel:12.7 kg.

.2 Accessories:
.1 Provide vinyl rod produced by the manufacturer of the vinyl wall covering and intended for heat welding of seams. Color compatible with field color of wall panels as selected by Departmental Representative.

.3 Joint Strips:
.1 1-Part joint strip – colour and length to suit panel length.
.2 2-Part joint strip – colour and length to suit panel length.

.4 Start and Edge Trim:
.1 1-Part start and edge strip – colour and length to suit panel length.
.2 2-Part start and edge strip – colour and length to suit panel length.

.5 Stainless Steel Accessories:
.1 Stainless Steel Corner Protector –brushed finish, size 100 mm x 65 x 65 mm.
.2 1-Part Stainless Steel Joint Strip – brushed finish, length 2134.
.3 Stainless Steel Capping – brushed finish, length 2440.

.6 Adhesive:
.1 Acrylic Adhesive: for dry, climate controlled areas, a one-part, water-based, acrylic adhesive as recommended by manufacturer.
.2 Polyurethane Adhesive: The default adhesive for most installations, suitable for wet area, non-climate controlled areas, and non-absorbent surfaces, a two-part resin-based polyurethane adhesive as recommended by manufacturer.

.7 Caulking and mastic compounds and tools:
.1 FlexiJoint Coil – [FJ101/white] [FJ* Colors] Length 164 linear feet
.2 FlexiJoint Steel Spacers (engineered steel)
.3 Parabond Mastic – [AP600] 10 oz
.4 Altro Mastic Caulking – [A802 White/A803 Clear/A806* Colors) 10.5 oz

2.2 SOURCE QUALITY

.1 Obtain wall products from a single manufacturer.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's product data, including product technical bulletins, product catalog, installation instructions and product label instructions for installation.

3.2 EXAMINATION

.1 Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 SUBSTRATE PREPARATION

.1 Remove ridges and bumps from existing masonry wall surfaces.

.2 Ensure cement board walls and gypsum board ceilings are smooth and level. Remove high points must be removed and low points filled with filler intended for the substrate and environmental conditions.

.3 Ensure surfaces are permanently dry and free from all substances that may contribute to adhesive bond failure.

.4 Remove loose paint and conduct an adhesive bond test with paint.

.5 Surfaces must be paint ready.

3.4 PREPARATION

.1 Clean all surfaces to receive vinyl covering, free from dust prior to installation.

.2 Ensure the working environment is dust free. Failure to comply with these conditions will reduce the bond strength between the adhesive and substrate, and may cause panels to debond.

.3 Apply a PVA sealer to gypsum board and cement board surfaces a minimum of 12 hours prior to the installation of vinyl covering panels.

.4 All electrical switches, power points etc., should be in a rough-in condition with only wiring installed and not connected to power source.

.5 All plumbing should be roughed in and "tails" left protruding from the substrate ready for installation of vinyl covering panels with openings drilled for protruding plumbing lines. Drill all holes in panels 3mm oversize to pipe size and fixing bolts to allow for expansion, and seal with mastic caulking. Allow 3 mm to 4 mm oversize holes at hot pipes.

.6 Ensure door frames are in place prior to installation of vinyl panels.

.7 Sealant used in vinyl wall covering system is non paintable.

.8 Prior to installation check the room using a 2 m level to ensure all walls are flat, paying particular attention to the corners, reveals, and door frames. Ensure room surfaces are free of any debris or irregularities, which could prevent the panels laying flat to the substrate after the adhesive has been applied and the panel installed.

3.5 HYGIENIC SHEET VINYL WALL COVERING APPLICATION

.1 Install vinyl covering over walls and ceiling surfaces indicated, in accordance with the current published installation instructions. Install joins by approved methods as detailed in the installation instructions.

.2 Seal open joints adjacent to other materials using approved sealant as recommended by wall covering manufacturer.

.3 Terminate wall covering at epoxy floor base.

3.6 SCHEDULE OF FINISHES

.1 Room AD 105: wall and ceiling surfaces.

.2 Room AD 103: wall and ceiling surfaces.

3.7 FIELD QUALITY REQUIREMENTS

.1 Manufacturer's Field Services:
.1 Provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.2 Site Visits: minimum two visits, one at start up meeting specified in para. 1.5.3 and one site visit on final day of installation.
.3 Submit inspection report to Departmental Representative following second inspection.

3.8 PROTECTION OF FINISHED WORK

.1 Protective covering to remain on wall covering surface until just prior to final cleaning. Protect room from damage by other trades.

3.9 CLEANING

.1 Cleaning:
.1 Remove protective film and clean all surfaces down with antistatic solution or antistatic wipes.

.2 Clean installed products in accordance with manufacturer's instructions prior to occupancy.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - Submittal Procedures, Waste Management And Disposal.

.2 Section 05 50 00 - Metal Fabrications.

.3 Section 06 23 00 - Millwork and Cabinet Fabrications

.4 Section 09 96 59 - Seamless Epoxy / Quartz Flooring.

1.2 DESCRIPTION OF WORK

.1 Refer to notes and finish schedule on drawings for finishing of new work and existing surfaces.

1.3 REFERENCES

.1 American Society for Testing and Materials (ASTM):
.1 ASTM D 3960-05(2013), Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.

.2 Architectural Painting Specifications Manual, Master Painters Institute (MPI).

.3 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 (for Surface Coatings) of the Environmental Protection Agency (EPA).

.4 National Fire Code of Canada.

1.4 QUALITY ASSURANCE

.1 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.

.2 Conform to latest MPI requirements for interior painting work including preparation and priming.

.3 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.

.4 Standard of Acceptance:
.1 Walls: No defects visible from a distance of 1000 mm at 90° to surface.
.2 Bulkheads/Ceilings: No defects visible from 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.

1.5 SAMPLES

.1 Submit sample colours of each paint type specified in accordance with Section 01 01 50.

.2 Submit duplicate mm sample panels of each paint, stain, clear coating, special finish, type colour texture specified.

.3 Submit full range of available colours where colour availability is restricted.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 01 50.

.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 Observe manufacturer's recommendations for storage and handling.

.5 Store materials and supplies away from heat generating devices.

.6 Store materials and equipment in a well ventilated area with temperature range 7° C to 30° C.

.7 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.8 Remove paint materials from storage only in quantities required for same day use.

.9 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.10 Fire Safety Requirements:
- .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
- .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
- .3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.7 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

.1 Provide paint products meeting MPI "Environmentally Friendly"E2, E3 rating based on VOC (EPA Method 24) content levels.

1.8 SITE REQUIREMENTS

.1 Heating, Ventilation and Lighting:

.1 Ventilate enclosed spaces in accordance with Section 01 01 50.
.2 Perform no painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 ° C for 24 hours before, during and after paint application until paint has cured sufficiently.
.3 Where required, provide continuous ventilation for seven days after completion of application of paint.
.4 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.
.5 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.
.6 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities is provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
.1 Unless specifically pre-approved by the specifying body, Paint Inspection Agency and the applied product manufacturer, perform no painting work when:
.1 Ambient air and substrate temperatures are below 10 ° C.
.2 Substrate temperature is over 32 ° C unless paint is specifically formulated for application at high temperatures.
.3 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
.2 Perform no painting work when the maximum moisture content of the substrate exceeds:
.1 15% for wood.
.2 12% for gypsum board.
.3 Conduct moisture tests using a properly calibrated electronic Moisture Meter.
.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.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 Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

1.9 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 form Departmental Representative for any changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about the occupied building.

1.10 WASTE MANAGEMENT

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - Waste Management And Disposal.

.2 Non-water based opaque and transparent 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 Provincial Ministries of Environment 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 employees, individuals, or organizations for verifiable re-use or re-manufacturing.

2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Paint materials for paint systems shall be products of a single manufacturer.

.3 Only qualified products with E2, E3 "Environmentally Friendly" rating are acceptable for use on this project.

.4 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

2.2 COLOURS

.1 Departmental Representative will provide Colour Scheme after Contract award.

.2 Where specific products are available in a restricted range of colours, selection will be based on the limited range.

.3 Second coat in a three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.

.2 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 MPI values:

loss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 max.
G2	Velvet finish	0 to 10	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 min.
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
	High-Gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete Masonry Units:
- .1 Prepare existing surfaces to manufacturer's instructions.
- .2 INT 4.2D High performance architectural latex G4 finish.

.2 Gypsum Board wall surfaces:
.1 INT 9.2A Latex G4 finish (over latex sealer).

.3 Gypsum Board ceilings surfaces:
.1 INT 9.2A Latex G1 finish (over latex sealer).

.4 Metal doors, frames and PS glazing frames, miscellaneous metal:
.1 INT 5.1R High performance architectural latex coating G4 gloss level.

.5 Security Steel, including Holding rooms framework/grille and plate walls and window bar/grilles:
.1 INT 5.1Y Epoxy high build low gloss finish (over primer).

.6 Existing surfaces:
.1 Prepare existing surfaces to manufacturer's instructions.
.2 INT 5.1R High performance architectural latex coating G4 gloss level.

.7 Hardwood trim:
.1 INT 6.4M Water based, varnish clear finish, G4 gloss level.

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. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
.1 Gypsum Board: 12%.
.2 Wood: 15%.

3.3 PROTECTION

.1 Protect interior building surfaces not to be painted from paint spatters, markings and other damage. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Cover or mask windows and other ornamental hardware adjacent to areas being painted to prevent damage and to protect from paint drops and splatters. Use non-staining coverings.

.3 Protect items that are permanently attached such as Fire Labels on doors and frames.

.4 Protect factory finished products and equipment.

.5 Remove electrical cover plates, light fixtures, surface hardware on doors, accessories and other surface mounted equipment, fittings and fastenings prior to undertaking any painting operations by General Contractor. Securely store and re-install items after painting is completed by General Contractor.

.6 As painting operations progress, place "WET PAINT" signs in all 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.
.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 Where possible, prime surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
.2 Apply wood filler to nail holes and cracks.
.3 Tint filler to match stains for stained woodwork.

.4 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.

.5 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. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, or vacuum cleaning.

.6 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.

.7 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. Apply paint by brush, roller, airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.

.5 Remove runs, sags and brush marks from finished work and repaint.

.3 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.

.4 Apply coats of paint as a continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 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.

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 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.3 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.4 Do not paint over nameplates.

.5 Keep sprinkler heads and stainless work free of paint.

.6 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

3.7 RESTORATION

.1 Clean and re-install all items that were removed before undertaking 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 surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 03 05 10 - Cast-in-place Concrete for concrete floor finish.

1.2 EXAMINATION

.1 Examine work upon which work of this section depends. Do not apply the work of this section until any unsatisfactory conditions have been rectified. Commencement will be deemed acceptance of substrate.

.2 Check finish schedule for areas requiring seamless flooring.

1.3 SUBMITTALS

.1 Provide submittals for review by Departmental Representative in accordance with Section 01 01 50 General Instructions for submittal requirements.

.2 Submit 100 x 100 mm samples of flooring for colour selection from manufacturer's standard colours. One colour will be used for all seamless flooring.

.3 Provide flooring manufacturer's maintenance instructions for seamless flooring for incorporation into maintenance manual specified in Section 01 01 50 General Instructions.

1.4 HANDLING AND STORAGE

.1 Store materials in original undamaged condition with manufacturer's labels and seal intact. Prevent damage to materials during handling and storage.

1.5 PROTECTION

.1 Protect work of others from damage resulting from work of this Section.

.2 Provide adequate ventilation.

.3 Do not install seamless flooring until other trades, except painter have finished their work.

.4 Maintain temperature above 13°C for installation and curing period.

1.6 DESCRIPTION OF SYSTEM

.1 Epoxy Flooring:
- .1 Surface preparation of concrete floor and wall base and apply epoxy bond coat.
- .2 Coloured aggregate and epoxy matrix troweled-on over bond coat.
- .3 Clear epoxy topcoats with non-slip finish on floor and semi-gloss finish on base, roller applied.

2 Products

2.1 MATERIALS

.1 Troweled on seamless epoxy/coloured aggregate flooring and base system of nominal 2.5 to 3 mm thickness comprised of:

.1 Primer: A two-component, penetrating, moisture tolerant, epoxy primer.

.2 Undercoat: A two-component, free flowing epoxy formulation consisting of resin and curing agent.

.3 Aggregate: Brightly colored, quartz broadcast aggregate.

.4 Sealer: A two-component, high performance, UV resistant, clear epoxy sealer.

.5 Provide compatible troweled on waterproofing in shower area.

.6 Physical characteristics of seamless flooring system:

Compressive Strength (ASTM C-579)	9,000 psi after 7 days
Tensile Strength (ASTM C-307)	1,600psi
Flexural Strength (ASTM C-580)	4,000 psi
Flexural Modulus of Elasticity (ASTM C-580)	1.0 X 10^6 psi
Hardness (ASTM D-2240, Shore D)	85 to 90
Bond Strength (ASTM D-4541)	>400 psi (100% concrete failure)
Impact Resistance (ASTM D-2794)	>160 in./lbs.
Abrasion Resistance (ASTM D-4060, CS-17)	0.06 gm max. weight loss
Coefficient of Friction(Dry) (ASTM F-1679)	Standard Texture>1.0 Medium Texture - 0.96
Slip Resistance Index (Wet) (ASTM F-1679) Medium Texture - 0.93	Standard Texture>1.0
Flammability (ASTM D-635)	Self-Extinguishing Extent of burning 0.25 in. max
Thermal Coefficient of Linear Expansion (ASTM C-531)	1.8 x 10-5 in./in.°C
Water Absorption (ASTM C-413)	0.1 %
Heat Resistance Limitation	140°F/60°C (for continuous exposure) 200°F/93°C (for intermittent spills)
Cure Rate @ 5°C	12 hours for foot traffic 24 hours for normal operations

.6 Acceptable Product: Stonhard Stoneshield SLT. Other products meeting the above requirements in 2.1.1 are acceptable provide the physical characteristics are met.

.2 Physical characteristics of Sloped floor topping: three-component, fast-setting, troweled on, epoxy based grout designed for horizontal applications and compatibility with floor system and meeting the following physical characteristics:

Compressive Strength (ASTM D579)	7,600 psi after 7 days
Tensile Strength (ASTM C 307)	1,800 psi
Flexural Strength (ASTM C-580)	3,300 psi
Flexural Modulus of Elasticity (ASTM D-700)	8.5 x 10_5 psi
Hardness (ASTM D-2240,Shore D)	86-88
Bond Strength (ASTM D7234)	>400 psi (100% concrete failure)
Pot Life	30 minutes @ 75°F/24°C
Passes ANSI A118.10	2 to 4 hours @ 70°F/21°C

.3 Termination strips: extruded aluminum as recommended by manufacturer and approved by Departmental Representative.

3 Execution

3.1 WORKMANSHIP

.1 All workers installing epoxy flooring and base must be fully trained and manufacturer approved installers.

.2 Prepare surface of substrate in accordance with flooring material manufacturer's instructions.

.3 Patch cracks and other openings in substrate using an epoxy filler.

.4 Grind down uneven joints, rough area, projections and remove foreign matter from surfaces to receive flooring and base.

.5 Mask adjacent surfaces and apply seamless flooring, seamless fillet cove and monolithic flash cove base in accordance with manufacturer's directions.

.6 Install termination strips at junctions of seamless flooring and other floorings, at exposed edges of seamless flooring, at top of monolithic base and at other locations required due to application techniques of the system.

.7 Apply flooring to a minimum 2.5 mm thickness, tightly compacted and free from surface holes and depressions. Application consists of prime coat, granular ceramic aggregate in epoxy binder, and epoxy top coats to provide a slip resistant easy maintenance flooring.

.8 Allow primer, undercoat, aggregate and sealer coats to dry to touch between coats. Do not apply more than two coats per day.

.9 Protect grout coat and top coat from damage during curing period in accordance with manufacturer's instructions.

.10 At completion of work clean up and remove all surplus materials and debris.

.11 Workmanship and installation to manufacturer's instructions.

3.2 INSTALLATION

.1 Prepare substrate to manufacturer's instructions and install waterproofing membrane to floor surfaces and up wall 150 mm. Install trowel applied epoxy grout sloped to drain in accordance with manufacturer's instructions. Apply multi layered epoxy finish to floor and wall base in accordance with manufacturer's instructions.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 06 10 11 - Rough Carpentry, for backing and rough-in.

1.2 REFERENCE STANDARDS

.1 ASTM A 269-13, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.2 ASTM A 167- 99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.3 CSA W59-03(R2008), Welded Steel Construction (Metal Arc Welding).

.4 ASTM A666 -10 Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar

.5 ASTM A276-13a Standard Specification for Stainless Steel Bars and Shapes.

1.3 SUBMITTALS

.1 Submit samples in accordance with Section 01 01 50 - General Instructions for Submittals.

.2 Submit Product Data in accordance with Section 01 01 50, General Instructions for Submittals.
.1 Indicate, by large scale details, all materials, finishes, dimensions, anchorage and assembly.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
.1 Deliver, store, handle and protect materials in accordance with Section 01 01 50 - General Instructions, Common Product Requirements clause.

.2 Storage and Protection:
.1 Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating, before shipping to job site.
.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - General Instructions for Construction/Demolition Waste Management And Disposal clause.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material in appropriate on-site containers for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

2 Products

2.1 MATERIALS

.1 Sheet steel: commercial grade, stretcher levelled sheet steel to ASTM A 653/A653M with Z275 zinc coating.

.2 Stainless steel sheet: to ASTM A666 type 302 or 304 with No. 4 finish, minimum 0.75 mm thick.

.3 Stainless steel tubing: ASTM A 269, ANSI Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.

.4 Aluminum Association (AA), Designation System for Aluminum Finishes (2000).

.5 Fasteners: screws and bolts hot dip galvanized. Expansion shields fibre, lead or rubber as recommended by fixture manufacturer for component and its intended use.

2.2 FINISHES

.1 Stainless steel: to ANSI No. 4 satin lustre finish.

2.3 FIXTURES

.1 Surface mounted toilet tissue dispenser: double roll type as scheduled, chrome plated steel frame with hood, capacity of 500 double ply roll; roll under spring tension for controlled delivery.

.2 Recessed toilet paper holder:
.1 Toilet paper roll compartment for installation in walls, stainless steel sheet material thickness 2.0 mm, visible surface satin finished. Round insert compartment for one WC paper roll. Mounting from front. With 4 mounting holes, fixing material included.
.2 Size: overall width and height 180 mm x 180 mm and 125 mm Ø roll compartment x 105 mm depth.

.3 Grab bars: 32 mm dia x 1.2 mm wall tubing of stainless steel, 85 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Grab bar material and anchorage to withstand downward pull of 2.2 kN. Length 900 mm on side walls and 600 mm on back walls at water closets with syphon jet flush.

.4 Prison coat hooks: stainless steel, material thickness 2 mm, visible surface satin finished. Safety hook tilts downwards when overloaded, projection 30 mm from wall plate. Dimensions 108 x 108 x 52 mm (W x H x D).

.5 Washroom Mirror: No. 1 quality 6 mm laminated float glass, electrolytically silverplated, with 10 year guarantee against silver spoilage; sizes as indicated, framed in type 304, 19 mm x 19 mm heavy gauge stainless steel angle frame, one piece roll formed type.

.1 Corners of frame heliac welded and ground and polished smooth. Provide with companion vandal-proof concealed fastening, locking fasteners and wall hangers.
.2 Corners: protected by friction-absorbing filler strips.
.3 Back: protected by full-size, shock-absorbing, water-resistant, non-abrasive, 5mm thick polyethylene padding.

.6 Prison Mirror:
.1 One-piece #304 stainless steel. Highly polished #8 finish.
.2 Size: 280 mm x 430.
.3 Mount direct to wall at1500 above floor.

.7 Fold-down seat:
.1 L-shaped fold down phenolic seat 13 mm thickness, with frame legs, mounting brackets of type 304 stainless steel and comes with self-locking mechanism to keep seat in vertical position while not in use.
.2 Size: 838mm wide and extends from wall 610mm.

2.4 SHOWER ROOM CURTAINS

.1 Fabrics: flame resistant and have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.

.2 Identify fabrics with appropriate markings of applicable testing and inspecting agency.

.3 Shower and Entry Curtain:
.1 Break Away Track:
.1 Shower: extruded aluminum track, type 6063-T5 aluminum, 38 mm W by 15 mm H x 1.6 mm wall thickness, one piece, 'Hat' shaped for ceiling mount in shower. Satin anodized finish.
.2 Entry: extruded aluminum track, type 6063-T5 aluminum, 30 mm H by 24 mm W x 1.6 mm wall thickness, one piece, inverted 'J' shape for wall mount at entry. Satin anodized finish.
.3 Nylon sliders with plated spring steel hook.
.4 Track Accessories: safety tabs 100 mm long and 20 mm wide. Provide three safety tabs per 300 mm.
.2 Break Away Curtain: one piece floor to ceiling, with nylon mesh upper section, clear vinyl lower section and opaque center section. Manufactured with heat welded seams to prevent bacteria growth. Double lock stitched with 38 mm loop tape across the top for attachment to the safety tabs.

2.5 WASHROOM ACCESSORIES 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 ferrous metal anchors and fastening devices to ASTM A123.

.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 or rough-in measurements as required.

.9 Provide steel anchor plates and components for installation on steel stud walls and building framing.

2.6 BREAK AWAY CURTAIN/TRACK

.1 Fabricate shower and entry break away curtain with 38 mm loop tape sewn to top hem.

.2 Fabricate three section break away shower and entry curtain:
.1 Mesh upper section: flame resistant mesh top for ventilation and head viewing with 13 mm grid spacing. Mesh height 750 - 900 mm.
.2 Curtain mid-section: flame resistant vinyl fabric with filament reinforcement, stain resistant, antistatic, odor resistant and with anti-microbial agent.
.3 Clear lower section: flame resistant, double polished clear vinyl for feet viewing. Clear section 450 mm high.
.4 Curtain size:
.1 Shower: 150 mm longer than wall to wall dimension, 50 mm clear of floor.
.2 Entry: 200 mm wider than opening width, 100 mm clear of floor

3 Execution

3.1 WASHROOM ACCESSORIES INSTALLATION

.1 Install and secure fixtures rigidly in place as follows:
.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish or ensure solid backing is provided in wall. Provide plate with threaded studs or plugs.
.2 Masonry walls: lead plug anchors and stainless steel screw fasteners.
.3 Install grab bars on built-in anchors provided by bar manufacturer or ensure solid backing is provided in wall.
.4 Use tamper proof screws/bolts for fasteners.
.5 Fill units with necessary supplies shortly before final acceptance of building.

3.2 BREAK AWAY CURTAIN AND TRACK

.1 Install track surface mounted to shower ceiling and to wall above entry to shower room, level and plumb, according to manufacturer's written instructions.

.2 Provide safety tabs adequate for 100 mm spacing along full length of curtains.

.3 Hang curtains on each curtain track. Track length in shower, 50 mm less than wall to wall dimension. Track length at entry curtain, 200 mm longer than entry opening width.

3.3 LOCATION AND QUANTITY

.1 Locate accessories in Stall Washroom and Inmate Shower. Exact locations to be determined by Departmental Representative.

.1 Inmate Shower:

- .1 2 grab bars.
- .2 1 recessed toilet paper holder.
- .3 1 stainless steel mirror.
- .4 1 fold down seat.
- .5 2 curtains with track.
- .6 2 prison coat hooks.

.2 Staff Washroom:

- .1 2 grab bars.
- .2 1 surface mounted toilet paper holder.
- .3 1 stainless steel framed glass mirror.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Salvaged storage shelving - Section 02 41 17 Demolition and Removal Work.

.2 Floor finish - Section 03 35 00 Floor Grinding and Polishing.

1.2 DESCRIPTION OF WORK

.1 Supply and installation of mobile shelving, fixed shelving, track and carriage assembly with manual control.

.2 Salvage existing shelving units and reuse in new layout, installed on new carriage and track assembly.

.3 Assess existing shelving, noted in paragraph 1.2.2 above, to determine suitability for reuse in new layout on new compatible mobile carriage. Provide all new shelving if assessment determines the existing shelving on new mobile carriage is not acceptable to the mobile shelving supplier due to additional modifications to existing shelving is required and costs are higher compared to installing all new shelving.

1.3 REFERENCES

.1 ASTM A490M-91 Specification for High-Strength Steel Bolts, 150 ksi (1035 MPa) Tensile Strength.

.2 ASTM A 924/A924M - 94, Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 CAN/CGSB-1.81-M90 Air Drying and Baking Alkyd Primer for Vehicles and Equipment.

.4 CGSB 1-GP-88M-83 Enamel, Alkyd, Air Drying and Baking, Gloss.

.5 CGSB 31-GP-107Ma-90 Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.6 CSA G40.20-13/G40.21-13 Welded Structural Quality Steel/Structural Quality Steels.

.7 CSA W59-03(R2008) Welded Steel Construction (Metal Arc Welding).

1.4 DESIGN CRITERIA

.1 Mobile Storage System function - (to accommodate storage boxes 560 W x 445 D x 368 mm H):
.1 Design and construct sheet metal shelving to support 750 lbs. UDL with maximum deflection of 180th of span.
.2 Size: 2290 total height with carriage, 1220 mm wide modular shelving with five 450 mm deep fixed shelves, spaced 428 mm c/c vertical dimension.
.3 Top of cabinet with frame bar between gables (open top shelf), bottom shelf on 150 mm base.
.4 Top of cabinet obstruction (boxes on top shelf) to clear ceiling by minimum 450 mm to accommodate sprinkler requirements.
.5 Provide rubber bumpers to stop shelf unit and maintain 100 mm gap between each mobile storage shelving unit between mobile shelves (and walls) in parked position.
.6 Note: One bank of shelf units are non-rolling type and must be fastened to wall.

.2 Arrangement of mobile shelves is configured to permit locking of shelving banks in closed position to negate exposing open shelves and unauthorized access to shelf contents.

1.5 QUALIFICATIONS

.1 Installation of high density mobile storage system to be performed only by those firms engaged in the manufacture and installation of this type of equipment for the last 5 years.

1.6 SHOP DRAWINGS

.1 Submit shop drawings, product data and representative colour samples for review.

.2 Indicate mobile storage shelving layout and dimensions to room plan, number of bays, number of shelves, system of bracing, rolling mechanism, track and raised floor details and anchoring devices.

1.7 WARRANTY

.1 Warranty product free of defects in material and workmanship for 5 years on all new component parts.

2 Products

2.1 MATERIALS

.1 Galvanized steel sheet: commercial grade to ASTM A 924/A924M, Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process, with baked enamel finish.

.2 Steel sections and plates: to CAN/CSA-G40.21, Type 400W.

.3 Steel bolts, nuts and washers: to ASTM A490M.

.4 Welding materials: to CSA W59.

2.2 SHELF UNITS

.1 Fabricate shelf unit components to meet design criteria, loading and function of unit. Shelves, gables etc. all bolted assembly.

.2 Finish sheet metal shelf units in baked enamel or polyester powder coating in colour(s) as selected.

2.3 MOBILE TRACK STORAGE SYSTEM

.1 High density mobile storage system: the manufacturer's component parts are to be used with this system complete with manufacturer's factory finish. (eg. shelving, track, carriage assembly, operating mechanism and wheels, anchorage and all accessories).

.2 Accessories:

.1 Floor: Provide plywood filler panels on floor between surface mounted tracks complete with floor finish and steel or aluminum ramp threshold plates attached to provide smooth entry at one end. Mobile track system will be installed onto a concrete floor with polished surface as specified in Section 03 35 00.

.2 Mechanical assist system: low profile complete with a mechanical carriage keyed lock on end unit.

.3 Seals: dust seals to the top and bottom edges of filing equipment .

.4 Anti-tip system: consisting of additional structural channels in the floor, matching with corresponding parts, mounted to the carriage to prevent tipping of movable carriages.

.5 Design and provide seismic bracing to meet local codes and NBCC2010.

.6 Provide finished end panels and carriage end caps.

.7 Safety features: provide anti-movement lock on each carriage.

.8 Carriage to be a one piece member capable of supporting a minimum load of 1,488 kg minimum per carriage metre length.

3 Execution

3.1 DELIVERY

.1 Install track, mobile shelving assembly and fixed shelving to manufacturer's instructions and to reviewed shop drawings.

.2 Brace, secure and anchor mobile and fixed shelving units and mobile carriage in place.

.3 Make good factory finished surfaces damaged during shipment or installation.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results – Mechanical

1.2 References

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)

- .1 ANSI/NFPA 10-2013, Standard for Portable Fire Extinguishers.
- .2 ANSI/NFPA 13-2013, Installation of Sprinkler Systems.
- .3 ANSI/NFPA 25-2014, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.

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

- .1 Material Safety Data Sheets (MSDS).

.3 Underwriter's Laboratories of Canada (ULC).

.4 Fire Commissioner of Canada FC 403, "Sprinkler System".

1.3 Design Requirements

.1 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13, by hydraulic calculations for uniform distribution of water over design area.

.2 The "Authority Having Jurisdiction" will be designated by the Departmental Representative.

.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.

.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 sprinkler systems.

.6 Design systems for earthquake protection for buildings in seismic zone applicable.

.7 Location of Sprinkler Heads:

- .1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13.
- .2 Uniformly space sprinklers on branch.

.8 Water Distribution:

- .1 Make distribution uniform throughout the area in which sprinkler heads will open.

.9 Water Supply:

- .1 Arrange and conduct required flow tests. For design purpose, the available water supply pressures shall be de-rated by a 10% safety factor.

.10 Sprinkler drawings and specifications are to give the bidder concept of the work involved. The design intent shall not be changed. Significant design features such as the location of exposed pipes and the method of zoning the sprinkler system may not be changed without prior discussion and approval by the Engineer. Field changes may be required to accommodate lighting, and hidden obstructions. Possible additional sprinkler heads may be required if blind spaces and ceiling drops have not been noted and/or dry type heads may have to be implemented if the area is not frost free.

.11 The contractor shall make access to blind spaces in a professional manner. Honeycombing required to establish joist locations and/or similar endeavours to establish sound pipe hangers, are acceptable.

1.4 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions.

.2 Submit two copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 01 50 – General Instructions.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Shop drawings: submit drawings stamped sealed and signed by professional engineer registered or licensed in Province of B.C, and Letters of Assurance. Indicate:

.1 Materials.

.2 Finishes.

.3 Method of anchorage

.4 Number of anchors.

.5 Supports.

.6 Reinforcement.

.7 Assembly details.

.8 Accessories.

.3 Drawings: Sprinkler heads and piping system layout.

.1 Prepare detail working drawings of system layout in accordance with NFPA 13 using full size contract drawings.

.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.

.4 Design Data:

.1 Calculations of sprinkler system design.

.2 Indicate type and design density of each system.

.3 Samples

.1 Submit samples of following:

.1 Each type of sprinkler head.

.2 Signs.

.4 Assurance of Professional Design and Commitment for Field Review.

.1 Provide Assurance commitment letters (Schedules B-1 and B-2) at the commencement of the project, in accordance with the building code and for submission to the Departmental Representative and review by the Authority Having Jurisdiction.

.2 Provide Assurance of Professional Field Review and Compliance (Schedule C-B) at the completion of the project.

.5 Closeout Submittals:

.1 Submit maintenance and engineering data for incorporation into manual specified in Section 01 01 50 – General Instructions in accordance with ANSI/NFPA 13.

.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 Field Test Reports:

.1 Preliminary tests on piping system.

.2 Formal tests and inspections

.4 Records:

.1 As-built drawings of each system.

.1 After completion, but before final acceptance, submit complete set of as-built drawings (prints) of each system for record purposes.

.2 Submit drawings in digital file versions with title block similar to full size contract drawings.

.5 Operation and Maintenance Manuals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

.2 Provide detailed hydraulic calculations including summary sheet, and Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual specified in Section 01 01 50 – General Instructions in accordance with ANSI/NFPA 13.

1.5 Quality Assurance

.1 Qualifications:

.1 Installer: company or person specializing in sprinkler systems with documented experience.

.2 All work shall be carried out by Sprinkler Pipe Fitters who carry a "Certificate of Qualification" for this trade as issued by the Ministry of Labour.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

.3 Inspections and Tests:

.1 All inspections, examinations and tests required by the "Authorities and Agencies having jurisdiction" specified shall be arranged and paid for by the fire protection contractor, as necessary to obtain complete and final acceptance of the fire protection system.

.2 Provide Contractor's Material and Test Certificates and all required test papers as may be requested by all parties having jurisdiction and duly witnessed by Departmental Representative, showing proof of:

.1 Underground hydrostatic test of 1400 kPa (200 PSI).

.2 Flushing of underground main through 100mm (4") drain pipe.

.3 Hydrostatic test of overhead piping @ 1400 kPa (200 PSI).

.4 Verification of all alarm and trouble devices installed under this contract.

.3 Provide the services of the Professional Engineer who designed the fire protection systems for "Field Review" of the installation. Construction period review reports shall be submitted during the construction period.

.4 If welding is required, the Contractor shall submit a copy of the welder's certification to the Engineer for Record purposes prior to starting work.

1.6 Maintenance

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 01 50 – General Instructions.

.2 Provide spare sprinklers and tools as required by ANSI/NFPA 13.

1.7 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 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.

.3 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

PART 2 PRODUCTS

2.1 Pipe, Fittings & Valves

.1 Pipe:

.1 Piping shall meet or exceed one of the following standards:

.1 Black and Hot-Dipped Galvanized Welded and Seamless Steel Pipe – ASTM A795

.2 Welded and Seamless Steel Pipe – ANSI/ASTM A53

.3 Wrought Steel Pipe – ANSI B36.19M

.4 Elec.-Resistance Welded Steel Pipe – ASTM A135

.2 All thickness for pressures up to 2070 kPa (300 psi) shall be as follows:

.1 Joined by shop welding or roll grooving:

.1 Up to and incl. 125mm (5") – Schedule 10

.2 150mm (6") – 3.40mm (0.134)

.3 200mm, 250mm (8", 10") – 4.78mm (0.188")

.2 Joined by threaded fittings or cut grooves:

.1 up to 200mm (8") – Schedule 40

.2 200mm (8") and larger – Schedule 30

.2 Fittings and joints to ANSI/NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.2 Copper tube: screwed, soldered, brazed. Not permitted in any inmate areas.

.3 System piping 50mm (2") and smaller shall be Schedule 40 and threaded joints, or Schedule 10 lightwall with grooved joints, material and IPS dimensions conforming to NFPA 13. Larger sizes shall be Schedule 10 and joined by welding or groove joining methods in accordance with NFPA 13.

.4 All grooved products shall be of one manufacturer. All grooved end fittings shall be of "full flow" design and manufactured from ductile iron conforming to ASTM A-536. Grooved coupling shall be designed with angle bolt pads to provide a rigid joint

except where flexibility is required. "Flush cap" or "flush seal" gaskets shall be used with couplings in dry pipe systems.

.5 Cast iron floor and ceiling plates with set screws shall be provided whenever pipe passes through walls, floors and partitions. In finished areas, plates shall be chrome plated.

.6. CPVC piping is not acceptable for this project.

.3 Valves:

.1 ULC listed for fire protection service.

.2 Up to NPS 2: bronze, screwed ends, O. S. & Y. gate.

.3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve; OS & Y gate.

.4 Swing check valves.

.5 Ball drip.

.6 All water supply and zone isolation valves shall be monitored with tamper switches. Electric wiring for control and alarm components will be provided Under Division 16.

.7 Valves controlling water supply and alarm shut-off shall be of O. S. & Y. type with rising stem or approved gear operated butterfly valves with supervisory switch. Where a grooved piping system is installed, grooved end isolation/control valves may be used. Valves shall be supervised by a factory installed double throw/double pole switch.

.8 All O. S. & Y. gate vales shall be monitored with tamper switches. Electric wiring for control and alarm components shall be provided under Division 16.

.4 Pipe hangers:

.1 ULC listed for fire protection services.

.2 Hanger standards shall conform to Section 3-10 of NFPA 13. Use "C" clamps complete with lock nuts and restraining straps. Hangers shall be supplied and installed in accordance with NFPA 13. C-type clamps used to attach hangers to the building structure shall be equipped with lock nuts and retaining straps.

.3 Sway bracing shall be installed as per Section 3-5.3.5 of NFPA 13.

2.2 Sprinkler Heads

.1 General: to ANSI/NFPA 13 and ULC listed for fire services.

.2 All sprinklers in suspended ceiling areas shall be chrome finish recessed type with chrome flush type escutcheon plates. All sprinklers in open ceiling areas shall be of brass finish upright or pendent types. All sidewall sprinklers shall be chrome finish horizontal type.

.3 Sprinkler shall be protected from mechanical injury by standard guards where necessary. The proximity of sprinklers to heating units shall be taken into consideration in determining the temperature rating.

.4 Adjacent to each sprinkler alarm valve, provide one (1) 12-sprinkler capacity Underwriters approved cabinet complete with various type and temperatures of sprinklers in ratio to the numbers installed of each type along with a standard sprinkler wrench.

2.3 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 walls, 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, provide mechanically adjustable segmented elastomeric seal.

.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, ductile-iron, cast-iron 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.

2.4 Escutcheon Plates

.1 Provide split hinged type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished chromium-plated finish on copper alloy plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

2.5 Spare Parts Cabinet

.1 For storage of maintenance materials, spare sprinkler heads and special tools.

.2 Construct to sprinkler head manufacturer's standard.

2.13 Signs

.1 Attach properly lettered and approved metal signs to each valve and alarm device to ANSI/NFPA 13.

.2 Permanently fix hydraulic design data nameplates to riser of each system.

2.16 Portable Fire Extinguisher

.1 Provide Ansul dry chemical, multi-purpose fire extinguishers with U.L. rating 2-A:10-B:C.

.2 Provide extinguishers in all fire extinguisher cabinets as located on the Architectural drawings. Provide wall bracket and mount additional surface mounted extinguishers, where shown on Mechanical drawings. Locations of extinguishers and minimum travel distances shall comply with NFPA 10 regulations.

PART 3 EXECUTION

3.1 Manufacturer's Instruction

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

3.2 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 areas with suspended ceiling.

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 Install spare parts cabinet as indicated.

.6 Valve identification:

.1 Identify drain valve and auxiliary valves.

3.4 Field Painting

.1 Clean, pre-treat, prime, and paint new systems including piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

.2 Apply coatings to clean, dry surfaces, using clean brushes.

.3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.4 Immediately after cleaning, provide metal surfaces with 1 coat of pretreatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.5 Shield sprinkler heads with protective covering while painting is in progress.

.6 Upon completion of painting, remove protective covering from sprinkler heads.

.7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.

.8 Provide primed surfaces with following:

.1 Piping in Finished Areas:

.1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.

.2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.

.3 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.

.2 Piping in Unfinished Areas:

.1 Finish painting not required in spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a pre-finished material.

.2 Provide piping with 50 mm wide red enamel bands self-adhering red plastic bands spaced at maximum of 6 m intervals.

3.5 Field Quality Control

.1 Site Test, Inspection:

.1 Perform test to determine compliance with specified requirements in presence of Engineer.

.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 Test alarms and other devices.

.5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.

.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.

.7 Altered and relocated sprinkler system to be inspected and tested in conformance with NFPA 125.

3.6 Placing In Service

.1 When the entire fire protection system has been completed to the satisfaction of the Departmental Representatives and when operating and maintenance instructions have been provided, the Fire Protection Contractor shall, in the presence of the Engineer, demonstrate the complete operation and maintenance required to the operating personnel. A complete operational test conducted on the entire installation for the purpose of verification of compliance with all applicable standards and codes shall be carried out.

.2 Three copies of a complete operating manual shall be provided, which must include the following:

.1 Detailed instructions for the normal maintenance of all installed equipment including operational procedures, frequency of operational checks, service instructions and trouble shooting instructions.

.2 Valve schedule for all valves including location, service type and normal position for all systems.

.3 Schematic showing the location of each excess pressure pump breaker, inspectors test valves, low point drains and flow switches where applicable.

.4 Warranties and certificates.

.5 Manufacturer's operating and maintenance manuals.

.6 Description of the operation of each system and the function of each piece of equipment.

.7 Lubrication schedule for all lubricated equipment including recommended lubricants.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 05	Installation of Pipework
.4	Section 23 05 29	Hangers & Supports for Piping & Equipment
.5	Section 23 05 48	Vibration & Seismic Controls for Ductwork Piping & Equipment
.6	Section 23 05 93	Testing, Adjusting and Balancing for HVAC
.7	Section 23 07 19	Thermal Insulation for Piping

1.2 References

.1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME).

- .1 ANSI/ASME B16.15-2011, Cast Bronze Threaded Fittings, Classes 125 and 250.
- .2 ANSI/ASME B16.18-2012, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ANSI/ASME B16.22-2013, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.24-2011, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.

.2 American Society for Testing and Materials International, (ASTM).

- .1 ASTM A 307-2012, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- .2 ASTM B 88M-2013, Standard Specification for Seamless Copper Water Tube (Metric).

.3 American Water Works Association (AWWA).

- .1 AWWA C111-2012, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.4 Canadian Standards Association (CSA International).

- .1 CSA B242-05 (R2011), Groove and Shoulder Type Mechanical Pipe Couplings.

.5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).

- .1 MSS-SP-70-2006, Gray Iron Gate Valves, Flanged and Threaded Ends.
- .2 MSS-SP-71-2005, Gray Iron Swing Check Valves, Flanged and Threaded Ends.
- .3 MSS-SP-80-2008, Bronze Gate, Globe, Angle and Check Valves.

.6 National Sanitation Foundation (NSF) / American National Standards Institute (ANSI).

- .1 NSF/ANSI 61, Drinking Water System Components.

1.3 Submittals

.1 Submittals in accordance with Section 01 01 50 – General Instructions

.2 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.4 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Place materials defined as hazardous or toxic in designated containers.

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

.5 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan

.6 Fold up metal banding, flatten and place in designated area for recycling.

1.6 Quality Assurance

.1 All potable water system components shall conform to NSF/ANSI Standard 61.

PART 2 PRODUCTS

2.1 Piping

.1 Domestic hot, cold and hot recirculation water systems, within building.

.1 Above ground: copper tube, hard drawn, type L: to ASTM B 88M to NPS 4 size.

.2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B 88M, in long lengths and with no buried joints.

.2 Water service pipe NPS6 or large in building shall be Ductile Iron, minimum Pressure Class 350 designed and manufactured in accordance with ANSI/AWWA C150/A21.50 and C151/A21.51. All pipe shall be cement –mortar lined in accordance with ANSI/AWWA C104/A2.4 and grooved to BS 4772/2531 standards.

2.2 Fittings

.1 Bronze pipe flanges and flanged fittings, Class 150 and 300: to ANSI B16.24.

.2 Cast bronze threaded fittings, Class 125 and 250: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 2 to NPS 4: roll grooved to CSA B242.

2.3 Joints

.1 Rubber gaskets, 1.6mm thick: to ANSI/AWWA C111/A21.11.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5 tin copper alloy or brazing.

.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 to ASTM F492, complete with thermoplastic liner.

2.4 Gate Valves

.1 NPS2 and under, soldered:

.1 Rising stem: to MSSSP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc.

.2 NPS2 and under, screwed:

.1 Rising stem: to MSSSP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc.

.3 NPS2-1/2 and over, in mechanical rooms, flanged:

.1 Rising stem: to MSSSP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS & Y bronze trim.

.4 NPS2-1/2 and over, other than mechanical rooms, flanged:

.1 Non-rising stem: to MSSSP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet.

2.5 Globe Valves

.1 NPS2 and under, soldered:

.1 To MSSSP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet.

.2 Lockshield handles: as indicated.

.2 NPS2 and under, screwed:

.1 To MSSSP-80, Class150, 1MPa, bronze body, screwed over bonnet, renewable composition disc.

.2 Lockshield handles: as indicated.

2.6 Swing Check Valves

.1 NPS 2 and under, soldered:

.1 To MSSSP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat.

.2 NPS2 and under, screwed:

.1 To MSSSP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, re-grindable seat.

.3 NPS2-1/2 and over, flanged:

.1 To MSSSP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap.

2.7 Ball Valves

.1 NPS2 and under, screwed:

.1 Class150.

.2 Bronze body, chrome plated brass ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle.

.2 NPS2 and under, soldered:

.1 To ANSI B16.18, Class150.

.2 Bronze body, chrome plated brass ball, PTFE Teflon adjustable packing, brass gland and PTFE Teflon seat, steel lever handle, with NPT to copper adaptors.

2.8 Drain Valves

.1 Drain valves shall be provided with cap and chain.

.2 Drain and hose valves 20mm (3/4") and smaller:

.1 Sediment Faucets.

.2 Ball valves.

2.9 Plumbing Piping

.1 Water supply piping under concrete slabs or in walls shall be encased in standard weight flexible polyethylene pipe one size larger than copper tubing. All joints to be wrapped in plastic wrapping tape.

2.10 Dielectric Unions

.1 Insulating dielectric unions and flange unions shall be installed when adapting between dissimilar metallic pipe for domestic water supply piping, and domestic water storage tanks. Elsewhere, unions and adaptors for copper piping shall be cast brass pressure fittings.

2.11 Expansion Joints

.1 Domestic and industrial water: Annular close pitch corrugated metal hose with Type 316L stainless steel butt welded tube. Type 304 single stainless steel outer brain, flanged, welded or screwed ends. Suitable for 1034 kPa (150 psi) working pressure and 50mm traverse.

2.12 Strainers

.1 NPS 2 and under: Full pipeline size, 1,034 kPa (150 psi) SWP bronze, with screwed ends and a removable plug type screen retainer.

.2 NPS 2-1/2 and over: Full pipeline size, 860 kPa (125 psi) SWP cast iron, with flanged ends and a bolted screen retainer.

2.13 Balancing Fittings:

.1 Sizes: Calibrated balancing valves, as specified this section.

.2 NPS 2 and under: Globe type, Y-pattern, bronze body, EPDM O-ring and NPT connections.

.3 Flow measuring valve shall be fitted with meter readout ports with check valves and caps, digital handwheel with memory stop indicator, NPS 20 hose connection, and a nameplate bearing manufacturer's name and calibrated nameplate.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with Section 23 05 05 - Installation of Pipework, Section 23 05 29 – Hangers & Supports for Piping & Equipment, and Section 23 05 48 – Vibration & Seismic Controls for Ductwork Piping & Equipment.

.2 Install in accordance with National Plumbing Code and local authority having jurisdiction.

.3 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.

.4 Assemble all piping using fittings manufactured to ANSI standards.

.5 Install tubing close to building structure to minimize furring, conserve headroom and space. Group exposed piping and run parallel to walls.

.6 Install CWS piping below and away from HWS and HWR and all other hot piping so as to maintain temperature of cold water as low as possible.

.7 Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.

.8 Buried tubing:

.1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.

.2 Bend tubing without crimping or constriction. Minimize use of fittings.

3.2 Valves

.1 Isolate equipment, fixtures and branches with gate or ball valves.

.2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 Pressure Tests

.1 Test pressure: 1.5 times maximum system operating pressure, and not less than 860 kPa.

3.4 Balancing

.1 Balance domestic hot water recirculation system shall be balanced by TAB Contractor under Division 23. Refer to Section 23 05 93 - Testing, Adjusting and Balancing for HVAC for applicable procedures.

3.5 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.

3.6 Disinfection

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction and approval of Departmental Representative.

.2 Upon completion, provide a "Chlorination Certificate" at project closeout and provide a copy in the O&M Manual.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results for Mechanical
.4	Section 23 05 05	Installation of Pipework
.5	Section 23 05 29	Hangers & Supports for Piping & Equipment
.6	Section 23 05 48	Vibration & Seismic Controls for Ductwork Piping & Equipment
.7	Section 23 07 19	Thermal Insulation for Piping

1.2 References

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

- .1 ASTM B 32-03, Specification for Solder Metal.
- .2 ASTM B 306-02, Specification for Copper Drainage Tube (DWV).
- .3 ASTM C 564-03a, Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).

- .1 CAN/CSA-B70-02, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .2 CAN/CSA-B125-01, Plumbing Fittings.

1.3 Submittals

.1 Submittals in accordance with Section 01 01 50 – General Instructions.

.2 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.4 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Waste Management and Disposal

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Place materials defined as hazardous or toxic in designated containers.

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

.5 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan

.6 Fold up metal banding, flatten and place in designated area for recycling.

PART 2 PRODUCTS

2.1 Copper Tube and Fittings

.1 Above ground sanitary storm and vent, Copper Type DWV to: ASTM B 306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.

.2 Wrought copper: to CAN/CSA-B125.

.2 Solder: tin-lead, 50:50, type 50A or lead free, tin-copper alloy 95:5, type TA to ASTM B 32.

2.2 Cast Iron Piping and Fittings

.1 Buried sanitary, storm and vent, cast iron (minimum NPS 2) to: CAN/CSA-B70.

.1 Joints.

.1 Mechanical joints.

.1 Neoprene or butyl rubber compression gaskets: to ASTM C 564 or CAN/CSA-B70.

.2 Stainless steel clamps.

.2 Above ground sanitary storm and vent: Cast iron to CAN/CSA-B70.

.1 Joints.

.1 Mechanical joints.

.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

2.3 ABS Piping

.1 Drainage piping under the building, provided that such piping does not pass through any fire separations, may be as follows, at the contractor's option:

.1 Underground sanitary drainage piping under building, 150mm in diameter and smaller shall be certified to the current version of CSA B181.1, ABS Drain, Waste and Vent Pipe and Fittings. Piping shall be solid wall in construction. Cell core piping is not acceptable.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with Section 23 05 05 - Installation of Pipework, Section 23 05 29 – Hangers & Supports for Piping & Equipment, and Section 23 05 48 – Vibration & Seismic Controls for Ductwork Piping & Equipment.

.2 Install in accordance with National Plumbing Code and local authority having jurisdiction.

.3 Install buried pipe on 150 mm bed of clean washed sand, shaped to accommodate hubs and fittings, to line and grade as indicated. Backfill with 150 mm of clean washed sand.

.4 Install above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

3.2 Testing

.1 Pressure test buried systems before backfilling.

.2 Hydraulically test to verify grades and freedom from obstructions.

3.3 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 Storm water drainage:

.1 Verify domes are secure.

.2 Ensure weirs are correctly sized and installed correctly.

.3 Verify provisions for movement of roof system.

.4 Ensure that fixtures are properly anchored, connected to system and effectively vented.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section Includes:

.1 The supply and installation of Plumbing Fixtures and Trim.

.2 Products Installed but not Supplied Under this Section:

.1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.

.2 Equipment installed by others.

.1 Connect with unions.

.3 Equipment not installed.

.1 Capped for future connection by others.

1.2 Related Section

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results for Mechanical

1.3 References

.1 Canadian Standards Association (CSA International).

.1 CAN/CSA-B45 Series 02 (R2013) Plumbing Fixtures.

.2 CSA-B125.3-12, Plumbing Fittings.

.3 CSA-B651-12, Accessible Design for Built Environment.

.2 National Sanitation Foundation (NSF) / American National Standards Institute (ANSI).

.1 NSF/ANSI 61, Drinking Water System Components.

1.4 Submittals

.1 Submittals in accordance with Section 01 01 50 – General Instructions.

.2 Indicate, for all fixtures and trim:

.1 Dimensions, construction details, roughing-in dimensions.

1.5 Closeout Submittals:

.1 Submit maintenance data in accordance with Section 01 01 50 – General Instructions.

.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.

1.6 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.7 Delivery Storage and Disposal

.1 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan

.3 Fold up metal banding, flatten and place in designated area for recycling.

1.6 Quality Assurance

.1 All potable water system components shall conform to NSF/ANSI Standard 61.

PART 2 PRODUCTS

2.1 Manufactured Units

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.

.3 Exposed plumbing brass shall be chrome plated finish. Water supply piping exposed in finished areas shall be chrome plated brass pipe and fittings.

.4 Number, locations: architectural drawings to govern.

.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 Fixture Schedule:

FD- 1 Floor Drain in polished and sealed concrete, slab-on grade.

Epoxy coated cast iron floor drain with anchor flange, weep-holes, 6mm thick (152 mm diameter) nickel bronze strainer, no hub (MJ) outlet, and vandal proof.

WC-1 Water Closet (Handicapped Use)

ADA compliant, vitreous china water closet, floor mounted, siphon jet flushing action, 38mm [1.5"] I.P.S. top spud inlet, 54mm [2-1/8"] trapway diameter, full glazed trapway, integral flush rim, elongated bowl, water spot area 241mm x 187mm [9 ½" x 7 3/8"], closet bolts and caps, compliant with applicable sections of ASME A112.19.2/CSA B45.1, 17" height with manual flush valve (quite, exposed, diaphragm type, chrome plated closet flushometer (low consumption 6 LPF [1.6 GPF], ADA compliant metal oscillating non-hold-open handle with

triple seal handle packing, 25mm [1"] I.P.S. screwdriver angle stop, free spinning vandal resistant stop cap, adjustable tailpiece, high pressure vacuum breaker flush connection, spud coupling and flange for 38mm [1-1/2"] top spud, sweat solder adapter with cover tube and cast set screw wall flange, YG extended bumper on angle stop for seat with cover, etc.).
Elongated heavy duty solid plastic open front toilet seat with cover, reinforced stainless steel check hinge, posts, washers and nuts.

WC-2 Water Closet (Security/Institution, Handicapped Use)

Low Consumption Toilet, floor mounted, floor outlet, 14 gauge type 304 stainless steel, polished to a satin finish, elongated syphon jet flush action bowl, 2-1/8" (54mm) concealed trapway, 6 LPF [1.6 GPF] per flush, 38mm [1-1/2"] back spud, for use with concealed flush valve, toilet waste outlet is gasketed waste. Install with floor flange. Fixture shall withstand loadings of 2,273 kg [5,000 pounds] without permanent damage. Fixture shall be furnished with necessary fasteners for proper installation. ADA compliant.
Flush Valve, hydraulic, concealed, low consumption, 6 LPF [1.6 GPF] factory set flow, quiet action concealed diaphragm type, with vandal-resistant 16mm [5/8"] dia. push button, non-hold open feature, vacuum breaker and back-check angle stop.
Provide floor flange, flange bolts, gasket, waste fitting, nipple and C.P. cap.

L-1 Lavatory (Handicapped Use)

Barrier free vitreous china lavatory [wall mount, white, hole drillings on 203mm [8"] center, overflow, ADA compliant, OD = 508mm [20"] width x 686mm [27"] depth.
Floor mounted lavatory carrier with concealed arms with heavy gauge steel uprights with integral welded feet, adjustable epoxy coated cast iron arms with levelling screws and basin locking device, upper tie rod, and plated hardware.
Deck mounted 4" fixed centre hot and cold faucet, chrome plated solid brass body, 4" C-C integral cast brass spout, 1.9 LPM [0.5 GPM] flow aerator outlet, 64mm [2-3/8"] cast brass handles, ceramic disk operating cartridges, 12mm [1/2"] NPSM supply inlets with coupling nut for 9.5mm [3/8"] or 12mm [1/2"] flexible riser, mounting hardware included, 5 years cartridges warranty.
Thermostatic mixing control valve to CSA-B125.3 and ASSE 1017/1070, vandal resistant temperature adjusting spindles, ceramic cartridge, integral checks; lead free brass, bronze and stainless steel construction; stainless steel strainers, installed in fully recessed lockable steel cabinet. Temperature control range 15 to 45 °C [59 to 113°F]. Minimum flow 1.9 LPM [0.5 GPM].
Offset open grid polished chrome cast brass P.O. plug with 19 holes c/w rubber washer, friction washer, brass locknut and tailpiece (32mm [1-1/4"] size with overflow holes).
Chrome plated angle valve stops (screwdriver stops) for cold and hot water with escutcheon.
Braided supply tubes (10mm) and 1-28-CP chrome plated risers (10mm) between stops and faucet.
Pre-wrapped adjustable cast brass P-trap kit with pre-wrapped offset grid drain. Furnished with cast brass adjustable P-trap with cleanout, offset grid drain assembly, seamless riser tube covers, supply angle stop covers, angle stop wheel handle covers, and chrome plated box flange.

L-2 Lavatory (Security/Institution, Handicapped Use)

Barrier free institutional lavatory [wall mount, ADA compliant, 406mm [18"] rectangular bowl, front access]. 14 gauge, type 304 S.S. construction, seamless welded, satin finish. Provide Air-Control pneumatically operated, metering, non-hold open valve with ADA compliant pushbutton. Lead free to NSF61. Cabinet interior shall be sound deadened with fire-resistant material. Fixture shall be furnished with necessary fasteners to complete installation.
Off-floor, wall outlet. Deck mounted spout. Air-control, H&C temperature, metering valve. Adjustable cast brass P-trap kit with offset grid drain, supply angle stop covers, angle stop wheel handle covers, and chrome plated box flange.
Thermostatic mixing control valve to CSA-B125.3 and ASSE 1017/1070, vandal resistant temperature adjusting spindles, ceramic cartridge, integral checks; lead free brass, bronze and stainless steel construction; stainless steel strainers, installed in fully recessed lockable steel cabinet. Temperature control range 15 to 45 °C [59 to 113°F]. Minimum flow 1.9 LPM [0.5 GPM].
Floor mounted lavatory carrier with support plate and stud for high back stainless steel lavatory, with concealed wall hanger and extended bottom securing lugs.

SH-1 Shower Metering Valve w/ TMV

Vandal resistant, wall-mounted shower with anchor tapping, anchor plates and supply connections. Vandal resistant C.P. cast brass shower head with 6.0 LPM [1.6 GPM] flow. Nozzle shall be threaded into body and locked in place by set screw. Pushbutton air-control valve, vandal resistant. Pushbutton panel shall be 14 gauge, type 304 S.S. polished to a satin finish. All other trims shall be chrome plated. Shower valve shall be air-control, metering, non-hold open type. Recessed soap dish. Components shall be furnished with all necessary fasteners and plate for proper installation.
Thermostatic mixing control valve to ASSE 1069 at 1.9 LPM [0.5 GPM], lead-free brass with corrosion resistant internal components, accessible integral screens, integral check, ½ NPT connection, allen wrench set point adjustment and lock nut to resist unauthorized set point adjustment, inlet ball valves and outlet gauges in fully recessed lockable steel cabinet. Temperature control range 32.2 to 46.1 °C [90 to 115°F].
All duco coated cast iron body drain, reversible flashing clamp with seepage openings and adjustable 127mm [5"] diameter nickel bronze 6.4mm [1/4"] thick strainer, secured with tamper proof S.S. screws, 102mm [4"] throat on strainer. Provide cast iron 'p' trap.
Comply with local codes for Shower Control location and Trim Kit requirements.

PART 3 EXECUTION

3.1 Installation

.1 Mounting heights:

.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

.2 Wall-hung fixtures: as indicated measured from finished floor.

.3 Physically handicapped: to comply with most stringent of either NBCC or CAN/CSA B651.

.2 For inmate areas, all gaps between fixtures, wall and floors are to be sealed with security caulking. Security caulking shall be two-part, non-sagging, chemically curing epoxy adhesive/sealant, specifically designed for use in interior security areas.

.3 For all other areas, all gaps between fixtures, wall and floors are to be sealed with silicone-based, mildew-resistant and low-VOC caulking compound, conforming to ASTM C920 Type S Grade NS Class 25.

.4 Caulking shall be made tight and beaded smooth in a neat and workmanlike manner

.5 Utilize security hardware and mounting plates provided with all security fixtures in areas accessible to inmates.

3.2 Supplies

.1 Provide isolation valves or stops for every fixture or appliance connection.

.2 Provide water hammer arrestors for flush valves and solenoid controlled appliances.

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.

3.4 Performance Verification:

.1 PV procedures:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers, backflow preventers: operation under all conditions.

.3 Wash fountains: operation of flow-actuating devices.

.4 Thermostatic controls: Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section Includes:

.1 The supply and installation of Plumbing Specialties and Accessories.

.2 Products Installed but not Supplied Under this Section:

.1 Install rough-in for equipment supplied by others, complete with valves on hot and cold water supplies, waste and vent.

.2 Equipment installed by others.

.1 Connect with unions.

.3 Equipment not installed.

.1 Capped for future connection by others.

1.2 Related Section

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results for Mechanical
.4	Section 23 08 01	Performance Verification Mechanical Piping Systems

1.3 References

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A126-04(2009), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.2 American Water Works Association (AWWA)

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-B64 Series-01 (2007), Backflow Preventers and Vacuum Breakers.

.2 CAN/CSA-C22.2 No. 130-03 (R2013), Requirements for Electrical Resistance Heating Cables and Heating Device Sets.

.3 CAN/CSA-B356-10, Water Pressure Reducing Valves for Domestic Water Supply Systems.

.4 Plumbing and Drainage Institute (PDI)

.1 PDI-WH201-2010, Water Hammer Arresters Standard.

.5 National Sanitation Foundation (NSF) / American National Standards Institute (ANSI).

.1 NSF/ANSI 61, Drinking Water System Components.

1.4 Submittals

.1 Submittals in accordance with Section 01 01 50 – General Instructions.

.2 Indicate, for all plumbing specialties and accessories:

.1 Dimensions, construction details, roughing-in dimensions.

1.5 Closeout Submittals:

.1 Submit maintenance data in accordance with Section 01 01 50 – General Instructions.

.2 Include:

.1 Description of plumbing specialties and accessories, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.6 Health and Safety

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.7 Delivery Storage and Disposal

.1 Waste Management and Disposal:

.1 Separate waste materials for recycling in accordance with Section 01 01 50 – General Instructions.

.2 Collect and separate plastic, paper packaging and corrugated cardboard in accordance with Waste Management Plan

.3 Fold up metal banding, flatten and place in designated area for recycling.

1.8 Quality Assurance

.1 All potable water system components shall conform to NSF/ANSI Standard 61.

PART 2 PRODUCTS

2.1 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 Access covers:

.1 Wall access: face or wall type, polished nickel bronze or stainless steel round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.

.2 Floor access: round cast iron body and frame with adjustable secured nickel bronze top cast box with anchor lugs and:

.1 Plugs: bolted bronze with neoprene gasket.
.2 Cover for unfinished concrete floors: cast iron round gasket, vandal-proof screws.
.3 Cover for terrazzo finish: polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws
.4 Cover for tile and linoleum floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
.5 Cover for carpeted floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.2 Water Hammer Arrestor

.1 Copper construction, bellows type: to PDI-WH201.

2.3 Vacuum Breaker

.1 To CSA-B64 Series.

2.4 Trap Seals Primer

.1 Brass, with integral vacuum breaker, NPS1/2 solder ends, NPS1/2 drip line connection.

2.5 Strainers

.1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.
.2 NPS2 and under, bronze body, screwed ends, with brass cap.
.3 NPS2 1/2 and over, cast iron body, flanged ends, with bolted cap.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with Canadian Plumbing Code provincial codes, and local authority having jurisdiction.
.2 Install in accordance with manufacturer's instructions and as specified.

3.2 Cleanouts

.1 In addition to those required by code, and as indicated, install at base of soil and waste stacks, and rainwater leaders.
.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.
.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS4.

3.3 Water Hammer Arrestor

.1 Install on branch supplies to each fixture or group of fixtures and where indicated.

3.4 Trap Seal Primers

.1 Install for all 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 soft copper or plastic tubing to floor drain.

3.5 Performance Verification:

.1 General:

.1 In accordance with Section 23 08 01 – Performance Verification Mechanical Piping Systems.

.2 PV procedures:

.1 Vacuum breakers, circulating pumps: operation under all conditions.

.2 Thermostatic controls: Verify temperature settings, operation of control, limit and safety controls.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 This Section specifies the common work results for the Mechanical Divisions, including:

.1	Division 21	Fire Protection
.2	Division 22	Plumbing
.3	Division 23	Heating Ventilation & Air Conditioning
.4	Division 25	Integrated Automation (EMCS)

.2 Read Division 1 General Requirements in conjunction with the specifications for Mechanical Divisions. Division 1 and this Section shall form a part of and shall apply to all Mechanical Divisions. The most stringent requirements of this and other Mechanical Sections must be adhered to.

.3 The Mechanical work shall consist of the supply and installation of complete and operable mechanical systems and shall include all necessary labour, plant, materials, and incidentals for the work involved as listed in the Mechanical Divisions. All sections in the Mechanical Divisions specifications are related sections and shall be read in conjunction with each other, whether or not "Related Sections" are explicitly mentioned under each section.

.4 Hazardous building materials under Mechanical Divisions that will be disturbed during construction shall be removed and disposed in accordance to Division 2. These hazardous building materials include but not limited to asbestos containing duct mastic, pipe elbows, plumbing gaskets.

1.2 Submittals

.1 Submittals: in accordance with Section 01 01 50 – General Instructions.

.2 Shop drawings to show:

- .1 Mounting arrangements.
- .2 Operating and maintenance clearances.

.3 Shop drawings and product data accompanied by:

- .1 Detailed drawings of bases, supports, and anchor bolts.
- .2 Acoustical sound power data, where applicable.
- .3 Points of operation on performance curves.
- .4 Manufacturer to certify current model production.
- .5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 01 50 – General Instructions: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.5 Closeout Submittals:

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

.2 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection. Also see "Mandatory Requirements for O&M Manuals" this in Section.

.3 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.4 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.5 Performance data to include:

.1 Equipment performance verification test results.

.2 Special performance data as specified.

.3 For each fan and pump installed, provide performance data in "Curve" or multi rating table.

.4 For each plumbing fixture, floor and roof drain installed, provide manufacturer's "cut" of that item and "cuts" of associated brass goods.

.6 Approvals:

.1 Submit 1 copy of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless 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 additional data when need for it becomes apparent during specified demonstrations and instructions.

.2 Copies of extended guarantees and warranties for equipment items such as hot water tanks and heat exchangers shall be included in a separate section of the manual.

.8 Site records:

.1 Departmental Representative will provide 1 set of mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to site mechanical drawings. Update drawings to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.5 The drawings shall indicate the inverts and dimensioned locations of all services at the property line and where they penetrate the building perimeter.

.9 As-built drawings:

.1 Departmental Representative will provide CAD drawings to Contractor who will be responsible for producing the as-built drawings. Contractor shall update CAD drawings using CAD drafting procedures, to show all changes made.

.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 one (1) hard copy for check prints to Departmental Representative for approval, and make corrections as directed. Upon acceptance by Departmental Representative, Contractor shall make multiple copies of as-built drawings (electronic and hard copies), and submit completed as-built drawings with Operating and Maintenance Manuals in accordance with Division 1.

1.3 Regulations

.1 Comply with most stringent requirements of NBC, Provincial and Municipal regulations and by-laws, specified standards, codes and this specification. Practices contained in these standards or standards suggested or recommended by reference organizations, are to be taken as minimum requirements.

.2 Furnish certificates confirming work installed conforms to requirements of authorities having jurisdiction.

.3 Drawings and specifications should not conflict with these Regulations but where there are apparent discrepancies, notify the Departmental Representative in writing and obtain clarifications before proceeding with the work.

1.4 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Guarantee Warranty

.1 Correct promptly at own expense, defects or deficiencies in the work in accordance with the Warranty requirements of the Contract.

.2 The Departmental Representative shall be the judge as to whether the failure is due to defective workmanship, improper usage or ordinary wear and tear.

.3 Make good any damage resulting from defective materials or workmanship.

.4 Rectify any deficiencies or omissions in respect to plans or Specifications which may appear during the guarantee period even though work has been accepted as complete.

1.6 Definitions

.1 Definitions used in this Division will have the following meaning:

.1 "Concealed": pipes, ducts, etc., in trenches, chases, furred spaces, pipe shafts, or hung ceilings.

.2 "Exposed": regarding insulation and painting of piping, ducts, etc., will mean that they are not "concealed", as defined herein.

.3 "Piping": includes, in addition to pipe, all fittings, valves, hangers, other accessories which comprise a system.

.4 "Provide": to supply and install, complete and ready for use.

1.7 Drawings

.1 Drawings:

.1 Are not intended to show structural details or architectural features.

.2 Are not to be scaled.

.3 Except where dimensioned, indicate general mechanical layouts only.

.4 The drawings are mainly schematic and do not attempt to show all offsets. Make such offsets at no additional cost to contract. Offset angles shall be as small as possible.

.5 All figured dimensions shall have precedence over scale. Detail drawings shall have precedence over small scale drawings; any difference between same shall be decided upon by the Departmental Representative.

.2 Provide field (shop) drawings to indicate relative position of various services when required by Departmental Representative and obtain approval before commencing work.

.3 Shop drawing review by Departmental Representative is for the sole purpose of ascertaining conformance with the general design concept. This review shall not mean that Departmental Representative approves the detail design inherent in the shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve the Contractor of his responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents. The Contractor is responsible for quantities and dimensions to be confirmed and correlated at the job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of the work of all sub-rades

1.8 Maintenance

.1 Furnish spare parts in accordance with Section 01 01 50 – General Instructions as indicated in the detailed product specification clauses.

.2 Provide access doors for concealed expansion joints, traps, strainers, cleanouts, balance dampers, fire dampers, other parts requiring accessibility for operating and maintenance.

.3 In suspended panel ceilings, use panel in place of access door; provide in such panel a button or other means of identification and easy removal when necessary.

1.9 Delivery, Storage and Handling

.1 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

1.10 Mandatory Requirements for O&M Manuals

.1 Employ an independent firm with minimum five (5) years experience in preparing professional quality O&M manuals.

.2 Hard Copy Requirements:

.1 Hard copies shall be placed in D-ring binders with clear overlay on front and spine with labels inserted on front cover and spine. Labels shall include the following information: Front cover label shall include the project name, project location, owner, architect, mechanical consultant, general contractor, mechanical contractor, firm preparing the manuals, and the month and year that the manuals were prepared. It shall also bear the label "Operating & Maintenance Manual for Mechanical Systems".

.2 Spine label shall include the project name, project location, and the year that the manuals were prepared. It shall also bear the label "Operating & Maintenance Manual for Mechanical Systems".

.3 Indicate Volume X of Y if more than one volume is required.

.4 Insert a Title page and Table of Contents in clear plastic covers.

.5 Title page shall include the project name, project location, as well as the name, address, phone number of the owner, architect, mechanical consultant, general contractor, mechanical contractor, firm preparing the manuals, and the month and year that the manuals were prepared. It shall also bear the label "Operating & Maintenance Manual For Mechanical Systems".

.6 Index the binder according to the following system:

Tab 1.1 Mechanical Drawing Schedule

Tab 1.2 Description of Systems

- Provide a schematic drawing and component description for each major mechanical system including air handling systems, boiler and hot water heating piping distribution systems and (where applicable) water chillers and chilled water distribution systems. The schematic

drawing shall identify each component with a letter designation corresponding to a description briefly explaining the purpose of each component and how it relates to the other components, and be presented in a current version of AutoCAD or similar computer aided drafting program.

- The component description shall be clearly written in a language that may be easily understood by the building operators and maintainers who will be using them.

Tab 1.3 Operating Division

Provide the following:

- Specific operating instructions for each major item of equipment, including air handling systems, pumps, boilers, chillers, etc.
    - Ventilation requirements, Energy considerations, Automatic temperature control settings, Information regarding air filters and pressure drops for clean and dirty conditions.
    - Trouble Shooting Procedure Guide in spreadsheet form with the most likely causes and recommended actions for all foreseeable problems. Trouble Shooting Procedure guides are required for all the major items of equipment including air handling systems, exhaust fans, circulating pumps, mechanical cooling equipment, etc.
    - Mechanical Equipment Starting Procedures.

Tab 1.4 Maintenance and Lubrication Division

Tab 1.5 Equipment Supplier and Contractor Schedule

- Provide a list of Equipment Suppliers and Contractors and include their address, telephone number.
- Provide the Equipment Make/Manufacturer

Tab 2.0 Guarantees, Certificates and Reports

- Including assurance letters, balancing and commissioning reports (if applicable)

Tab 2.1 Valve Tag Schedule

Tab 2.2 Labeling and Identification Schedule

- Piping colour code schedules
- Access panel identification schedules

Tab 2.3 Chemical Cleaning and Treatment

- Chemical cleaning shop drawings, water treatment data

Tab 3.0 Equipment Shop Drawings and Maintenance Data

- Organize this section into numbered tabs.
- Insert final shop drawings that have been reviewed and as-built control schematics.
- For each fan and pump installed, provide performance curves indicating the design point of intersection and the actual operating point.
- For each plumbing fixture, floor and roof drain installed, provide manufacturer's "cut" of that item and "cut" of associated brass goods.
- In addition to the shop drawings provided for the various items of mechanical equipment, this section shall also include the Manufacturers' Literature on:
  - Operating and maintenance instructions
  - Spare parts lists
  - Trouble Shooting information

Tab 4.0 Balance Report

The divider tabs shall be custom laminated mylar plastic and shall be in accordance with the following colour scheme:

- Tabs 1.1 to 1.5 – Orange
- Tabs 2.0 to 2.3 – Green
- Tab 3.0 – Yellow

.7 Furnish sufficient copies of equipment manufacturer's literature, a set of drawings, approved shop drawings, and Mechanical Specification to the company preparing the O&M manuals to meet the above requirements.

.2 Digital Manual Requirements

.1 The digital version of the manuals and the hard cover version shall be prepared by the same company.

.2 In addition to the operating and maintenance manuals provided in hard covered binders, two copies of all information shall be provided in digital format as follows:

.3 The information shall be organized into sections in a user-friendly format to make it easy to search for specific information. An indexing system shall be included that remains on an expandable portion of the screen that allows the end user to scroll through the manual information that appears on the main portion of the screen. The digital version content and organization for each manual shall be arranged in a manner identical to the hard copy version. The specific requirements are listed below:

.1 Utilize Adobe Acrobat PDF format.

.2 If there is more than one volume of manual, indicate "Volume X of Y" for each volume.

.3 Include a copy of the latest Adobe Acrobat Reader.

.4 The final Digital copies are to be copied to CDR with a custom CDR label. The custom CDR label shall include: Project Name, Location of Project, Date of Assembly, name of Mechanical Consultant, and shall be titled "Operating & Maintenance Manual for Mechanical Systems".

.5 The Digital Manual shall be enhanced with the following features: Bookmarks, Thumbnails, Internet Links, Internal Document Links and Optical Character Recognition (OCR). Refer to Scanning Requirements and Organizational Requirements listed below.

.4 Scanning Requirements:

.1 All pages contained within the hard copy manual are to be scanned and/or digitized to Adobe Acrobat PDF format.

.2 Provide a minimum 300 DPI for all scanned pages.

.3 All scanned shop drawings may be searched for text with minimum 75% Optical Character Recognition (OCR).

.4 All shop drawings are to be scanned to a minimum 8.5"X11" size. If the original page size is 11"X17", the digital copy shall also be 11"X17". Page sizes exceeding 11"X17" may be shrunk down to 11"X17".

.5 Rotation of scanned page images/texts shall be displayed within +/- 20 degrees.

.5 Organizational Requirements:

.1 Digital Manual shall be organized in the same manner as the approved Hard Copy Manual. (e.g. Tabs 1.1, 1.2, 1.3, 1.4, 1.5, 2.0, 3.0, 4.0, etc).

.2 Bookmark all major tabs and subsections.

.3 Bookmark each set of shop drawings (Section 3.0).

.4 Link the Table of Contents page to the referenced sections.

.5 Insert an introduction/summary page for Sections 1.2, 1.3, 1.4, and 3.0 indicating major subsections. Link these pages to their referenced sections.

.6 Link the system descriptions to the referenced schematic drawings contained in section 1.2.

.7 Insert Internet Links and Internal Document Links from Section 1.5 to Mechanical Equipment Manufacturers/Suppliers/Contractors official websites.

.8 Mechanical Equipment Shop Drawings located in Section 3.0.

.6 Use the following colour code for links contained in Sections 1.2, 1.3, 1.4, and 1.5.:

.1 Internet Links (light blue with underline).

.2 Internal Document Link (dark blue) (excludes AutoCAD schematic links).

.7 Insert a title page for each major piece of equipment located in Section 3.0. The title page shall include the Shop Drawing name, and a link (dark blue in colour) to Section 1.5.

.8 It is the responsibility of the Mechanical Trade to provide high quality documentation for scanning.

.9 Digital Manual shall be reviewed by the Departmental Representative for content and layout prior to final submission.

1.11 Firestopping

.1 Apply firestop sealant and systems around all penetrations through openings in fire rated wall, floor and ceiling assemblies.

.2 Seal around conduits penetrating fire separations.

.3 References:

.1 ULC-S115-05 – Standard Method of Fire Tests of Firestop Systems.

.4 Product Data

.1 Submit product data and layout plan in accordance with Section 01 01 50.

.2 Submit manufacturer's product data for materials and prefabricated devices, providing descriptions are sufficient for identification at job site. Include manufacturer's printed instructions for installation.

.3 Submit plan showing location of each penetration and product data to indicate type of firestopping being installed at each location.

PART 2 PRODUCTS

2.1 Access Doors

.1 Access door size shall be as indicated and where not indicated, make 305mm x 406mm [12" x 16"] minimum or 610mm x 457mm [24" x 18"] where persons have to enter. For acoustical ceilings, conform to architectural panel pattern.

.2 Unless otherwise indicated, access doors shall be hinged, flush type, steel framed panel, 14 gauge minimum, satin finished galvanized steel or type 304 stainless steel, with anchor straps for wet areas, washrooms, and all walls finished in ceramic tile.

.3 Hinges shall be concealed, spring hinge to allow door to open 175°. Locking devices shall be flush cam type, screwdriver operated, doors and frames shall have prime coated rust inhibiting paint, unless made of stainless steel.

.4 Where doors are required in fire rated walls, access doors shall be uninsulated and for all fire rated ceilings and walls where maximum temperature rise limitation is applicable, shall be insulated. All fire rated access doors shall have Warnock Hersey or ULC listed 2 hour fire rating and shall be installed in accordance with NFPA 80 and manufacturer's installation instructions.

2.2 Security Access Doors

.1 Security type access doors shall be fully welded construction. Panels and frames shall be manufactured of 10 gauge steel. In addition to concealed spot welding, individual knuckles on the full length piano hinge shall be welded to the frame and panel. Piano hinge shall have non-removable pin. The return flange on the door panel shall provide rigidity and tamper-resistance edge. Provide deadbolt locks with a Schlage "C" keyway. Electro-statically applied off white finish.

2.3 Firestopping

.1 Fire stopping and smoke seal systems: in accordance with ULC-S115.

.1 Systems capable of maintaining an effective barrier against flame, smoke and gases in compliance with requirements of ULC-S115 and not to exceed opening sizes for which they are intended.

.2 Fire stop system rating: to match wall/floor/roof assembly of rating indicated.

.2 Service penetration assemblies: certified by ULC in accordance with ULC-S115 and listed in ULC Guide No. 40 U19.

.3 Prefabricated flange units, with outer metal flange die-stamped from 0.3 mm thick 316 stainless steel, with inset of premoulded silicone elastomeric ring, factory moulded, U.L.C. or W.H. listed as a through penetration fire stop. Flange hinged for fixing over pipe and then secured tight with self-tapping screw.

.4 Fire-resistance rating of installed fire stopping assembly not less than the fire- resistance rating of surrounding wall assembly.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal; do not use cementitious or rigid seal at such locations.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: prefabricated silicone elastomeric seal; do not use a cementitious or rigid seal at such locations.

.7 Primers: to manufacturer's recommendation for specific material, substrate, and end use.

PART 3 EXECUTION

3.1 Installation

.1 Coordinate work with work of other sections to avoid conflict.

.2 Locate distribution systems, equipment, and materials to provide minimum interferences and maximum usable space.

.3 Where interference occurs, Departmental Representative shall approve relocation of equipment and materials, regardless of installation sequence.

.4 Provide tamperproof screws to new and relocated equipment which is located in inmate accessible areas.

3.2 Cleaning

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

3.3 Cutting and Patching

.1 Make arrangements with General Contractor for all cutting and patching in this work.

.2 Minimize cutting and patching. Set sleeves and mark openings in concrete or masonry.

.3 Conduct ground penetrating radar (GPR) scans prior to coring or cutting existing concrete structure.

3.4 Waterproofing

.1 Where any work pierces waterproofing including waterproofing concrete, the method of installation shall be as approved by the Departmental Representative before the work is done. Supply and install all necessary sleeves, caulking, roof curbs, and flashing required and make the openings watertight.

3.5 Protection of Work

.1 Protect equipment and material during construction from the weather, moisture, dust, painting, plastering and physical damage. Clean and return to "as new" condition.

.2 Mask or grease and cover machined surfaces. Firmly secure covers over equipment openings and open ends of piping, conduit and ductwork as work progresses. Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

.3 Any equipment that has operating parts, bearings or machined surfaces that show signs of rusting, pitting or physical damage will be rejected.

.4 Refinish damaged or marred factory finishes to the satisfaction of the Departmental Representative, using equal quality materials.

3.6 Field Quality Control

.1 Site Tests: conduct following tests in accordance with Section 01 01 50 – General Instructions and submit report as described in PART 1 - SUBMITTALS.

.2 Manufacturer's Field Services:

.1 Where specified, obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.7 Demonstration and Operating Instructions

.1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Provide training to Departmental Representative for the controls and operation of mechanical equipment and systems installed and/or modified as part of this project..

.3 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.

.4 Use operation and maintenance manual and as-built drawings as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 During substantial performance review of the work the Mechanical Contractor, together with the Departmental Representative, Controls Contractor, and other Subcontractors designated by the Departmental Representative, shall instruct the Owner's operating personnel in the proper operation and maintenance of all systems and equipment installed under the contract.

.7 It shall be the Mechanical Contractor's responsibility to have the specified equipment manuals prepared, previously approved by the Departmental Representative, and ready for presentation to the Owner at this meeting.

.8 Convene the meeting with the aforementioned parties at the time called for in the substantial performance review. The arrangements shall include written notices to all the parties concerned. Should the equipment manuals, or system installation not be complete and operable at the proper time, he shall then convene the operating instruction meeting at a later date and pay any additional costs including time and travelling expenses for the personnel involved which are attributable to the delay.

.9 Keeping a sign-in sheet is mandatory for the demonstration and training session. Submit a copy of the sign-in sheet to Departmental Representative for record.

3.8 Access Doors

.1 Furnish access doors for concealed expansion joints, traps, strainers, cleanouts, balance dampers, fire dampers, other parts requiring accessibility for operating and maintenance. Access doors shall be provided to General Contractor for installation and shall be coordinated.

.2 In suspended panel ceilings, use panel in place of access door; provide in such panel a button or other means of identification and easy removal when necessary.

.3 Security type access doors shall be used at the following locations where inmates may have access to, per Table 1 below:

Table 1

Room	Description / Locations
AD 100	Admission / Discharge
AD 105	B.F. Inmate Washroom

3.9 Firestopping

.1 Preparation:

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials. 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.

.2 Installation:

.1 Install fire stopping and smoke seal material and components in accordance with ULC certification and manufacturer's instructions.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Tighten self-tapping screw on flange unit to ensure adequate tight and permanent seal.

.4 Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete. Responsible trade to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

.5 Avoid cutting or penetrating of existing firestop systems already installed by other trades. If unavoidable, especially in renovations, remove existing material and provide new fire stopping system to complete the installation in accordance with this specification.

.3 Inspection:

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

.2 Final inspection of through-penetration firestopping shall be performed by the Manufacturer's Authorized Representative in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard. At project closeout, provide a letter to certification to the Departmental Representative indicating all fire stopping supplied and installed for the project meets Building Code requirements and has been installed in accordance with the Manufacturer's installation instructions. Include a copy of the letter in the O&M manual.

.4 Schedule:

.1 Fire stop and smoke seal at:

.1 Penetrations through fire-resistance rated walls, floors and ceilings.

.2 Around mechanical and electrical assemblies penetrating fire separations.

.2 Existing floor, wall and ceiling assemblies where there is fire stopping at existing penetration(s) shall be deemed to have fire resistive rating. New penetrations through such assemblies shall be fire stopped. Review existing condition on site and keep records.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 23 05 00 Common Work Results – Mechanical

.2 Section 23 05 29 Hangers & Support for Piping & Equipment

.3 Section 23 08 02 Cleaning and Start-up of Mechanical Piping Systems

.4 All work installed under Divisions 22 and 23 shall conform to this Section.

1.2 References

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.181-1999, Ready-Mixed Organic Zinc-Rich Coating.

1.3 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

PART 2 PRODUCTS

2.1 Not Used

.1 Not Used

PART 3 EXECUTION

3.1 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.

3.2 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, or components.

3.3 Pipework Installation

.1 Protect openings against entry of foreign material.

.2 Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.

.3 Assemble piping using fittings manufactured to ANSI standards.

.4 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.

.5 Install concealed pipework to minimize furring space, maximize headroom, conserve space.

.6 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 Install globe valves in bypass around control valves.

.6 Use chain operators on valves NPS 2-1/2 and larger where installed more than 2400mm above floor in Mechanical Rooms.

.7 Install dielectric coupling between dissimilar metals.

.8 Install in accordance with Section 23 05 29 – Hanger & Support for Piping & Equipment.

3.4 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 un-insulated 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 25mm above finished floor.

.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.

3.5 Escutcheons

.1 Install on pipes passing through walls, partitions, floors, and ceilings in finished areas.

.2 Construction: One piece type with 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.

3.6 Cleaning of Piping Systems

.1 Before start-up, clean interior of piping systems in accordance with requirements of Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

.2 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of filters in piping systems.

3.7 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 24 hours minimum unless specified for longer period of time.

.4 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media.

.5 Pay costs for repairs or replacement, retesting, and making good. Departmental Representative to determine whether repair or replacement is appropriate.

.6 Conceal work only after approval and certification of tests by Departmental Representative.

END OF SECTION

PART 1 GENERAL

1.1 Related Section

.1 Section 01 01 50 General Instructions

.2 Section 01 35 33 Health and Safety Requirements

.3 Section 23 05 00 Common Work Results – Mechanical

.4 Section 23 05 48 Vibration & Seismic Control for Ductwork, Piping and Equipment

.5 All work installed under Divisions 22 and 23 shall conform to this Section.

1.2 References

.1 American National Standards Institute / Sheet Metal and Air Conditioning Contractors National Association (ANSI/SMACNA):

.1 ANSI/SMACNA 001-2008, Seismic Restraint Manual, Guidelines for Mechanical Systems, 3rd Edition.

.2 American Society of Mechanical Engineers (ASME):

.1 ASME B31.1-12, Power Piping.

.3 American Society for Testing and Materials (ASTM):

.1 ASTM A125-96(2013)e1, Standard Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

.3 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS):

.1 MSS SP58-2009, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

.5 National Plumbing Code 2010.

1.3 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 SP58.

.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 all 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 to be in accordance with MSS SP58.

.2 Performance Requirements:

.1 Design supports and hangers to withstand seismic events as specified Section 23 05 48 – Vibration & Seismic Control for Ductwork, Piping and Equipment.

1.4 Submittals

.1 Submittals: in accordance with Section 01 01 50 – General Instructions.

.2 Submit shop drawings and product data for following items:

.1 Bases, hangers and supports.

.2 Connections to equipment and structure.

.3 Structural assemblies.

.3 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.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 maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.5 Quality Assurance

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.6 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.

.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 01 50 – General Instructions.

PART 2 PRODUCTS

2.1 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 SP58.

.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 SP58.

2.2 General

.1 Fabricate hangers, supports and sway braces in accordance with ANSI B31.1 and MSS SP58.

.2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.3 Upper Attachment

.1 Concrete:

.1 Inserts for cast-in-place concrete: galvanized steel wedge. ULC listed for pipe NPS 3/4 through NPS 8 - Grinnell/Anvil Fig. 281.

.2 Carbon steel plate with clevis for surface mount: malleable iron socket with expansion case and bolt. Minimum two expansion cases and bolts for each hanger – Grinnell/Anvil, plate fig. 49, socket fig. 290, expansion case fig. 117.

.2 Steel Beam (bottom flange):

.1 Cold piping NPS 2 and under: malleable iron C clamp - Grinnell/Anvil fig. 61.

.2 Cold piping NPS 2-1/2 and larger and all hot piping: malleable iron beam clamp - Grinnell/Anvil fig. 292.

.3 Steel Beam (top):

.1 Cold piping NPS 2 and under: malleable iron "top of beam" C clamp - Grinnell/Anvil Fig. 61.

.2 Cold piping NPS 2-1/2 and larger and all hot piping: steel jaw, hook rod with nut, spring washer and plain washer - Grinnell/Anvil fig. 227.

.4 Steel Joist:

.1 Cold piping NPS 2 and under: steel washer plate with double locking nuts.

.2 Cold piping NPS 2-1/2 and larger and all hot piping: steel washer plates with double locking nut, carbon steel clevis and malleable iron socket - Grinnell/Anvil: washer plate, fig. 60; clevis, fig. 66; socket, fig. 290.

.5 Steel Channel or Angle (bottom):

.1 Cold piping NPS 2 and under; malleable iron C clamp - Grinnell/Anvil fig. 86.

.2 Cold piping NPS 2-1/2 and larger and all hot piping; universal channel clamp - Grinnell/Anvil fig. 226.

.6 Steel Channel or Angle (top):

.1 Cold piping NPS 2 and under: malleable iron "top of beam" C clamp - Grinnell/Anvil fig. 61.

.2 Cold piping NPS 2-1/2 and larger and all hot piping: steel jaw, hook rod with nut, spring washer and plain washer - Grinnell/Anvil fig. 227.

.7 Wood beam or ceiling:

.1 Ceiling plate and flanges: malleable iron – Grinnell/Anvil Fig. 128R.

.2 Eye socket: galvanized steel – Grinnell/Anvil fig. 189 or 190.

2.4 Middle Attachments (Rod)

.1 Carbon steel black (electro-galvanized/cadmium plated for mechanical rooms) continuous threaded rod - Grinnell/Anvil fig. 146.

.2 Ensure that hanger rods are subject to tensile loading only.

2.5 Pipe Attachments

.1 Piping with less than 25 mm [1"] horizontal movement, NPS 2 and under: adjustable swivel ring hanger - Grinnell/Anvil fig. 69.

.2 Piping with less than 25 mm [1"] horizontal movement, NPS 2-1/2 and over: adjustable clevis hanger - Grinnell/Anvil fig. 260.

.3 Suspended hot piping with horizontal movement more than 25 mm [1"]: pipe roller - Grinnell/Anvil fig. 174 or Grinnell/Anvil fig. 181 up to NPS 6 and Grinnell/Anvil fig. 171 NPS 8 and larger.

.4 Bottom-supported hot piping: pipe roller stand - Grinnell/Anvil fig. 271.

.5 Spring hangers; where required to offset expansion on horizontal runs which follow long vertical risers - Grinnell/Anvil fig. 171 single pipe roll hanger with Grinnell/Anvil fig. 178.

.6 Use oversize pipe hangers for cold piping all sizes, hot piping NPS 2-1/2 and over, and steam piping all sizes.

.7 Perforated band iron, wire or chain hangers will not be approved.

.8 All hangers for copper pipe shall be copper, copper clad, felt lined or use plastic-tape wrapped pipe at hanger.

2.6 Riser Clamps

.1 Steel or cast iron pipe: galvanized carbon steel - Grinnell/Anvil fig. 261.

.2 Copper pipe: carbon steel copper finished - Grinnell/Anvil fig. CT-121.

2.7 Protection Shields

.1 Cold piping, all sizes: protection shield with calcium silicate pipe insulation under shield with uninterrupted vapour barrier.

.2 Hot piping with less than 25 mm [1"] horizontal movement, NPS 2 and under: insulation over pipe hanger.

.3 Hot piping with less than 25 mm [1"] horizontal movement, NPS 2-1/2 and over: protective shield with calcium silicate insulation under shield.

.4 Hot piping with horizontal movement more than 25 mm [1"], all sizes: protective shield with calcium silicate insulation under shield.

2.8 Wall Supports

.1 Horizontal pipe adjacent to wall:

.1 Angle iron wall brackets with specified hangers.

.2 Vertical pipe adjacent to wall.

.1 Exposed pipe wall support for lateral movement restraint - Grinnell/Anvil fig. 262 or 263.

.2 Channel type support.

2.9 Floor Support

.1 Horizontal pipe.

.1 Do not support piping from the floor unless specifically indicated.

.2 Vertical pipe.

.1 Mid-point of risers between floor slabs - adjustable fabricated steel supports.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems per Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment.

.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. Supporting piping from underside of light weight roof deck (without concrete) is not permitted.

.5 Use expansion anchor on existing concrete structure.

3.2 Hanger Spacing

.1 HVAC piping: in accordance with table below.

.2 Plumbing piping: in accordance with the most stringent requirements of the table below as well as the following:

.1 National. Plumbing Code.

.2 Authority Having Jurisdiction.

.3 Pipe hanger rods shall be sized in accordance to SMACNA Seismic Restraint Manual based on Seismic Hazard Level (SHL). For SHL, see Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment.

MAXIMUM HANGER SPACING						
PIPE DIA. NPS	STEEL SCH.40	COPPER L,K Hard Drawn	CAST.I STD.	GLASS	ABS/PVC	PEX
1/2	1.8 m [6'-0"]	1.8 m [6'-0"]			1.2 m [4'-0"]	0.8 m [2'-6"]
3/4 & 1	2.4 m [8'-0"]	2.4 m [8'-0"]			1.2 m [4'-0"]	0.8 m [2'-6"]
1-1/4	2.4 m [8'-0"]	3.0 m [10'-0"]			1.2 m [4'-0"]	0.8 m [2'-6"]
1-1/2 & 2	2.4 m [8'-0"]	3.0 m [10'-0"]	3.0 m [10'-0"]		1.2 m [4'-0"]	0.8 m [2'-6"]
2-1/2, 3, 4 & 5	2.4 m [8'-0"]	3.0 m [10'-0"]	3.0 m [10'-0"]	2.4 m [8'-0"]	1.2 m [4'-0"]	0.8 m [2'-6"]
6 & 8	3.0 m [10'-0"]	3.0 m [10'-0"]	3.0 m [10'-0"]	2.4 m [8'-0"]	1.2 m [4'-0"]	0.8 m [2'-6"]

3.3 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.

3.4 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 13mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.5 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.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 01 50 — General Instructions

.2 Section 23 05 00 — Common Work Results – Mechanical

.3 All work installed under Divisions 22 and 23 shall conform to this Section.

1.2 References

.1 National Building Code of Canada (NBC)

.2 American National Standards Institute / Sheet Metal and Air Conditioning Contractors National Association (ANSI/SMACNA):

.1 ANSI/SMACNA 001-2008, Seismic Restraint Manual, Guidelines for Mechanical Systems, 3rd Edition.

1.3 Shop Drawings

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Provide vibration isolation systems shop drawings complete with performance and product data. Shop drawings shall demonstrate compliance with the National Building Code and shall bear the seal of a Professional Engineer.

.3 Provide detailed drawings of all seismic restraint systems for piping and equipment.

1.4 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

.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 packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

PART 2 PRODUCTS

2.1 Vibration Isolation System – General

.1 Performance of vibration isolation systems shall be designed by manufacturer specializing in vibration isolation materials and devices.

.2 Size and shape of bases type shall be coordinated with submitted equipment.

.3 Products shall of the same manufacturer unless otherwise noted.

2.2 Elastomeric Pads

.1 Type EP1 - neoprene waffle or ribbed; 9 mm [3/8"] minimum thick; 50 durometer; maximum loading 350 kPa [50 psi].

.2 Type EP2 - rubber waffle or ribbed; 9 mm [3/8"] minimum thick; 30 durometer natural rubber; maximum loading 415 kPa [60 psi].

.3 Type EP3 - neoprene-steel-neoprene; 9 mm [3/8"] minimum thick neoprene bonded to 1.71 mm [16 gauge] steel plate; 50 durometer neoprene, waffle or ribbed; holes sleeved with isolation washers; maximum loading 350 kPa [50 psi].

.4 Type EP4 - rubber-steel-rubber; 9 mm [3/8"] minimum thick rubber bonded to 1.71 mm [16 gauge] steel plate; 30 durometer natural rubber, waffle or ribbed; holes sleeved with isolation washers; maximum loading 415 kPa [60 psi].

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, molded with rod isolation bushing which passes through hanger box.

.3 Type H2 - stable spring, elastomeric washer, cup with molded isolation bushing which passes through hanger box.

.4 Type H3 - stable spring, elastomeric element, cup with molded isolation bushing which passes through hanger box.

.5 Type H4 - stable spring, elastomeric element with pre-compression washer and nut with deflection indicator.

2.4 Acoustic Barriers for Anchors and Guides

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

2.5 Flexible Pipe Connectors

.1 Inner corrugated hose: stainless steel.

.2 Outer braid: Braided wire mesh stainless steel outer jacket.

.3 Type of end connection: threaded for 50mm [2"] or smaller; flange for 65mm [2-1/2"] or larger.

.4 Operating conditions:

.1 Working pressure: 1379 kPa [200 psi].

.2 Working temperature: 4540 °C [850 °F].

2.6 Seismic Control Measures

.1 General:

.1 Design anchorage and attachment methods for all systems and/or equipment as specified herein.

.2 Seismic control systems to work in all directions.

.3 Fasteners and attachment points to resist same maximum load as seismic restraint.

.4 Drilled or power driven anchors and fasteners not permitted.

.5 No equipment, equipment supports or mounts to fail before failure of structure.

.6 Supports of cast iron or threaded pipe not permitted.

.7 Seismic control measures not to interfere with integrity of firestopping.

.8 For equipment mounted on housekeeping pad, specify the minimum distance between anchor bolt and edge of housekeeping pad.

.2 Static equipment:

.1 Anchor equipment to equipment supports. Anchor equipment supports to structure.

.2 Seismic restraints:

.1 Cushioning action to be gentle and steady.

.2 Shall never reach metal-like stiffness.

.3 Vibration isolated equipment:

.1 Seismic control measures not to jeopardize noise and vibration isolation systems. Provide 6 to 9mm clearance during normal operation of equipment and systems between seismic restraint and equipment.

.2 Provide seismic restraints in addition to vibration isolation system to resist complete isolator unloading.

.4 Piping systems:

.1 Provide seismic restraints for all piping in accordance to the latest edition of SMACNA Seismic Restraint Manual.

.2 Seismic restraints may be omitted for the following conditions:

.1 Fuel piping less than 25mm [1"] diameter.

.2 All other piping less than 32mm [1-1/4"] diameter located inside boiler rooms, mechanical rooms and refrigeration rooms.

.3 All other piping less than 65mm [2-1/2"] diameter located outside boiler rooms, mechanical rooms and refrigeration rooms.

.4 All piping suspended by individual hangers 305mm [12"] or less in length, as measured from the top of the pipe to the bottom of the structural support for the hanger.

.3 To be compatible with requirements for anchoring and guiding of piping systems.

.4 Wet weight of piping shall be to be used for designing seismic restraint systems.

.5 Small pipes may be rigidly secured to larger pipes for restraint purposes, but not reverse.

.6 Where cable is used for restraining vibration isolated piping systems, install cable with sufficient slack to avoid short-circuiting of vibration isolators.

.5 Ductwork systems:

.1 Provide seismic restraints for all ductwork in accordance to the latest edition of SMACNA Seismic Restraint Manual as described below:

.1 All rectangular ducts with cross sectional areas 0.56m^2 [6 ft^2] and larger.

.2 All round ducts with diameters 711 mm [28"] and larger.

.2 Seismic restraints may be omitted for the following conditions:

.1 All ductwork suspended by hangers 305mm [12"] or less in length, as measured from the top of the duct to the bottom of the structural support for the hanger.

.6 Bracing methods:

.1 Approved by Departmental Representative.

.2 Structural angles or channels.

.3 Cable restraint system incorporating grommets, shackles and other hardware to ensure alignment of restraints and to avoid bending of cables at connection points. Incorporate neoprene into cable connections to reduce shock loads.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Seismic control measures to meet requirements of NBC.

.2 Install vibration isolation equipment in accordance with manufacturer's instructions and adjust mountings to level equipment.

.3 Ensure piping, ducting and electrical connections to isolated equipment do not reduce system flexibility and that piping, conduit and ducting passage through walls and floors do not transmit vibrations.

.4 Where isolation is bolted to floor use vibration isolation rubber washers.

.5 Block and shim level bases so that ductwork and piping connections can be made to rigid system at operating level, before isolator adjustment is made. Ensure that there is no physical contact between isolated equipment and building structure.

3.3 Field Quality Control

.1 Provide the services of the Professional Engineer(s) who designed the restraint systems for "Field Review" of the installed components, and submit the following to the Departmental Representative:

.1 Schedule B, signed and sealed; provided at the commencement of the project.

.2 Signed and sealed shop drawings of seismic restraints for equipment, piping and ductwork; provided prior to installation.

.3 Typewritten inspection reports; provided during the construction period.

.4 Schedule C-B, signed and sealed; provided after performing "Field Review".

END OF SECTION

PART 1 - GENERAL

1.1 Related Sections

.1 Section 01 01 50 — General Instructions

.2 Section 01 35 33 — Health and Safety Requirements

.3 Section 23 05 00 — Common Work Results – Mechanical

.4 All work installed under Divisions 22 and 23 shall conform to this Section.

1.2 References

.1 Canadian Gas Association (CGA)

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

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)

.1 NFPA 13, Standard for the Installation of Sprinkler Systems.

.2 NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

1.3 Quality Assurance

.1 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.4 Delivery, Storage, and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.

.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 01 50 – General Instructions.

.2 Dispose of unused paint and coating material at official hazardous material collections site approved by Departmental Representative.

.3 Do not dispose of unused paint and 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:

	Sizes (mm)	No. of Lines	Height of Letters (mm)
1	10 x 50	1	3
2	13 x 75	1	5
3	11 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 PWGSC 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 Piping Systems Governed by Codes

.1 Identification:

.1 Natural gas and propane: to CSA/CGA B149.1.

.2 Sprinklers: to NFPA 13.

2.4 Identification of Piping Systems

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Pictograms:

.1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.6 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive [plastic-coated cloth] [vinyl] with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.7 Colours and Legends:

.1 Where not listed, obtain direction from 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
Hot water heating supply	Yellow	HEATINGSUPPLY
Hot water heating return	Yellow	HEATINGRETURN
Domestic hot water supply	Green	DOM.HWSUPPLY
Domestic HW recirculation	Green	DOM.HWCIRC
Domestic cold water supply	Green	DOM.CWS
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN.VENT
Natural gas and propane	to Codes	
Fire protection water	Red	FIREPROT.WTR
Sprinklers	Red	SPRINKLERS

2.5 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.

2.6 Valves, Controllers

.1 Plastic tags with 12 mm stamped identification data.

.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.

2.7 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.

2.8 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 has been completed.

3.3 Installation

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide CSA registration plates as required by respective agency.

.3 Identify systems, equipment to conform to PWGSC 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 Cleaning

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

END OF SECTION

PART 1 - GENERAL

1.1 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 Company

.1 Testing and balancing shall be performed by an agency that specializes in this type of work. Provide proof that the agency has successfully completed five projects of similar size and scope

.2 All work shall be performed by persons with proven ability and thoroughly versed in the type of testing and balancing. Submit names, complete with experience, record and references for review by the Consultant prior to work being carried out.

.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:

.1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2002.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-1998.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 Purpose of TAB

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

.2 Adjust and regulate installed 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 installed 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.

.2 TAB of existing equipment already in operation but not affected by the renovation.

1.5 Coordination

.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. 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 Division 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:

.1 Installation of ceilings, doors, windows, other construction affecting TAB.

.2 Application of weather-stripping, sealing, caulking.

.3 All pressure, leakage, other tests specified elsewhere Division 23.

.4 All provisions for TAB installed and operational.

.3 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 Outlets installed, volume control dampers open.

.3 Liquid systems:

.1 Flushed, filled, vented.

.2 Correct pump rotation.

.3 Strainers in place, baskets clean.

.4 Isolating and balancing valves installed open.

.5 Calibrated balancing valves installed, at factory settings.

.6 Chemical treatment systems complete, operational.

1.10 Application Tolerances

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 5%, minus 5%.

.2 Hydronic systems: plus or minus 10%.

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 Associated Air Balance Council Manual.

.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.

.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 Standard: TAB to be to most stringent of this section or TAB standards of ASHRAE.

.2 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop, temperatures (dry bulb, wet bulb, dew point, duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.3 Locations of equipment measurements: To include, but not be limited to, following as appropriate:

.1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.4 Locations of systems measurements to include, but not be limited to, following as appropriate: Main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.20 Water Systems (HVAC):

.1 Water circulating systems shall be balanced by means of balancing fittings and tabulated results shall include the following:

.1 Differential head across all circulating pumps.

.2 Flow and return water temperature to supply and return header for all zones.

.3 Water temperature supplied to and returning from each coil and heating element.

.2 Contractor shall arrange with balancing technician to have water flow through radiation elements checked prior to installation of radiation enclosure.

1.21 Domestic Hot Water Systems

.1 Meet requirements as specified for liquid systems.

.2 Locations of equipment measurements: To include, but not be limited to, following as appropriate: Inlet and outlet of heaters, tank, pump, circulator, at controllers, controlled device.

.3 Locations of systems measurements to include, but not be limited to, following as appropriate: main, main branch, branch, sub-branch.

.4 Domestic hot water recirculation system shall be balanced by proportioning the water flow at balancing fittings and ensuring adequate flow through each circuit.

1.22 Other TAB Requirements

.1 Testing of Fire Dampers & Fire Stop Flaps:

.1 Conduct a "trip" test on all fire dampers and fire stop flaps to ensure that fire mechanisms function correctly and that dampers attain a fully closed position when tripped.

.2 Send a copy of test results tabulating the fire damper location, size, and date of trip test, to the Departmental Representative for record purposes. Copies shall also be inserted in Equipment Maintenance Manuals.

.3 Dampers and Flaps which fail to function correctly shall be re-tested after corrective action has been completed. Any fusible links damaged when conducting tests shall be replaced by this Contractor. A signed and dated test label shall be attached to each fire damper upon completion of test and resetting of fire damper.

PART 2 - PRODUCTS

2.1 Not Used

.1 Not used.

PART 3 - EXECUTION

3.1 General

.1 Test and balance new/existing equipment and systems serving the renovated areas. Submit balancing report to Departmental Representative for review prior to substantial completion inspection.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 23 05 00	Common Work Results - Mechanical
.3	Section 23 05 29	Hangers and Supports for HVAC Piping and Equipment

1.2 References

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

- .1 ANSI/ASHRAE/IESNA 90.1-2013; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 American Society for Testing and Materials International, (ASTM)

- .1 ASTM B209M-10, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
- .2 ASTM C335/C335M-10e1, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C411-11, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .4 ASTM C449-07(2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .5 ASTM C547-12, Standard Specification for Mineral Fiber Pipe Insulation.
- .6 ASTM C553-13, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- .7 ASTM C612-14, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .8 ASTM C795-08(2013), Standard Specification for Thermal Insulation for Use with Austenitic Stainless Steel.
- .9 ASTM C921-10, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

- .1 CGSB 51-GP-52Ma-1989, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 South Coast Air Quality Management District (SCAQMD), California State

- .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

.5 Thermal Insulation Association of Canada (TIAC):

- .1 Mechanical Insulation Best Practice Guide, 2013.

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-07, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-11, Standard for Thermal Insulation Polyotrene, Boards and Pipe Covering.

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

.1 Material Safety Data Sheets (MSDS).

1.4 Submittals

.1 Submittals: in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. 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 01 50 – General Instructions.

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.4 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.5 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 33 - Health and Safety Requirements.

1.6 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 01 50 – General Instructions.

.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 01 50 – General Instructions.

.2 Place excess or unused insulation and insulation accessory materials in designated containers.

.3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.4 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.

PART 2 PRODUCTS

2.1 Fire and Smoke Rating

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 Insulation

.1 Mineral fibre as specified herein 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 C 335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C 612. Provide 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 C 553. Provide factory applied vapour retarder jacket to CGSB 51-GP-52Ma as scheduled in PART 3 of this section.

.1 Mineral fibre: to ASTM C 553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C 553.

.5 Evidence shall be provided to the Departmental Representative on the site of ULC listings of all products being used. Duct insulation adhesives and coatings shall be non-toxic as defined by WCB Regulations.

2.3 Jackets

.1 Canvas:

.1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: Compatible with insulation.

.1 Maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.2 Aluminum:

.1 To ASTM B 209 with and without moisture barrier as scheduled in PART 3 of this section.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Stucco embossed.

.4 Jacket banding and mechanical seals: 19 mm wide, 0.5 mm thick stainless steel.

2.4 Accessories

.1 Vapour retarder lap adhesive:

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

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C 449.

.4 Outdoor Vapour Retarder Mastic:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m².

.5 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.

.6 Contact adhesive: quick-setting

.7 Facing: 25 mm stainless steel hexagonal wire mesh stitched on one face of insulation.

.8 Fasteners: 2 mm diameter pins with 35 mm square clips, length to suit thickness of 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 ductwork systems 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 manufacturer's instructions and as indicated.

.3 Use two layers with staggered joints when required nominal thickness exceeds 75 mm.

.3 Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be outside vapour retarder jacket.

.5 Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.

.6 Supports, Hangers in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.7 Fasteners: At 300 mm oc in horizontal and vertical directions, minimum two rows each side.

.8 All ductwork exposed to weather shall have waterproof seams for weathertight construction. Ductwork exposed to weather which are not insulated or finish painted, shall be coated with two applications of bitumastic waterproofing compound to prevent corrosion. Exposed ducts, which are insulated, shall have aluminum jacket.

3.4 Duct Insulation Schedules

.1 Insulation types and thicknesses: Conform to following table:

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular, cold, dual temperature supply air ducts	C-1	Yes	50
Round, cold, dual temperature supply air ducts	C-2	Yes	50
Rectangular, warm air ducts	C-1	No	25
Round, warm air ducts	C-2	No	25
Supply, return and exhaust ducts exposed in space being served			None
Outside air ducts to mixing plenum	C-1	Yes	25
Exhaust ducts between dampers and louvers	C-1	No	25
Rectangular ducts outside	C-1	Special	50
Round ducts outside	C-2	Special	50
Acoustically lined ducts			None

.2 Finish: Conform to following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	None	None
Indoor, exposed within Service Rooms, including but not limited to mechanical equipment rooms, electrical equipment rooms, telecom/LAN rooms, janitor rooms	CRF/1	CRD/1
Indoor, exposed elsewhere	CRF/2	CRD/2
Outdoor, exposed to weather	CRF/3	CRD/3

3.5 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.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 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results - Mechanical
.4	Section 23 05 05	Installation of Pipe Work
.5	Section 23 05 29	Hangers and Supports for Ductwork, Piping and Equipment

1.2 References

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

- .1 ANSI/ASHRAE/IESNA 90.1-2013; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 American Society for Testing and Materials International, (ASTM)

- .1 ASTM B209M-10, Specification for Aluminum and Aluminum Alloy Sheet and Plate (Metric).
- .2 ASTM C335/C335M-10e1, Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
- .3 ASTM C411-11, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .4 ASTM C449-07(2013), Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
- .5 ASTM C547-12, Standard Specification for Mineral Fiber Pipe Insulation.
- .6 ASTM C553-13, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- .7 ASTM C612-14, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- .8 ASTM C795-08(2013), Standard Specification for Thermal Insulation for Use with Austenitic Stainless Steel.
- .9 ASTM C921-10, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

- .1 CGSB 51-GP-52Ma-1989, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Thermal Insulation Association of Canada (TIAC):

- .1 Mechanical Insulation Best Practice Guide, 2013.

.5 South Coast Air Quality Management District (SCAQMD), California State

- .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-07, Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701-11, Standard for Thermal Insulation Polyotrene, Boards and Pipe Covering.

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

.1 Material Safety Data Sheets (MSDS).

1.3 Definitions

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED"-will mean "not concealed" as defined herein.

.2 TIAC Codes:

.1 CRF: Code Rectangular Finish.

.2 CPF: Code Piping Finish.

1.4 Submittals

.1 Submittals: in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. 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 01 50 – General Instructions.

.3 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.4 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.5 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 33 - Health and Safety Requirements.

1.6 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 01 50 – General Instructions.

.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 01 50 – General Instructions.

.2 Place excess or unused insulation and insulation accessory materials in designated containers.

.3 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.

.4 Dispose of unused adhesive material at official hazardous material collections site approved by Departmental Representative.

PART 2 - PRODUCTS

2.1 Fire and Smoke Rating

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 Insulation

.1 Mineral fibre as specified herein 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.

.3 TIAC Code A-1: Rigid molded mineral fibre without factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/CGSB-51.9.

.2 Maximum "k" factor: to CAN/CGSB-51.9.

.4 TIAC Code A-3: Rigid molded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/CGSB-51.9.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/CGSB-51.9.

.5 TIAC Code C-2: Mineral fibre blanket faced [with] [without] factory applied vapour retarder jacket (as scheduled in PART 3 of this section).

.1 Mineral fibre: to CAN/ULC-S702.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702.

.6 TIAC Code A-6: Flexible unicellular tubular elastomer.

.1 Insulation: flexible closed-cell elastomer to ASTM C534.

.2 Jacket: to CGSB 51-GP-52Ma. Required for outdoor application.

.3 Maximum "k" factor: 0.27.

.4 Vapour transmission: 0.08 perm-inch.

.5 To be certified by manufacturer to be free of potential stress corrosion cracking corrodants.

.7 To be formaldehyde free, low VOC; resists mold and mildew.

.8 Evidence shall be provided to the Engineer on the site of ULC listings of all products being used. Duct insulation adhesives and coatings shall be non-toxic as defined by WCB Regulations.

2.3 Insulation Securement

.1 Tape: Self-adhesive, aluminum, reinforced, 50mm wide minimum.

.2 Contact adhesive: Quick setting.

.1 Maximum VOC limit 80 g/L to SCAQMD Rule 1168.

.3 Canvas adhesive: Washable.

.1 Maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.4 Tie wire: 1.5mm diameter stainless steel.

.5 Bands: Stainless steel, 19mm wide, 0.5mm thick.

2.4 Cement

.1 Thermal insulating and finishing cement:

.1 To CAN/CGSB-51.12.

.2 Hydraulic setting or Air drying on mineral wool, to ASTM C 449.

2.5 Vapour Retarder Lap Adhesive

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

2.6 Indoor Vapour Retarder Finish

.1 Vinyl emulsion type acrylic, compatible with insulation.

2.7 Outdoor Vapour Retarder Finish

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m.

2.8 Jackets

.1 Polyvinyl Chloride (PVC):

.1 One-piece moulded type and sheet to CGSB 51-GP-53M with pre-formed shapes as required.

.2 Colours: White.

.3 Minimum service temperatures: 20°C [68°F].

.4 Maximum service temperature: 65°C [150°F].

.5 Moisture vapour transmission: 0.02 perm.

.6 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 and 120 gm/m cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C 921.

.2 Lagging adhesive: Compatible with insulation.

.1 Maximum VOC limit 250 g/L to SCAQMD Rule 1168.

.3 Aluminum:

.1 To ASTM B 209 with and without moisture barrier as scheduled in PART 3 of this section.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Stucco embossed.

.4 Jacket banding and mechanical seals: 19 mm wide, 0.5 mm thick stainless steel.

PART 3 - EXECUTION

3.1 Pre-Installation Requirement

.1 Pressure testing of piping systems and adjacent equipment to be complete, witnessed and certified.

.2 Surfaces to be clean, dry, free from foreign material.

3.2 Installation

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturer's instructions and this specification.

.3 Use two layers with staggered joints when required nominal wall thickness exceeds 75mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Hangers, supports to be 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.

3.3 Removable, Pre-fabricated, Insulation and Enclosures

.1 Application: At expansion joints, valves, primary flow measuring elements flanges and 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.

3.4 Installation of Elastomeric Insulation

.1 Insulation to remain dry at all times. Overlaps to manufacturer's instructions. Ensure tight joints.

.2 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 at 300mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.3 TIAC Code: A-3.

.1 Securements: SS Bands at 300mm on centre.

.2 Seals: VR lap seal adhesive, VR lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.4 TIAC Code: A-6.

.1 Seals: lap seal adhesive, lagging adhesive.

.2 Installation: TIAC Code: 1501-CA; per manufacturer's recommendation.

.5 TIAC Code: C-2 with vapour retarder jacket.

.1 Insulation securements: SS Bands at 300mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code: 1501-C.

.6 Thickness of insulation to be as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000mm long.

.2 Do not insulate exposed run-outs to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp °C	TIAC Code	Run out	To NPS1	1 ¼-2	2 ½-4	5-6	8 & over
Hot Water Heating	60-94	A-1	25	38	38	38	38	38
Hot Water Heating	< 59	A-1	25	25	25	25	38	38
Domestic HW		A-1	25	25	25	38	38	38
Domestic CW		A-3	25	25	25	25	25	25

.7 Finishes:

.1 Exposed indoors: Canvas or PVC jacket.

.2 Exposed indoor in Service Rooms: Canvas or PVC jacket.

.1 Service Rooms include but are not limited to mechanical equipment rooms, electrical equipment rooms, telecom/LAN rooms, janitor rooms.

.3 Concealed, indoors: ASJ, no further finish.

.4 Exposed outdoors: Aluminum jacket.

3.6 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.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 Related Sections

.1	Section 22 42 01	Plumbing Specialties and Accessories
.2	Section 23 05 93	Testing, Adjusting and Balancing
.3	Section 23 08 02	Cleaning and Start-up of Mechanical Piping Systems

1.2 Cleaning and Start-up of Mechanical Piping Systems

.1 In accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

1.3 Hydronic Systems – Performance Verification (PV)

.1 Perform hydronic systems performance verification after cleaning is completed and system is in full operation.

.2 When systems are operational, perform following tests:

.1 Conduct full scale tests at maximum design flow rates, temperatures and pressures for continuous consecutive period of [48] hours to demonstrate compliance with design criteria.

1.5 Hydronic System Capacity Test

.1 Perform hydronic system capacity tests after:

.1 TAB has been completed

.2 Verification of accuracy of temperature and pressure sensors and gauges.

.2 Calculate system capacity at test conditions.

.3 Using manufacturer's published data and calculated capacity at test conditions, extrapolate system capacity at design conditions.

.4 When capacity test is completed, return controls and equipment status to normal operating conditions.

.5 Submit sample of system water to approved testing agency to determine if chemical treatment is correct. Include cost.

1.3 Potable Water Systems

.1 When cleaning is completed and system filled:

.1 Verify performance of equipment and systems as specified elsewhere in Division 22.

.2 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 recharge air chambers. Repeat for each outlet and flush valve.

.3 Confirm water quality consistent with supply standards, verifying that no residuals remain as a result of flushing and/or cleaning.

1.4 Wet Sprinkler System

.1 Cleaning, testing, start-up, performance verification of equipment, systems, components, and devices is specified elsewhere in Division 21.

.2 Verification of controls, detection devices, alarm devices is specified Division 28.

1.5 Sanitary and Storm Drainage Systems

.1 Buried systems: Perform tests prior to back-filling. Perform hydraulic tests to verify grades and freedom from obstructions.

.2 Ensure that traps are fully and permanently primed.

.3 Ensure that fixtures are properly anchored, connected to system.

.4 Operate flush valves, tank and operate each fixture to verify drainage and no leakage.

.5 Cleanouts: Refer to Section 22 42 01 - Plumbing Specialties and Accessories.

.6 Roof drains:

.1 Refer to Section 22 42 01 - Plumbing Specialties and Accessories.

.2 Remove caps as required.

PART 2 - PRODUCTS

2.1 Not Used

.1 Not Used.

PART 3 - EXECUTION

3.1 Not Used

.1 Not Used.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results-Mechanical
.4	Section 23 05 93	Testing Adjusting and Balancing
.5	Section 23 25 00	HVAC Water Treatment Systems

1.2 References

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

.1 Material Safety Data Sheets (MSDS).

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.

.2 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Instructions: submit manufacturer's installation instructions.

1.4 Quality Assurance

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery, Storage, and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse recycling in accordance with Section 01 01 50 – General Instructions.

PART 2 PRODUCTS

2.1 Cleaning Solutions and Chemicals

.1 Tri-sodium phosphate: 0.40 kg per 100 L water in system.

.2 Sodium carbonate: 0.40 kg per 100 L water in system.

.3 Low-foaming detergent: 0.01 kg per 100 L water in system.

.4 Cleaning solutions shall be provided by the supplier of chemicals for water treatment under Section 23 25 00 – HVAC Water Treatment Systems.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Cleaning of Hydronic Systems

.1 Timing:

.1 Systems to be operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.

.2 Cleaning Agency:

.1 Retain qualified water treatment specialist to perform system cleaning.

.3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist. Install cross upstream per manufacturer's recommendation. Install plugs in unused connections.

.4 Cleaning procedures:

.1 Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:

.1 Cleaning procedures, flow rates, elapsed time.

.2 Chemicals and concentrations to be used. Include Material Safety Data Sheets (MSDS).

.3 Inhibitors and concentrations.

.4 Specific requirements for completion of work.

.5 Special precautions for protecting piping system materials and components.

.6 Complete analysis of water to be used to ensure water will not damage systems or equipment.

.5 Conditions at time of cleaning of systems:

.1 Systems to be free from construction debris, dirt and other foreign material.

.2 Control valves to be operational, fully open to ensure that terminal units can be cleaned properly.

.3 Strainers to be clean prior to initial fill.

.6 Report on Completion of Cleaning:

.1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

.7 Hydronic System:

.1 Fill system with water, ensure air is vented from system.

.2 Provide drain connections to drain system in one hour. All drains for chemical treatment shall be piped to the nearest floor drain. After initial flushing ahs been completed, clean all strainer screens.

.3 System pumps may be used for circulating cleaning solution provided that pumps are dismantled and inspected, worn parts repaired with new gaskets and seals install. Submit used seals.

.4 Add cleaners and chemicals to closed systems at concentration levels recommended by the Chemical Specialist.

.5 For heating hot water systems, apply heat while circulating, raise temperature slowly to 70°C [158°F] and maintain at 70°C [158°F] for a minimum of 12 hours. Remove heat and continue to circulate until temperature is below 38°C [100°F].

3.3 Start-up of Hydronic Systems

.1 After cleaning is completed and system is filled:

.1 Establish circulation and expansion tank level, set pressure controls.

.2 Ensure air is removed.

.3 Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.

.4 Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.

.5 Clean out strainers repeatedly until system is clean.

.6 Commission water treatment systems as specified in Section 23 25 00 - HVAC Water Treatment Systems.

.7 Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.

.8 Repeat with water at design temperature.

.9 Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.

.10 Bring system up to design temperature and pressure slowly over a 48 hour period.

.11 Perform TAB as specified in Section 23 05 93 - Testing, Adjusting and Balancing.

.12 Adjust pipe supports, hangers, springs as necessary.

.13 Monitor pipe movement, performance of expansion joints, loops, guides, anchors.

.14 Re-tighten bolts, etc. using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.

.15 Check operation of drain valves.

.16 Adjust valve stem packings as systems settle down.

.17 Fully open all balancing valves (except those that are factory-set).

.18 Check operation of over-temperature protection devices on circulating pumps.

.19 Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

3.4 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.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 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results - Mechanical
.4	Section 23 05 05	Installation of Pipework
.5	Section 23 05 93	Testing, Adjusting and Balancing
.6	Section 23 08 01	Performance Verification of Mechanical Piping
.7	Section 23 08 02	Cleaning and Start-up of Mechanical Piping Systems

1.2 References

.1 American Society of Mechanical Engineers (ASME).

- .1 ASME Boiler and Pressure Vessel Code, 2013.

.2 American Society for Testing and Materials, (ASTM).

- .1 ASTM A47/A47M-09, Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A278/278M-01(2011), Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperatures up to 650°F (350°C).
- .3 ASTM A516/A516M-10, Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate - and Lower - Temperature Service.
- .4 ASTM A536-11, Standard Specification for Ductile Iron Castings.
- .5 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.3 Canadian Standards Association (CSA International).

- .1 CSA B51-14, Boiler, Pressure Vessel, and Pressure Piping Code.

1.3 Submittals

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Closeout Submittals:

- .1 Submit maintenance data in accordance with Section 01 01 50 – General Instructions.

1.4 Quality Assurance

.1 Health and Safety.

- .1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery Storage and Handling

.1 Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling in accordance with 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Fold up metal and plastic banding, flatten and place in designated area for recycling.

PART 2 PRODUCTS

2.1 Manual Air Vent

.1 Disc vent: with built-in check valve, NPT 1/8 connection. Rated at 345 kPa [50 PSI] working pressure.

2.2 Automatic Air Vent

.1 Disc vent: with built-in check valve, NPT 1/8 connection. Rated at 345 kPa [50 PSI] working pressure.

.2 Float vent: brass body, stainless steel float, NPT 3/4 connection, with built-in check valve. Rated at 1,034 kPa [150 PSI] working pressure and 121°C [250°F] operating temperature.

.3 High capacity vent: cast iron body, stainless steel float and NPS 3/4 connection. Rated at 1,034 kPa [150 PSI] working pressure and 121°C [250°F] operating temperature.

2.3 Strainer

.1 NPS 1/2 to 2: Y-type, bronze body to ASTM B 62, screwed connections, 304 stainless steel screen with 20 mesh perforations.

.2 NPS 2 1/2 to 12: Y-type, cast iron body to ASTM A 126 Class B, flanged connections, 304 stainless steel screen with 20 mesh perforations.

.3 NPS 2 to 12: T-type, cast iron body to ASTM A126 Class B, flanged connections, 304 stainless steel screen with 0.063 perforations for NPS 2 to 4, and 0.125 perforations for NPS 6 and larger.

.4 Working pressure: 1,034 kPa [150 PSI].

.5 Provide blow-down valve with capped hose adapter fitting and chain.

PART 3 EXECUTION

3.1 General

.1 Install as indicated and to manufacturer's recommendations.

.2 Run drain lines and blow off connections to terminate above nearest drain.

.3 Maintain proper clearance to permit service and maintenance.

.4 Should deviations beyond allowable clearances arise, request and follow Engineer's directive.

.5 Check shop drawings for conformance of all tappings for ancillaries and for equipment operating weights.

3.2 Strainer

.1 Install in horizontal or down flow lines.

.2 Ensure clearance for removal of basket.

.3 Install ahead of each pump unless suction diffuser is provided.

.4 Install ahead of each automatic control valve and as indicated.

3.3 Air Vents

.1 Install at high points of systems.

.2 Install gate valves at the inlet of float vents and high capacity float vents.

.3 Applications:

.1 Disc vent: radiators and convectors.

.2 Float vent: pipe mains.

.3 High capacity vent: air separator.

3.4 Performance Verification

.1 In accordance with Section 23 08 01 - Performance Verification of Mechanical Piping.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results - Mechanical
.4	Section 23 05 05	Installation of Pipework
.5	Section 23 05 93	Testing, Adjusting and Balancing
.6	Section 23 08 01	Performance Verification of Mechanical Piping
.7	Section 23 08 02	Cleaning and Start-up of Mechanical Piping Systems

1.2 References

.1 American National Standards Institute (ANSI) / American Welding Society (AWS)

- .1 ANSI/AWS A5.8/A5.8M-2011, Specification for Filler Metals for Brazing and Braze Welding.

.2 American Society of Mechanical Engineers (ASME).

- .1 ASME B1.20.1-2013, Pipe Threads, General Purpose, Inch.
- .2 ASME B16.1-05(2009), Cast Iron Pipe Flanges and Flanged Fittings.
- .3 ASME B16.3-2011, Malleable Iron Threaded Fittings, Classes 150 and 300.
- .4 ASME B16.5-2013, Pipe Flanges and Flanged Fittings.
- .5 ASME B16.9-2012, Factory-Made Wrought Steel Buttwelding Fittings.
- .6 ASME B16.15-2013, Cast Copper Alloy Threaded Fittings.
- .7 ASME B16.18-2012, Cast Copper Alloy, Solder Joint Pressure Fittings.
- .8 ASME B16.22-2013, Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
- .9 ASME B16.25-2012, Buttwelding Ends.
- .10 ASME B18.2.1-2003, Square and Hex Bolts and Screws (Inch Series).
- .11 ASME B18.2.2-2010, Square and Hex Nuts (Inch Series).

.3 American Society for Testing and Materials International, (ASTM).

- .1 ASTM A47/A47M-09, Standard Specification for Ferritic Malleable Iron Castings.
- .2 ASTM A53/A53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
- .3 ASTM A126-04(2009), Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
- .4 ASTM A536-11, Standard Specification for Ductile Iron Castings.
- .5 ASTM B32-08, Standard Specification for Solder Metal.

.6 ASTM B61-08(2013), Standard Specification for Steam or Valve Bronze Castings.

.7 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.8 ASTM B371/B371M-08(2013), Standard Specification for Copper-Zinc Silicon Alloy Rod.

.4 American Water Works Association (AWWA).

.1 AWWA C111-12, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

.5 Canadian Standards Association (CSA International).

.1 CSA B242-M1980(R1998), Groove and Shoulder Type Mechanical Pipe Couplings.

.2 CAN/CSA W48-06(R2011), Filler Metals and Allied Materials for Metal Arc Welding.

.6 Manufacturer's Standardization of the Valve and Fittings Industry (MSS).

.1 MSS-SP-67-2002a, Butterfly Valves.

.2 MSS-SP-70-2006, Cast Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71-2005, Cast Iron Swing Check Valves Flanged and Threaded Ends.

.4 MSS-SP-80-2008, Bronze Gate, Globe, Angle and Check Valves.

.5 MSS-SP-85-2002, Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.3 Submittals

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

1.4 Quality Assurance

.1 Health and Safety.

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery Storage and Handling

.1 Waste Management and Disposal.

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Fold up metal and plastic banding, flatten and place in designated area for recycling.

1.6 Maintenance

.1 Extra Materials.

.1 Provide following spare parts:

.1 Valve seats: one for every ten valves, each size. Minimum one.

.2 Discs: one for every ten valves, each size. Minimum one.

.3 Stem packing: one for every ten valves, each size. Minimum one.

.4 Valve handles: two of each size.

.5 Gaskets for flanges: one for every ten flanges.

PART 2 PRODUCTS

2.1 Steel Pipe

.1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:

.1 To NPS 10: Schedule 40.

.2 NPS 12 and over: 10 mm [3/8"] wall thickness.

.2 Joints

.1 NPS 2 and under: screwed fittings to ANSI/ASME B1.20.1.

.2 NPS 2-1/2 and over: welding fittings and flanges to ANSI/ASME D1.1, ANSI/ASME Section 9 and CAN/CSA W48.

.3 Pipe thread: taper.

.4 Flanges: weld neck, raised face to AWWA C111.

.5 Orifice flanges: slip-on, raised face.

.6 Flange gaskets: to AWWA C111.

.7 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.

.8 Nipples: extra heavy black steel.

.3 Fittings

.1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.

.2 Pipe flanges and flanged fittings:

.1 Cast iron: to ASME B16.1, Class 125.

.2 Steel: to ASME B16.5.

.3 Butt-welding fittings: steel, to ASME B16.9.

.4 Unions: malleable iron, to ASTM A47/A47M and ASME B16.3.

.5 Fittings for roll grooved piping (only to be used at for equipment with grooved connection): malleable iron to ASTM A47/A47M; ductile iron to ASTM A536.

2.2 Valves

.1 Gate valves: to MSS-SP-70 and MSS-SP-80:

.1 NPS 2 and under: Class 150 to MSS-SP80. Rising stem, threaded, union bonnet and solid wedge. Body, bonnet and wedge shall be of bronze ASTM B62. Stem shall be of dezincification-resistant silicon bronze ASTM B371 or low-zinc alloy B-99.

.2 NPS 2-1/2 and over: Class 150 to MSS-SP70. OS&Y, flanged, bolted bonnet, solid wedge, iron body, bronze trimmed, with body and bonnet conforming to ASTM A126 Class B cast iron.

.2 Drain valves:

.1 Ball type, Class 150 to MSS-SP-110, 2-piece cast bronze body, threaded, full port, anti-blowout stem, stainless steel ball and stem, 20mm [3/4"] hose connection with cap and chain.

.3 Swing check valves:

.1 NPS 2 and under: Class 150 to MSS-SP-80. Swing type, Y-pattern, threaded, bronze body to ASTM B-62, renewable TFE seat and disc, regrinding type, dezincification-resistant.

.2 NPS 2-1/2 and over: Class 125 to MSS-SP-71. Swing type, flanged, cast iron to ASTM A126 Class B, renewable bronze seat disc.

.4 Silent check valves:

.1 NPS 2 and under: Class 125 to MSS-SP-80. Inline lift type, threaded, bronze body to ASTM B-584, TFE disc, stainless steel stem, spring, disc holder and seat screw, dezincification-resistant.

.2 NPS 2-1/2 and over: Class 125 to MSS-SP-71. Globe style, flanged, cast iron to ASTM A126 Class B, renewable bronze seat (bonded with Buna-N) and disc, stainless steel spring.

.5 Ball valves:

.1 NPS 2 and under: Class 150 to MSS-SP-110. Cast bronze, 2-piece body, threaded, full port, anti-blowout stem, 316 stainless steel stem and ball (vented), TFE packing, RTFE thrust washers and seat rings, 50mm [2"] extended blowout stem for insulated piping, lever handle with position indicator.

2.3 Dielectric Coupling

.1 NPS 2 and under: Screwed, Schedule 40 electro zinc plated ASTM A120/A53 casing with inert self-cleaning thermoplastic liner, 300 PSI WP at 225°F.

.2 NPS 2-1/2 and over: Flanged with isolation gaskets, washers and sleeves, 300 lb. WOG.

2.4 Balancing Fittings, for TAB:

.1 Sizes: Calibrated balancing valves, as specified this section.

.2 NPS 2 and under: Globe type, Y-pattern, bronze body, EPDM O-ring and NPT connections.

.3 Flow measuring valve shall be fitted with meter readout ports with check valves and caps, digital handwheel with memory stop indicator, NPS 20 hose connection, and a nameplate bearing manufacturer's name and calibrated nameplate.

.4 Furnished with preformed rigid polyurethane insulation.

PART 3 EXECUTION

3.1 Piping Installation

.1 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

.2 Install concealed pipes close to building structure to keep furring space to minimum. Install to conserve headroom and space. Run exposed piping parallel to walls. Group piping where ever practical.

.3 Slope piping in direction of drainage and for positive venting.

.4 Use eccentric reducers at pipe size change installed to provide positive drainage and positive venting.

.5 Provide clearance for installation of insulation and access for maintenance of equipment, valves and fittings.

.6 Assemble piping using fittings manufactured to ANSI standards.

.7 Install dielectric couple between dissimilar metals on open systems.

.8 Use long radius elbows.

.9 Remake leaking joints using new materials. Do not caulk or cement leaking threaded joints.

.10 Do not use thread protection couplings, close nipples, running nipples or street elbows.

3.2 Valve Installation

.1 Install rising stem valves in upright position with stem above horizontal.

.2 Install isolation valves at branch take-offs and to isolate each piece of equipment, and as indicated.

.3 Install check valves on discharge of pumps and as indicated. Provide silent check valves in vertical pipes with downward flow and swing check valves horizontal pipes.

.4 Install chain operators on valves NPS 2-1/2 and over where installed more than 2400mm [8'-0"] above finished floor in mechanical room(s).

3.3 Drain Connections

.1 Pipe the discharge from all liquid relief valves, liquid safety valves, high capacity air vents, steam drip pan elbows, equipment blowdown, water columns, overflows and piping system drains to the nearest building drain. No drains or overflow shall discharge onto floor in the building.

.2 Provide 20 mm [3/4"] drain valves as shown on the drawings and at all low points of piping systems. Provide 40 mm [1-1/2"] valves for pipe cleaning. Provide hose end adaptors on all drain valves.

.3 Provide chained caps for all drain valves.

.4 Drains from drain pans shall be DWV copper ASTM B306 32mm [1-1/4"] minimum size.

.5 Drain and vent piping shall be of the same material as the piping system to which it is connected unless otherwise noted.

3.4 Cleaning, Flushing, & Start-Up

.1 In accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

3.5 Testing

.1 Test system in accordance with Section 23 08 01 - Performance Verification – Mechanical Piping Systems.

3.6 Balancing

.1 Balance water systems to within plus or minus 5% of design output.

.2 Refer to Section 23 05 93 - Testing, Adjusting and Balancing for applicable procedures.

3.7 Performance Verification

.1 In accordance with Section 23 08 01 - Performance Verification of Mechanical Piping.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section Includes:

.1 Materials, components, equipment and chemicals for installation of complete HVAC water treatment system.

1.2 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results-Mechanical
.4	Section 23 08 02	Cleaning & Startup of Mechanical Piping Systems

1.3 References

.1 American Society of Mechanical Engineers (ASME)

.1 ASME Boiler and Pressure Vessel Code, Section VII – 2013.

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

.1 Material Safety Data Sheets (MSDS).

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. 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 01 50 – General Instructions.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.3 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Closeout Submittals:

.1 Submit operation and maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

.2 Include following:

.1 Log sheets as recommended by manufacturer.

1.4 Quality Assurance

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery, Storage, and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse recycling in accordance with Section 01 01 50 – General Instructions.

PART 2 PRODUCTS

2.1 Manufacturer

.1 Equipment, chemicals, service provided by one supplier.

2.2 Chemicals

.1 Closed System Treatment (Hot Water): To match existing.

.2 Cleaning solutions: as indicated in Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Cleaning of Mechanical System

.1 Provide copy of recommended cleaning procedures and chemicals for approval by Departmental Representative, include in O&M manuals.

.2 Thoroughly flush mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and other extraneous materials. Chemicals to inhibit corrosion of various system materials and be safe to handle and use.

.3 During circulation of cleaning solution, periodically examine and clean filters and screens and monitor changes in pressure drop across equipment.

.4 Drain and flush system[s] until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.

.5 Disposal of cleaning solutions to be approved by authority having jurisdiction.

3.5 Water Treatment Services

.1 Provide water treatment monitoring and consulting services for period of one year after system start-up. Service to include:

.1 Initial water analysis and treatment recommendations.

.2 System start-up assistance.

.3 Operating staff training.

.4 Visit plant every 30 days during period of operation and as required until system stabilizes, and advise on treatment system performance.

.5 Provide necessary recording charts and log sheets for one year operation.

.6 Provide necessary laboratory and technical assistance.

.7 Provide clear, concise, written instructions and advice to operating staff.

3.6 Field Quality Control

.1 Start-Up

.1 Start up water treatment systems in accordance with manufacturer's instructions.

.2 Commissioning

.1 Commissioning Agency: to be installing water treatment sub-contractor.

.2 Timing:

.1 After start-up deficiencies rectified.

.2 After start-up and before TAB of connected systems.

.3 Pre-commissioning Inspections: verify:

.1 Presence of test equipment, reagents, chemicals, details of specific tests performed, and operating instructions.

.2 Suitability of log book.

.3 Currency and accuracy of raw water analysis.

.4 Required quality of treated water.

.4 Commissioning procedures - applicable to Water Treatment Systems:

.1 Establish, adjust as necessary and record automatic controls and chemical feed rates.

.2 Monitor performance continuously during commissioning of connected systems and until acceptance of project.

.3 Establish test intervals, regeneration intervals.

.4 Record on approved report forms commissioning procedures, test procedures, dates, times, quantities of chemicals added, raw water analysis, treated water analysis, test results, instrument readings, adjustments made, results obtained.

.5 Establish, monitor and adjust automatic controls and chemical feed rates as necessary.

.6 Visit project at specified intervals after commissioning is satisfactorily completed to verify that performance remains as set during commissioning (more often as required until system stabilizes at required level of performance).

.7 Advise Departmental Representative in writing on matters regarding installed water treatment systems.

.5 Commissioning procedures - Closed Circuit Hydronic Systems:

.1 Analyze water in system.

.2 Based upon an assumed rate of loss approved by Departmental Representative, establish rate of chemical feed.

.3 Record types, quantities of chemicals applied.

.6 Training:

.1 Commission systems, perform tests in presence of, and using assistance of, assigned O&M personnel.

.2 Train O&M personnel in softener regeneration procedures.

.7 Certificates:

.1 Upon completion, furnish certificates confirming satisfactory installation and performance.

.8 Commissioning Reports:

.1 To include system schematics, test results, test certificates, raw and treated water analyses, design criteria, other data required by Departmental Representative.

.9 Commissioning activities during Warranty Period:

.1 Check out water treatment systems on regular basis and submit written report to Departmental Representative.

3.5 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.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 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 23 05 00	Common Work Results-Mechanical
.3	Section 23 05 93	Testing Adjusting and Balancing for HVAC

1.2 Waste Management and Disposal

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

.2 Dispose of unused cleaning solutions at official hazardous material collections site approved by the Departmental Representative.

.3 Do not dispose of unused cleaning solutions into sewer system, into streams, lakes, onto ground or in other locations where it will pose health or environmental hazard.

.4 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.5 Dispose of packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

1.3 Scope

.1 All air systems installed by this contract shall be cleaned by a Cleaning Contractor.

.2 The Cleaning Contractor shall visit the site in the case of existing systems or shall review the drawings and specifications of new systems, in order to be fully acquainted with the scope of work and requirements before tendering. No consideration will be granted for any misunderstanding of work to be done resulting from failure to visit the site or inspect the contract documents.

.3 The following air systems shall be cleaned, as applicable:

- .1 Relief
- .2 Supply
- .3 Return
- .4 Exhaust
- .5 Air Conditioning

.4 All components within each system shall be thoroughly cleaned to the Departmental Representative's satisfaction and shall include but not be limited to the following:

- .1 Intake exhaust and relief louvres
- .2 Bird screens
- .3 Auto dampers
- .4 Filter frames
- .5 Coils
- .6 Fans & motors - complete assembly

.7 All plenum surfaces

.8 Terminal heating/cooling coils

.9 Supply air grilles, registers and diffusers

.10 Ductwork

.11 Mixing boxes, air terminal units

.12 Return, exhaust and relief air grilles and diffusers.

1.4 Qualifications

.1 Cleaning shall be performed by a cleaning service company with high capacity cleaning equipment designed specifically for the work involved, executed by personnel specifically trained for the application.

PART 2 PRODUCTS

2.1 Cleaning Equipment

.1 Cleaning shall generally by high capacity power vacuum.

.2 High pressure compressed air, wire brushing and/or non-toxic solvent cleaning shall be used where dirt or scale cannot be removed otherwise.

PART 3 EXECUTION

3.1 Cleaning HVAC Systems

.1 The Cleaning Contractor shall provide access as required for the work and shall reseal and make good any duct or insulation damaged in the process of this work.

.2 Remove cheesecloth from grilles, etc., let over from the temporary use of the air systems.

.3 Air systems must not be shut down without prior approval from the owner

.4 The Cleaning Contractor shall be responsible for removing and replacing filter media. In new buildings this Contractor will remove the temporary filters and replace with new after cleaning the systems. In existing buildings this Contractor may re-use existing filter media (cleaned if possible) or new media will be provided by the Owner as established by the Departmental Representative.

.5 The Cleaning Contractor shall mark balancing damper positions before cleaning and return them to their original position when cleaning is completed unless the system is to be balanced.

.6 Re-install any grilles, registers and diffusers which may have been removed for cleaning purposes.

3.2 Report

.1 After completion of the work, the Contractor shall provide four copies of a certificate stating that all systems have been cleaned as specified and that all access panels for all

cleaning openings are in place. This certificate shall be placed in the Operating and Maintenance Manuals.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results - Mechanical
.4	Section 23 05 48	Vibration and Seismic Controls for Ductwork, Piping and Equipment
.5	Section 23 07 13	Thermal Insulation for Ducting
.6	Section 23 31 10	Cleaning of Mechanical Duct Systems

1.2 References

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.2 American Society for Testing and Materials (ASTM)

.1 ASTM A312/A312M-2014, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.

.2 ASTM A480/A480M-2013, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.

.3 ASTM A635/A635M-2013, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.

.4 ASTM A653/A653M-2013, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Department of Justice Canada (Jus).

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33 .

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

.1 Material Safety Data Sheets (MSDS).

.5 National Fire Protection Agency (NFPA)

.1 NFPA 90A-2012, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.2 NFPA 90B-2012, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

.3 NFPA 91-2010, Standard for Exhaust System for Air Conveying of Vapours, Gases, Mists, and Non-combustible Particle Solids.

.6 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 ANSI/SMACNA 006-2006, HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition.

.2 SMACNA HVAC Air Duct Leakage Test Manual, 2nd Edition, 2012.

.3 IAQ Guideline for Occupied Buildings Under Construction 1995, 1st Edition.

.7 Transport Canada (TC).

.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.8 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-07, Surface Burning Characteristics of Building Materials and Assemblies.

.9 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.3 Submittals

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples.

.2 Product Data: submit WHMIS MSDS - Material Safety Data Sheets for the following:

.1 Sealants.

.2 Adhesive

.3 Duct tape.

.4 Duct liners.

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 33 - Health and Safety Requirements.

1.5 Delivery Storage and Handling

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling and place in designated containers in accordance with Waste Management Plan.

.5 Place materials defined as hazardous or toxic in designated containers.

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

.7 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:

Pressure Class	Maximum Pressure (Pa)	SMACNA Seal Class
Medium Pressure	750	[B]
Low Pressure	500	[B]

.2 Seal classification:

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

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant.

2.2 Ductwork - General

.1 Duct dimension noted on drawings are clear inside dimensions. Insulation thickness shall be as noted on the drawings.

.2 All seams, joints and raw edges shall be sealed and covered with glassfab.

.3 Insulation shall be applied with mechanical fasteners and suitable adhesives. Duct insulation adhesive and coatings shall be non-toxic as defined by WCB Regulations.

.4 Round duct: with spiral seams. Sections shall be joined with a RT1 slip joint, screw fastened and sealed with no visible duct sealant to interfere with finish painting.

.5 Exposed round duct shall be installed in a neat workmanlike manner parallel to building walls and roof with no sags or misalignment, and shall be true and round.

.6 Ductwork downstream of low-pressure single duct air terminal units shall be constructed to 500 Pa low pressure duct.

.7 Ductwork upstream of single duct air terminal units shall be constructed to 1,000 Pa medium pressure duct.

2.3 Fittings

.1 Fabrication: to SMACNA. Fittings shall be 2 gauges heavier than connecting ductwork.

.2 Radius elbows:

.1 Rectangular: Centre-line radius equal to 1.5 times width of duct, with single thickness turning vanes.

.2 Round: Centre-line radius equal to 1.5 times diameter. 5-gore for 300mm [12"] and larger; die-stamped for 254mm [10"] and smaller.

3 Mitered elbows, rectangular:

.1 To 400mm [16"]: with single thickness turning vanes.

.2 Over 400mm [16"]: with double thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: 45° entry on branch.

2 Round main and branch: enter main duct at 45° or with conical connection. The use of spin-in collars is not acceptable.

.5 Transitions:

.1 Diverging: 20° maximum angle.

.2 Converging: 30° maximum angle.

.6 Offsets: full radius elbows.

.7 Obstruction deflectors: maintain full cross-sectional area.

.8 Elbows in autoclave exhaust shall be un-vaned, smooth radius construction with centre-line equal to 1.5 times width of duct.

2.4 Galvanized Steel

.1 Lock forming quality: to ASTM A 653, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to SMACNA.

.4 Applications:

.1 All supply and exhaust ductwork unless otherwise noted.

2.5 Hangers and Supports

.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct. Maximum size duct supported by strap hanger: 500mm [20"].

.2 Hangers, hanger configuration and attachment to structure: to SMACNA.

2.6 Duct Liner

.1 Fibrous glass duct liner: air stream side faced with FSK facing.

.2 Rigid:

.1 Use on flat surfaces.

.2 25mm [1"] or 50mm [2"] thick fibrous glass rigid board duct liner.

.3 Density: 36 kg/m³ [2.2 lb/ft^3].

.4 Thermal resistance: RSI-0.76 [R-4.3] for 25mm [1"], RSI-1.53 [R-8.7] 50mm [2"].

.3 Flexible:

.1 Use on round or oval surfaces.

.2 25mm [1"] or 50mm [2"] thick fibrous glass blanket duct liner as indicated.

.3 Density: 24 kg/m³ [1.5 lb/ft^3].

.4 Thermal resistance: RSI-0.74 [R-4.2] for 25mm [1"], RSI-1.47 [R-8.3] 50mm [2"].

.4 Fasteners shall be weld pins with metal retaining clips and square head.

.5 Flame and smoke ratings:

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.7 Sealant

.1 Oil resistant, polymer-based duct sealant. Temperature range of -23°C to 65°C [-10°F to 150°F]. ULC listed and comply with NFPA 90A and NFPA 90B.

.2 Flame and smoke ratings:

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

.3 Maximum VOC limit 420 g/L to SCAQMD Rule 1168 and SMACNA Technical Resource Bulletin (TRB) #9-09.

2.8 Adhesive

.1 Water-based vinyl copolymer adhesive. Temperature range of -23°C to 71°C [-10°F to 160°F]. ULC listed and comply with NFPA 90A and NFPA 90B. Adhesive shall be non-toxic as defined by WorksafeBC Regulations.

.2 Flame and smoke ratings:

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

.3 Maximum VOC limit 80 g/L to SCAQMD Rule 1168.

2.9 Duct Tape System

.1 Two part system combined of treated woven fibreglass tape and liquid sealant/adhesive. ULC listed and comply with NFPA 90A and NFPA 90B.

.2 Flame and smoke ratings:

.1 In accordance with CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

PART 3 EXECUTION

3.1 General

.1 Do work in accordance with NFPA 90A, NFPA 90B, ASHRAE, SMACNA, and as indicated.

.2 Do not break continuity of insulation vapour barrier with hangers or rods.

.3 Support risers in accordance with SMACNA.

.4 Install breakaway joints in ductwork on sides of fire separation.

.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

.7 All openings in ductwork shall be sealed with temporary duct cover during construction. Failure to maintain duct cleanliness will require the inside of all air ducts, plenums and equipment in the air stream to be cleaned with an industrial vacuum cleaner before system balancing is started.

.8 Apply protective galvanize coating to galvanized ductwork and accessories which have been welded.

.9 Apply duct sealer to all joints of metal ducts, connections to diffusers, plenums and flexible duct.

.10 Provide medium pressure duct for the following:

.1 Ductwork serving systems with air terminal units, extending from the air handling unit discharge to the inlet of air terminal units.

.2 As indicated.

.11 The use of plastic duct tape is not permitted.

.12 Thermal insulation to Section 23 07 13 – Thermal Insulation for Ducting.

3.2 Hangers

.1 Strap hangers: Install in accordance with SMACNA.

.2 Rectangular duct: Extend strap hanger down on both sides of duct, turn under bottom 25mm [1"] minimum. On each strap provide two sheet metal screws on the side and one in the bottom.

.3 Angle hangers: complete with locking nuts and washers.

.4 Hanger spacing: to SMACNA.

.5 Seismic restraint to Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment.

3.3 Duct Liner

.1 Install in accordance with manufacturer's recommendations, and as follows:

.1 Fasten to interior sheet metal surface with 100% coverage of adhesive.

.2 In addition to adhesive, install weld pins not less than 2 rows per surface and not more than 425mm on centres.

.2 Line inside of ducts where indicated.

.3 Duct dimensions, as indicated, are clear inside duct lining.

.4 Seal butt joints, exposed edges, weld pin and clip penetrations and damaged areas of liner with joint tape and sealer. Install joint tape in accordance with manufacturer's written recommendations, and as follows:

.1 Bed tape in sealer.

.2 Apply two coats of sealer over tape.

.5 Replace damaged areas of liner.

.6 Protect leading and trailing edges of duct sections with sheet metal nosing having 15mm [1/2"] overlap and fastened to duct.

.7 Provide 50mm [2"] liner for ductwork exposed to weather which is not insulated

3.4 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 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results - Mechanical

1.2 References

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

- .1 ANSI/SMACNA 006-2006, HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition.

.2 National Fire Protection Association (NFPA)

- .1 NFPA 90A-2012, Standard for the Installation of Air-Conditioning and Ventilating Systems.
- .2 NFPA 90B-2012, Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.

.3 Underwriter's Laboratories of Canada (ULC)

- .1 CAN/ULC-S110-07, Standard Method of Tests for Air Ducts.
- .2 UL 181-2013, Standard for Factory-Made Air Ducts and Air Connectors.

1.3 Submittals

.1 Submittals in accordance with Section 01 01 50 – General Instructions.

.2 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and data sheet. Indicate the following:
  - .1 Flexible connections.
  - .2 Duct access doors.
  - .3 Turning vanes.
  - .4 Instrument test ports.

.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

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

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's Field Reports: manufacturer's field reports specified.

.7 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.4 Quality Assurance

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery, Storage and Handling

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling in accordance with Section 01 01 50 – General Instructions.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan (WMP).

.4 Separate for reuse and recycling and place in designated containers in accordance with Waste Management Plan (WMP).

.5 Divert unused materials from landfill to recycling facility as approved by Departmental Representative.

PART 2 PRODUCTS

2.1 General

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 Flexible Duct

.1 General:

.1 UL-181 listed and labeled as Class I air duct, and complies with NFPA 90A and 90B.

.2 Non-metallic, Insulated:

.1 Constructed of CPE liner duct permanently bonded to a spring steel wire helix and with factory applied fibreglass insulation, lower permeability vapour barrier and laminate jacket for low and medium pressure systems.

.2 Maximum rated pressure: 1,000Pa [4" w.g.] positive, 250Pa [1" w.g.] negative.

.3 Operating temperature: -29 to 121 °C [-20 to 250 °F].

.4 Thermal resistance: RSI-0.74 [R-4.2].

.5 Application: cold air supply duct.

.3 Non-metallic, un-insulated:

.1 Constructed of supporting helix of coated spring steel wire permanently bonded to a coated woven fiberglass.

.2 Maximum rated pressure: 2,500Pa [10" w.g.] positive, 250Pa [1" w.g.] negative.

.3 Operating temperature: -18 to 121 °C [-0 to 250 °F].

.4 Application: warm air supply duct.

2.3 Flexible Duct Connectors

.1 Frame: galvanized sheet metal frame 0.66mm [24 gauge] thick with fabric clenched by means of double locked seams.

.2 Fabric:

.1 Indoor: Fire resistant, self extinguishing, neoprene coated fibreglass fabric, temperature rated at -40°C to 90°C [-40°F to 200°F], thickness of 0.63mm [0.025"].

.2 Outdoor: Fire resistant, self extinguishing, DuPont Hypalon coated fibreglass fabric, temperature rated at -40°C to 120°C [-40°F to 250°F], thickness of 0.61mm [0.024"].

2.4 Access Doors in Ducts

.1 Non-insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6mm [24 gauge] thick complete with sheet metal angle frame.

.2 Insulated ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6mm [24 gauge] thick complete with sheet metal angle frame and 25mm [1"] thick rigid fibreglass 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.

.3 451 to 1000 mm: piano hinge and minimum two sash locks.

.4 Doors over 1000 mm: piano hinge and two handles operable from both sides.

2.5 Turning Vanes

.1 Factory-made, single or double thickness as specified elsewhere, with trailing edge. Vanes shall be constructed of same material as duct, 0.55mm [26 gauge].

.2 Rails shall be fabricated of same material as duct, 0.66m [24 gauge]. Vanes shall be attached to rails using fasteners.

2.6 Instrument Test Ports

.1 Alloy casting with screw-in cap, neoprene gasket, 18 mm [3/4"] inside diameter opening for pitot tube or velometer.

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 Flexible Duct

.1 Provide flexible duct connecting air outlets as indicated. Flexible duct with integral volume damper is not acceptable.

.2 Install flexible duct fully extended, without tight bends and kinks. The radius at the centre-line shall not be less than one duct diameter. Do not install in compressed state.

.3 Length of flexible duct shall within 1,500mm to 2,100mm (5'-0" to 7'-0").

.4 Provide support for flexible duct at 1,200mm (4'-0") on centre. Maximum permissible sag is 42 mm/m (1/2 inch per foot) of spacing between support. A connection to a rigid duct or equipment shall be considered a support joint.

.5 Sheet metal strap for flexible duct support shall be minimum 38mm (1-1/2") wide.

.6 Sheet metal collars to which the flexible ducts are attached shall be minimum 50mm (2") in length.

.7 Repair torn or damaged vapour barrier jackets approved duct tape. If the internal core is penetrated, replace the flexible duct.

.8 Do not use flexible duct for connecting mixing box and air terminal unit inlets.

.9 Do not use flexible duct on return and exhaust ductwork.

.2 Flexible Duct Connectors

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100mm [4"].

.3 Minimum distance between metal parts when system in operation: 75mm [3"].

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.3 Access Doors in Ducts

.1 Size:

.1 610mm x 1520 mm [24"x60"] for person size entry.

.2 460mm x 460 mm [18"x18"] for service.

.3 300mm x 200mm [12"x8"] for cleaning.

.4 As indicated.

.2 Locations:

.1 Fire dampers and smoke dampers.

.2 Control dampers.

.3 Devices requiring maintenance.

.4 Required by code.

.5 Reheat coils.

.6 On both sides of turning vanes.

.7 At the base of all duct risers.

.8 At 12,000m [40'-0"] intervals in all duct systems, and 6,000mm [20'-0"] intervals in horizontal exhaust ducts for cleaning purposes.

.4 Instrument Test Ports

.1 Install in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Locations:

.1 For traverse readings:

.1 Ducted inlets to roof and wall exhausters.

.2 Inlets and outlets of other fan systems.

.3 Main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations.

.3 At inlet and outlet of coils.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 And as indicated.

.5 Turning Vanes

.1 Install in accordance with manufacturer's recommendations.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results – Mechanical
.4	Section 23 33 00	Air Duct Accessories

1.2 References

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

- .1 ANSI/SMACNA 006-2006, HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition.
- .2 SMACNA – Fire, Smoke and Radiation Damper Installation Guide for HVAC Systems, 2002.

.2 Underwriters Laboratories of Canada (ULC)

- .1 CAN/ULC-S112-10, Standard Method of Fire Test of Fire Damper Assemblies.
- .2 CAN/ULC-S112.2-07, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.
- .3 ULC-S505-1974, Standard for Fusible Links for Fire Protection Service.

.3 National Fire Protection Agency (NFPA)

- .1 NFPA 90A-2012, Standard for the Installation of Air-Conditioning and Ventilating Systems.

1.3 Submittals

.1 Product Data:

- .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.
  - .1 Indicate the following:
    - .1 Volume dampers.
    - .2 Remote control damper regulators.
    - .3 Fire dampers.
    - .4 Fire stop flaps.
    - .5 Smoke dampers.
    - .6 Backdraft dampers.
    - .7 Relief dampers.

.2 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.4 Quality Assurance

.1 Health and Safety Requirements:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General 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 01 50 – General Instructions.

1.6 Extra Materials

.1 Provide maintenance materials in accordance with Section 01 01 50 – General Instructions.

.2 Provide following:

.1 Six (6) fusible links for each type of fire damper.

PART 2 PRODUCTS

2.1 General

.1 Manufacture to SMACNA standards.

2.2 Single Blade Volume Dampers

.1 Blade: Of same material as duct. Two gauges heavier than duct but not less than 0.6mm [24 gauge], stiffened.

.2 Maximum dimension: 305mm [12"] height for rectangular ducts.

.3 Axles: 9.5mm [3/8"] continuous square rod up to 457mm [18"] wide duct, and 13mm [1/2"] continuous square rod up to 1,219mm [48"] wide duct.

.4 Linkage: shaft extension with locking quadrant and position indicator.

.5 Bearings: bronze oilite.

.6 Frame: of the same material as duct. Complete with angle stop for rectangular duct.

2.3 Multi-Bladed Volume Dampers

.1 Opposed blades: 1.2mm [18 gauge] of same material as adjacent duct, stiffened.

.2 Maximum blade width: 150mm [6"].

.3 Axles: 9.5mm [3/8"] or 13mm [1/2"] continuous square rod.

.4 Bearings: bronze oilite.

.5 Linkage: shaft extension with locking quadrant and position indicator.

.6 Frame: 51mm [2"] or 40 x 13 x 3 mm [1-1/2"x1/2"x1/8"] structural or roll-formed channel, complete with angle stop.

2.4 Remote Control Damper Regulators

.1 Cable controlled damper regulator for concealed ceiling applications.

.2 Cable: 1.4mm [0.054] stainless steel Bowden cable encapsulated in 1.6mm [1/16"] flexible galvanized spiral wire sheath.

.3 Control kit: die-cast aluminum housing with 76mm [3"] diameter chrome-plated cover, with steel rack and pinion gear drive converting rotary motion to push-pull motion.

.4 Provide hardware kit for damper by others.

2.5 Fire Dampers

.1 Dynamic type, Arrangement B, ULC listed and labelled, meeting requirements of provincial fire authority and NFPA 90A. Fire damper assemblies to be fire tested in accordance with CAN4-S112. Factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.2 Frame and integral sleeve shall be of same material as duct with mounting angles furnished by the damper manufacturer. Sleeve thickness to SMACNA and NFPA-90A.

.3 Top hinged: offset, round or square, interlocking blade type and sized to maintain full duct cross section.

.4 Fusible link: 74°C [165°F], replaceable.

.5 40 x 40 x 3 mm [1-1/2" x 1-1/2" x 1/8"] retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

2.6 Fire Stop Flaps

.1 To be ULC listed and labelled and fire tested in accordance with CAN4-S112.2.

.2 Construct of same material as duct, minimum 1.5 mm thick with 1.6 mm thick non-asbestos ULC listed insulation and corrosion-resistant pins and hinges.

.3 Flaps to be held open with fusible link conforming to ULC-S505 and close at [74] °C [or as indicated].

2.7 Backdraft Dampers

.1 Multi-blade, gravity-operated, centre pivoted, constructed of same material as duct with nylon bearings.

PART 3 EXECUTION

3.1 General

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.

.3 Seal multiple damper modules with silicon sealant.

3.2 Volume Damper

.1 For supply, return and exhaust systems, locate balancing dampers in each branch duct.

.2 Run-outs to registers and diffusers: install single blade damper located as close as possible to main ducts.

.3 All dampers to be vibration free.

.4 Attach fluorescent tape to regulator handle for concealed volume dampers.

.5 Provide remote control damper regulator for volume dampers above inaccessible ceiling where ceiling access panel is not provided, and as indicated.

3.3 Fire Dampers

.1 Install in accordance to Part 3, Sub-section 3.1.8 of the National Building Code.

.2 Provide fire damper where duct penetrates through fire-rated floor, wall, or fire separation.

.3 Provide fire stop flap at fire-rated ceiling assembly.

.4 Provide access door per Section 23 33 00 – Air Duct Accessories.

3.4 Field Quality Control

.1 Tests:

.1 Tests to cover period of not less than 2 days and demonstrate that system is functioning as specified.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results – Mechanical

1.2 System Description

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.

.2 Indicate following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

.2 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

1.4 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 01 50 – General Instructions.

1.5 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General Instructions.

.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 01 50 – General Instructions.

PART 2 PRODUCTS

2.1 General

.1 Size as indicated.

.2 Capacity, pressure drop, terminal velocity, throw, noise level, neck velocity shall conform to intended performances of specified materials.

.3 Frames:

.1 Full perimeter gaskets.

.2 Plaster frames where set into plaster or gypsum board and as specified on architectural reflected ceiling plans.

.3 Concealed fasteners.

.4 Where balancing damper is scheduled, damper shall be of opposed blade type.

.5 Diffusers, grilles and registers in areas with high humidity shall be of aluminum construction.

.6 Provide neck transition as required.

2.2 Manufactured Units

.1 Grilles, registers and diffusers of same generic type, product of one manufacturer.

2.3 Supply Grilles and Registers

.1 Supply grille, Type SG-1: fixed louvre, steel, 32 mm border, 19 mm o.c. blade spacing, double deflection, front blades parallel to long dimension. Finish: silver baked enamel.

2.4 Return, Exhaust, and Transfer Grilles and Registers

.1 Exhaust grille, Type EG-1: fixed louvre, aluminum, 32 mm border, 45 degree deflection, 19mm blade spacing, front blades parallel to long dimension. Finish: white baked enamel.

.2 Return air transfer grille, Type RTG-1: egg crate, steel, 13 mm x 13 mm x 13 mm aluminum grid core, lay-in. Finish: white baked enamel.

.3 Return air transfer grille, Type RTG-2: egg crate, steel, 13 mm x 13 mm x 13 mm aluminum grid core, surface mounted. Finish: white baked enamel.

2.5 Diffusers

.1 Supply diffuser, Type SD-1: square cone diffuser, 3-cones, four-way throw, steel, having fixed pattern, round inlet collar, surface mounted. Finish: white baked enamel.

2.6 Undercut and Door Grilles

.1 Type A: 20 mm undercut.

.2 Type B: door grille, 508 mm x 305 mm, aluminum, 32 mm border, both sides, countersunk screw hole fastening, sight proof. Finish: silver baked enamel.

.3 Type C: door grille, 508 mm x 406 mm, aluminum, 32 mm border, both sides, countersunk screw hole fastening, sight proof. Finish: silver baked enamel.

.4 Type D: door grille with fire damper, 457 mm x 356 mm. Finish: silver baked enamel.

2.6 Security Grilles, Diffusers, and Products

.1 Exhaust air grille, Type EG-S1 / Return air transfer grille, Type RTG-S1:

Minimum security lattice faceplate grille. 14 gauge hot rolled steel faceplate with 21mm x 21mm [13/16" x 13"x16"] square holes and 5mm [3/16"] frets. Faceplate to be attached with tamperproof screws in countersunk holes. For drywall ceiling installation, provide rear angle frame. For transfer air grille and return air transfer grille applications, provide rear plate with weld nuts. Provide tamperproof screws. Finish: white baked enamel.

.2 Supply diffuser, Type SD-S1:

Minimum security lattice face diffuser. 12 gauge hot rolled steel faceplate with 21mm x 21mm [13/16" x 13"x16"] square holes and 5mm [3/16"] frets, countersunk holes. Inner core assembly consisting of fixed louvre face diffuser, four-way throw, steel, square inlet collar. Complete with rear angle frame with weldnuts and tamper-proof bolts. Finish: white baked enamel.

.3 Security Bars, duct/barrier grille:

13mm [1/2"] hot rolled steel bars on maximum 152mm x 305mm [6" x 12"] centre. 5mm [3/16"] sleeve with two (2) 25mm x 25mm x 5mm [1" x 1" x 3/16"] 4-sided mounting frames (one frame welded, one frame shipped loose for field welding). Finish: white baked enamel.

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 manufacturer's instructions.

.2 Install with flat head screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers and diffusers, in place, in gymnasium and similar game rooms.

.4 Paint matte black behind all diffusers, grilles and registers so that no metallic part will be visible from the exposed side.

.5 Provide tamperproof screws for security grilles/diffusers located in inmate accessible areas. For grilles/diffusers supplied with sleeve and angle frame, stitch weld assembly to ductwork. The use of flexible duct connection to security grilles/diffusers is not acceptable.

.6 Stitch weld steel angles shipped loose with security grilles/diffusers.

.7 Provide security joint sealant on all maximum security grilles/diffusers.

.8 Provide security bars at transfer air openings above ceiling in inmate accessible areas.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 01 50 — General Instructions

.2 Section 01 35 33 — Health and Safety Requirements

.3 Section 23 05 00 — Common Work Results – Mechanical

1.2 References

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

.1 Material Safety Data Sheets (MSDS).

.2 Hydronic Institute of Boiler and Radiator Manufacturers (IBR)

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Indicate the following:

.1 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.

.3 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.1 Instructions: submit manufacturer's installation instructions.

.4 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.4 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.5 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General 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 01 50 – General Instructions.

PART 2 PRODUCTS

2.1 Dampers

.1 Factory built, internal damper, at enclosure air outlet grille for each convection type heating unit not thermostatically controlled. Refer to drawings.

2.2 Finned Tube Radiation

.1 Heating elements: Existing.

.2 Element hangers: Existing.

.3 Standard enclosures: 1.6 mm [16 gauge] thick steel complete with components for wall-to-wall or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as indicated. Provide full length channel and sealer strip at top of wall edge. Height as indicated. Joints and filler pieces flush with cabinet. Support rigidly top and bottom, on wall mounted brackets. Joints and filler pieces clear of grilles located to provide easy access to valves and vents. Provide access doors for valves and vents. Finish cabinet with factory applied baked enamel finish. Colour as selected by Departmental Representative.

.4 Dimensions for enclosures: measure site conditions. Do not scale from drawing. Unless indicated or specified otherwise, wall fin enclosures shall be 457mm [18"] longer than wall fin elements.

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 manufacturer's instructions.

.2 Maintain sufficient clearance to permit performance of service maintenance.

.3 Check final locations with Departmental Representative if different from that indicated prior to installation. Should deviations beyond allowable clearances arise, request and follow Departmental Representative's directive.

.4 Provide all end pieces, element hangers, trim pieces, corner pieces, access doors and other enclosure trim as required, indicated or directed to complete radiation installation. Access doors shall be provided for all automatic control valves, hand operated radiation valves, balance valves and other fittings requiring adjustment or maintenance. Where wall fin

radiation is indicated in Architectural cabinet, provide extension stem with guides for manual control valves so that valves may be operated from top of enclosure.

.5 Clean finned tubes and comb straight.

3.3 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.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 Related Sections

.1	Section 01 01 50	General Instructions
.2	Section 01 35 33	Health and Safety Requirements
.3	Section 23 05 00	Common Work Results – Mechanical

1.2 References

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

.1 Material Safety Data Sheets (MSDS).

.2 Hydronic Institute of Boiler and Radiator Manufacturers (IBR)

1.3 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 01 50 – General Instructions. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

.2 Submit the following:

.1 Complete scale shop drawings showing layouts and complete details of all areas where radiant panels are indicated. These drawings shall be coordinated with and interference shall be cleared with other trades.

.2 Shop drawings shall indicate location of supply and return hook-ups in addition to interconnection details for each zone.

.3 Quality assurance submittals: submit following in accordance with Section 01 01 50 – General Instructions.

.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 shop drawings for incorporation into manual specified in Section 01 01 50 – General Instructions.

1.4 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

.2 Panels shall be manufactured by a company regularly engaged in the manufacture of radiant panels and having catalogue performance data and certified test data.

1.5 Delivery, Storage and Handling

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 01 50 – General 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 01 50 – General

PART 2 PRODUCTS

2.1 Linear Radiant Ceiling Panels

.1 Contractor shall refer to architectural reflected ceiling plans and room finish schedule in addition to mechanical drawings to determine location, quantity and finish of radiant panels.

.2 Refer to the contract drawings for details and dimensions. Panels shall run continuously from wall to wall and specified widths are minimum allowable.

.3 The radiant ceiling extrusions shall consist of extruded aluminum with copper tubing of 12.8mm [1/2"] I.D. mechanically attached to the aluminum face plate. The copper tube shall be held in place by an aluminum saddle which extends more than halfway around the diameter of the tube. A non-hardening heat conductive paste shall be placed between the copper tubing and the aluminum face plate. Panels shall weigh no more than 10.5 kg/m2 (2.15 lb/ft2) when operating. The use of adhesive and/or clips to attach the copper tube to the extrusion will not be acceptable.

.4 Heating panels shall have an output of 693 watts/m2 [220 Btuh/sf] at 82.2° C [180°F] mean water temperature (MWT). Water pressure drop, per panel shall not exceed 3.0 kPa @ .07 L/s [12"w.g. @ 1.1 US GPM] flow.

.5 Panels shall be finished in the manufacturer's standard white colour.

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 manufacturer's instructions.

.2 Install in accordance with piping layout.

.3 Cooperate with other trades working in the ceiling to achieve a neat, well coordinated overall installation. Refer to Architectural and Mechanical Details for installation requirements.

.4 No installation of finished radiant panels shall begin until all glazing has been completed and all exterior openings closed in.

.5 All interconnecting of radiant panels by the mechanical contractor shall consist of 0.500' O.D. soft copper tubing.

.6 All radiant panels shall be installed by personnel wearing clean white gloves, to avoid soiling of panel face.

.7 All system piping shall be thoroughly cleaned, flushed, drained and refilled before radiant panels are connected into the system.

.8 All active panels shall be covered with a minimum of 40mm [1.5"] thick fiberglass insulation with factory applied reinforced aluminum foil face.

.9 Each group or zone of coils shall be given a pressure test in accordance with procedures specified elsewhere.

.10 Run-out piping shall terminate at the supply and return points as detailed on the drawings or within 610mm [2'-0"] of panel tube connection.

3.3 Linear Radiant Ceiling Panels

.1 All interconnecting of radiant panels by the mechanical contractor shall consist of 0.500' O.D. soft copper tubing or factory supplied 360 deg. inter-connecting loops and 180 deg. return U-bends. Supply first to panel tubing pass closest to perimeter wall. Multiple panels shall be circuited to ensure serpentine flow over complete length of zone. Individual serpentine panel coils connected in series is unacceptable for multiple panel zones.

.2 All radiant panels shall run continuous from wall-to-wall and shall beheld trimmed to length ensuring adequate expansion allowance while maintaining panel end coverage by architectural mouldings. Inactive filler panels will be permitted only where indicated on drawings.

.3 Hanger wires for safety and seismic restraint shall be installed not over 914 mm [3'-0"] on centre.

.4 Cross tees shall be used between panel ends. The cross tee shall be fastened to the main tees to provide uniform support to all edges of the radiant panels. Refer to details on drawings. This contractor shall trim the ends of the radiant panels to accommodate the support tees, on site conditions, and thermal expansion. The cutting procedure shall be in strict accordance with the manufacturer's recommendations to avoid marring the finished panel. Radiant panels installed in suspended gypsum board ceilings shall be recessed with support mouldings provided by the ceiling contractor.

.5 When non standard supports are required in order to install panels in locations other than horizontal ceilings, they shall be supplied by the radiant panel manufacturer. Supports shall be brake formed angle or tee sections as required, finished painted to complement the panel finish. Panel manufacturer shall provide extruded aluminum frame where panels are indicated as being surface mounted.

3.4 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

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

END OF SECTION

RADIANT CEILING PANELS								
Mark	RP-1							
Location	Room AD 100							
Panel Width - mm (in.)	508	20						
Panel Length - mm (in.)	5,182	204						
Capacity - kW (Btuh)	5.28	5,491						
Flow - L/sec (usgpm)	0.04	0.6						
Notes	1							

Active panel length to be as noted on drawings. Overall panels lengths to be field verified, where shown on drawings as running from wall to wall.

Panel rating is based upon 76.7°C [170°F] mean water temperature and 11°C [20°F} water temp. drop.
Refer to drawing details for installation and piping requirements.
Refer to Architectural reflected ceiling plans for exact panel locations and ceiling types.

1. Radiant panel to be complete with extruded aluminum frame installed flush with ceiling.

CONTROL VALVES												
Mark	V-RP 1											
Service	RP- 1											
Type	2-W 2-P											
Flow - L/s (gpm)	0.04	0.6										
P.D. - kPa (psi)	6.9	1.0										
Notes												

Refer to control contractor's shop drawings for piping configuration for multi-port valves.
Heating control valves are to be spring powered to fail to full heat upon loss of power where specified.

Valve Types:
2-W Mod PICCV : 2-way modulating pressure independent characterized control valve
2-W 2-P PICCV : 2-way 2-position pressure independent characterized control valve
2-W Mod : 2-way modulating control valve
2-W 2-P : 2-way 2-position control valve
3-W Mod : 3-way modulating control valve
3-W 2-P : 3-way 2-position control valve

PART 1 GENERAL

1.1 Related Sections

.1 Section 01 01 50 — General Instructions

.2 Section 23 05 00 — Common Work Results - Mechanical

1.2 General

.1 Provide, install, program and commission a BACnet-based DDC controls system to achieve the performance specified in the following clauses.

.2 Work covered by sections referred to above consists of fully operational EMCS, including, but not limited to, following:

.1 Control devices as listed in I/O Summaries.

.2 Data communications equipment necessary to effect an EMCS data transmission system connection to BACnet network.

.3 Field control devices.

.4 Software and graphics upgrade complete with full documentation for software and equipment.

.5 Complete operating and maintenance manuals and field training of operators, programmers and maintenance personnel.

.6 Acceptance tests, technical support during commissioning, full documentation.

.7 Relocate room thermostats. Provide new zone control valve.

.8 Firestopping for new penetrations through existing fire rated assemblies. Refer to Section 23 05 00 – Common Work Results – Mechanical.

.3 The existing operator workstation and DDC front-end is a Delta Controls system installed by ESC Automation. The nearest existing building controller (Delta Controls) is located in the North Mechanical Room MR203.

1.3 Metric Reference

.1 Conform to CAN/CSA-Z234.1.

.2 Provide required adapters between Metric and Imperial components.

1.4 Standard Compliance

.1 All equipment and material to be from manufacturer's regular production, CSA certified, manufactured to standard quoted plus additional specified requirements.

.2 Where CSA certified equipment is not available submit such equipment to inspection authorities for special inspection and approval before delivery to site.

.3 Submit proof of compliance to specified standards with shop drawings and product data. Label or listing of specified organization is acceptable evidence.

.4 In lieu of such evidence, submit certificate from testing organization, approved by Departmental Representative, certifying that item was tested in accordance with their test methods and that item conforms to their standard/code.

.5 For materials whose compliance with organizational standards/codes/specifications is not regulated by an organization using its own listing or label as proof of compliance, furnish certificate stating that material complies with applicable referenced standard or specification.

1.5 Existing Control Components

.1 Field control devices that are usable in their original configuration may be re-used provided that they conform to applicable codes, standards, specifications. Do not modify original design of any existing devices without written permission from the Departmental Representative. Provide for new, properly designed device where components are not certain as to reusability. Provide list of equipment so included in bid. Include unit price of all for this equipment.

.2 Within 30 days of award of contract, and prior to installation of any new devices, inspect and test all existing devices intended for re-use. Furnish test report listing each component to be re-used and indicating whether it is in good order or requires repair by Departmental Representative.

.3 Non-functioning items:

.1 Provide with report specification sheets or written functional requirements to support findings.

.2 Departmental Representative will provide directions related to repair or replacement existing items judged defective yet deemed necessary for EMCS.

.4 Submit written request for permission to disconnect any controls and to obtain equipment downtime before proceeding with work.

.5 Assume responsibility for existing controls to be incorporated into EMCS, to commence upon approval for disconnection of controls or equipment downtime.

.1 Be responsible for repair costs due to negligence or abuse of Departmental Representative's equipment.

.2 Responsibility for existing devices to terminate upon acceptance of EMCS or applicable portions thereof.

1.6 Submittals

.1 Submit in accordance with Section 01 01 50 – General Instructions.

.2 Provide one electronic copy of schematic control diagrams for review. Each valve, actuator and instrument shall be given an identification label which will refer directly to control diagram.

.3 Provide shop drawings including complete operating data, system drawings, wiring diagrams, and type written detailed operational description of sequences, and description and engineering data on each control system component.

.4 At completion of work, make detailed check of automatic control system and submit written report to the Departmental Representative.

.5 Provide sufficient copies of complete parts and repair manuals for binding in O&M Manuals.

.6 Provide "record" control drawings and schedules; incorporate into O&M Manuals.

.7 The submittals shall be prepared using the dynamic graphics software normally provided with system and be incorporated into the dynamic graphics system for on-line reference. Provide original, registered software disks of Windows, the Graphics Software package, the Operating System software, and the project graphic schematics, floor plan layouts, and control drawings.

1.7 Monitoring and Control Features

.1 Operator defined digital and analogue alarms and automatic alarm condition reporting.

.2 Direct keyboard override of all inputs and outputs, with an indication on the display for any point that is operating under keyboard override.

.3 Addition, deletion, definition and modification of all points from operator keyboard.

.4 Trend log graphing and reporting of user selected points at user defined intervals.

.5 Run time logging of digital points.

.6 Ability to accept a variety of standard analogue and digital input signals.

.7 Ability to generate a variety of standard analogue and digital output signals.

1.8 Offline Storage

.1 The DDC system shall have the capability to be taken off-line in the event of failure or for maintenance and returned to operation without the need for entering any portion of the software program manually.

.2 An off-line disk storage device shall be utilized to provide software backup and reload. Backup and verification of the entire system, with full applications software, shall be less than TWO (2) seconds per real point.

1.9 Power Surge Protection

.1 The DDC system shall be protected from power line surges and voltage transients by installation of a power line filter.

1.10 Power Failure Protection

.1 The DDC system shall have automatic protection from any power failure of at least TWENTY-FOUR (24) hours duration.

.2 This protection shall at a minimum include continuous real-time clock operation and automatic system restart upon power return.

.3 Outputs shall have the option of being set to "staggered start" upon power reset.

1.11 Electrical Components, and Conduit

.1 Provide all control system components, except those supplied as part of packaged equipment controls, but including all auto sequencing devices, electric relays, safety devices and electrical interlocks required to accomplish specified sequences. Refer to the electrical motor schedule in the electrical drawings and/or specification, which delineate the limits of electrical work in Division 26 (Electrical) serving mechanical systems.

.2 Provide all control circuit transformers required for control systems and not supplied by Division 26 including line voltage power connection from indicated outlets shall be included by Division 25.

.3 All wiring installed under this contract shall be plenum rated FT-6 or FT-4, if approved by all authorities having jurisdiction. Locate wiring away from top or bottom of ceiling joists or trusses to minimize possibility of accidental damage. Number 18 gauge wire may be used in Class 2 circuits unless voltage drops are excessive. THHN wire will not be acceptable. Twisted shielded wiring, minimum of 22 gauge wire shall be used for all DDC or co-axial communication wiring. Line voltage alternating current wiring shall not be run in the same conduit, or cabling as DDC wiring.

.4 Use 1m of flexible conduit for all connections to vibrating equipment. Use liquid tight flex

.5 All shielded wiring will be grounded at the BMS panels and prevented from grounding at the terminal end.

.6 Run all wiring parallel to building lines. All wiring to be installed in a neat, workmanlike manner.

.7 Support wiring independent of piping, ductwork, and equipment. Keep wiring clear of hot piping, ductwork/equipment.

.8 Identify all junction boxes with control company label.

.9 There are to be no splices in any of the control wiring except at devices or control panels.

.10 LAN wiring shall be CAT5E UTP to TIA/EIA-568.

1.12 Identification, Calibration and Programming

.1 Provide a written sequence of operation for each piece of equipment or system being controlled that does not require knowledge of DDC programming. Provide a print out of the complete data base, including program listings, inputs, outputs, controllers, virtual points, trend logs, alarm points, etc. Provide in an organized manner, separated for each panel.

.1 Procedures for daily operation of the system.

.2 Theory of operation of the equipment.

.3 Theory of operation of the control program.

.2 Mount an input/output layout sheet within each controller. This sheet shall include the name of the points connected to each controller channel.

.3 Identify all controllers and associated devices with symbols relating directly to the control diagram. Provide plastic labels for each input and output point with the following information:

.1 Point descriptor.

.2 Point type and channel number.

.3 Corresponding controller number.

.4 Program each controller immediately following installation. Setup and tune all control loops during the initial startup of the systems. Submit a well documented print out of the controller program for review.

.5 At the time of the Owner's Demonstration and Instruction Period:

.1 Demonstrate and confirm that all systems are programmed and operating correctly. Submit trend logs, 1 week in duration, that confirm systems are operating as designed and follow the internal building loads in an energy efficient manner.

.2 Submit CD's (including back-up diskettes) containing up to date copies of the programs in each controller.

.3 Submit (4) CD's with printed PDF copies of the final programs that include all point definitions, weekly and annual schedule settings, controller set points and tuning parameters, and documented general control language programs. (As Built control shop drawings)

.4 Provide the original software diskettes and the users manuals for all software programs provided as part of this contract. Provide one set of original disks for each notebook, laptop, and desktop computer the software has been installed on. The controls contractor shall be responsible for registering all software with the manufacturer in the owner's name. Provide copies of the registration of all software to the Departmental Representative as part of the final inspection.

.6 Check sensor calibration and control system operation twice during the first year of operation including the first heating season and prior to the first cooling season. Include all parts and labour in service. Following each visit submit:

.1 A report indicating all work performed.

.2 Printed graphs of trend logs one week in duration with hourly samples for all analog inputs connected to each controller.

.3 Update printed and diskette copies of any changes made to programs for any controller.

.7 Provide one day of on-site instruction to the Owner's operating personnel during the first year of operation, scheduled as requested by the Owner, during one or more of the 2 visits.

1.13 Controller Software

.1 Each stand alone control panel shall contain a complete software development system in each panel. The software development system shall consist of a menu driven, prompted programming language containing complete libraries of control algorithms for DDC, Energy Management, and Facilities Management functions. These resident libraries of algorithms shall be drawn from for the creation of the application specific programming of each individual stand alone control panel.

.2 Four user access levels shall be provided with a user access code available at each level. Each level shall permit identifiable multiple user access.

.3 Point names shall be defined using a minimum of 128 alphanumeric characters to provide an English language description of the point function.

.4 The stand alone control panel shall be capable of generating sorted alarm, trend log, energy management, maintenance time remainder, and exception log reports on a prioritized basis. Segregated report generation shall be invoked by manual request, time of day, calendar, accumulated run time, or event occurrence.

.5 DDC Control:

.1 The network of standalone control panels shall individually perform set point reset, ramping functions, 2-position ON/OFF control, PID loop control, linear sequencing, rotating sequencing, binary sequencing, HI/LO/AVE selection, energy dead band, and thermostat controls as required to control their connected systems of equipment.

.6 Energy Management Control:

.1 The network of standalone control panels shall individually perform time of day scheduling, optimum start/stop, enthalpy optimization, trend logging, demand limiting and all control optimization strategies, such as supply air reset, and soft ramp-up, for their connected systems of equipment.

.2 Coordination of strategies involving multiple systems of equipment shall be performed by sharing of necessary data between the stand-alone control panels on the communicating network.

.7 Facilities Management Control:

.1 The Owner shall be provided the ability to read out temperatures and other values and to adjust specific items from localized, as well as remote centralized location. Every controller shall provide the following reports:

.2 Facility Diagnostics

.1 The facilities management system shall provide diagnostic reports for selected systems of equipment as specified.

.3 Alarm Occurrence Status

.1 When specified alarm conditions occur, provide a report available to printout, listing the status of specific items associated with the equipment generating the alarm. Report shall be routed through auto dial out feature to a specific printer or combination of printers. Report shall record the time the status information was taken, and shall allow operational personnel to use this information to diagnose the alarm situation.

.8 SAC and Micro Controller Trend Logs:

.1 Controllers shall be capable of storing up to twenty-five (25) full trend logs with a minimum of 200 data samples each. They shall be able to collect and store samples of the value of any system variable (i.e. temperature). The operator shall be able to create a trend log, with each trend log containing up to 4 points. The sample frequency shall be selectable for each trend log between 1 second and 24 hours. The ability to graphically display to 4 points on the screen simultaneously, print a log, or store a log on disk in an ASCII format that can be imported into a standard spreadsheet program shall be provided. This capability shall be provided for all forms of access.

.9 Network communication/controllers Trend Logs:

.1 Trend logs shall be provided to collect and store samples of the value of a point i.e., temperature. The network communication/controllers shall have sufficient memory to create and store 200 full trendlogs. Each BacNet trendlog shall be capable of monitoring 1 I/O or virtual point from any controller or combination of controllers across the network, and storing a minimum of 2000 data samples for each trended point. The sample frequency shall be selectable for each trend log between 1 second and 24 hours. The network communication/controllers shall be

capable of archiving the trended data to the Host computer or dialing out to a remote trend computer and downloading the data automatically. The ability to indefinitely retain the contents of a trend log in the controller or automatically transfer the contents of a trend log to disk storage, printer or remote site and restart the log shall be provided.

.10 Host Level Trending:

.1 Shall be provided to collect and store samples of the value of any system variable (i.e. temperature Trend Logs: Shall be provided to collect and store samples of the value of any system variable. The operator shall be able to create a BACnet trend log, with each trend log containing 1 point. The sample frequency shall be selectable for each trend log between 1 second and 99 hours. The ability to link multiple single point BACnet trend logs to be displayed on a 8 point Multi-trend log for comparative analysis shall be provided. Ability to print a log, or store a log on disk in an ASCII format that can be imported into a standard spreadsheet program shall be provided. This capability shall be provided for all forms of

.11 The Ethernet interface with the remote operator's terminal shall provide all features listed above.

1.14 Computer Graphics Software

.1 Incorporate the following standards for the required host capabilities and installed features:

.1 The host computer operator interface, network interface and graphical interface software shall be Microsoft Windows based.

.2 Provide one licensed copy of the complete HOST software package complete with operating manuals, installation manuals, setup manuals, programming manuals, and original diskettes.

.3 Host operator interface.

.2 The following functionality shall be available to the operator from either the onsite host, remote host, or colour laptop connected to anywhere on the network inside the building. These workstations shall operate as graphic interface devices. Attention must be paid to developing an interface to the system using a minimum of user keystrokes. The primary user interface must be the mouse.

Provide functionality such that any of the following may be performed simultaneously, at either workstation and in any combination, via user-sized windows.

.1 Dynamic color graphics and graphic control

.2 Alarm management and control

.3 Time of day scheduling

.4 Trend data definition and presentation

.5 Graphic definition

.6 Graphic construction

.7 Database functions

.3 Graphic generation and design:

.1 Provide a default graphic consisting of a visual overview of the entire control system. The display shall be in a tree format. Indicate the various branches of graphic access available from the tree for each mechanical system and building zone. The site plan of the facility should be used as a reference tree to show the relationship of each system to a particular building zone. Graphic links for each zone must be available to allow the user to link directly to the desired graphic or step systematically forward or backward through the tree to each graphic associated with the mechanical system. The operator must be able to return directly to the default from any level of graphic menu penetration.

.2 As a minimum, provide the following graphic screens and dynamic linking:

.1 A default graphic to be used as a central starting point for penetrating the menu of available graphic screens.

.2 Zone summary graphic. Dynamically indicate zone high select (Hsel) and low select (Lsel) temperatures, AHU supply air temperatures and setpoints, and status of the air handling units serving the zone.

.3 Dynamic graphic floor plans for each building zone, scaled appropriately to be readable from a laptop. Indicate room temperatures, architectural room number, control valve position, supply fan system serving the area, and any associated equipment such as exhaust fans, fume hoods, etc. From this screen the operator shall be able to command the control valve, adjust the room setpoint, access the graphic screen for the supply fan system, view a trend log of the room temperature, or access a graphic for associated mechanical equipment.

.4 A schematic of each mechanical system. As a minimum, each graphic will indicate all DDC I/O points and software variables associated with each system. Indicate the DDC point names, current status value, and operator priority.

All graphic screens shall be created using the same software supplied to the owner. Provide the graphic data files in a format suitable for inclusion into the graphical operator interface and for direct loading into the graphic editor. The graphic data files shall be the sole property of the Owner.

DEFAULT GRAPHIC COLOURS			
Normal On	GREEN	Text Arial 12 pt	BLACK
Heating Equipment	RED	Normal Off	BLACK
Background	WHITE	Cooling Equipment	BLUE
Ducts	BLACK	**ALARM**	**RED**
Sensors	BLUE		

.3 Graphical links:

.1 All system graphical links will be located in the upper left corner of the screen. These links will be displayed in sequential order representative of the menu tree.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 General

.1 Check and verify location of thermostats and other exposed control sensors with plans and room details before installation. Locate thermostats and temperature sensors 1.5m above floor. For existing installations, locate thermostats and temperature sensors at same locations as existing but not less than 1.5m above floor.

.2 The installation shall conform to each manufacturer's recommended procedures and to all applicable codes, statutes and ordinances.

.3 All equipment installed shall be mechanically stable and, as necessary, fixed to wall or floor.

.4 Equipment shall be installed so as to allow for easy maintenance access. Equipment shall be installed such that it does not interfere in any way with access to adjacent equipment and personnel traffic in the surrounding space.

.5 Permanently identify each wire, cable, conduit and tube at each terminal.

.6 Wiring and tubing shall be identified at each DDC panel by termination number. Wiring and tubing shall be identified at terminal device by termination and DDC panel numbers.

.7 All transmitters, interfaces, terminations and control relays, etc. shall be mounted in field cabinets that may be locked.

.8 All wall mounted devices in new finished space shall be mounted on a wall box. The wall box shall be connected to the ceiling space by a conduit stub. On renovations, when sensors are mounted in existing finished walls, wiring or tubing may be fished into the walls without conduit.

.9 Provide tamperproof screws to new and relocated equipment, controls enclosures and devices which are located in inmate accessible areas.

3.3 Enclosure and Conduit

.1 Relays, transformers, and I/O devices and peripherals shall be installed in separate enclosures and not in the enclosures containing the controllers.

.2 All wires penetrating the enclosure that are not required to be in conduit must be neatly bundled and strapped in place.

.3 Wiring is to be in EMT conduit with set screw metal fittings in all wall spaces and exposed locations as well as in pipe chases, service spaces, attics, and crawl spaces which are entered for service access. Wiring in suspended ceiling spaces does not require conduit but shall be neatly installed parallel to building lines using bridle rings. All conduits shall be piped smoothly and neatly following building lines. Wiring above existing ceilings and wall cavities may be run free-air.

.4 Exposed conduits located in areas where inmates have access (see Section 23 05 00 - Common Works Results - Mechanical, Clause 3.8 Table 1) shall comply with the following security measures:

.1 Use two-hole straps.

.2 Install straps within 100mm of device boxes.

.3 Install straps within 100mm of both sides of fittings.

.4 Install straps at a maximum spacing of 500mm.

.5 All fittings steel.

.6 Keep conduit close to the wall and avoid spaces behind the conduit.

.7 Route conduit along top of walls where possible.

.5 Liquid-tight flexible conduit to be used for rooftop unit wiring c/w liquid-tight fittings. Provide spun aluminum roof jack where control wiring penetrates roof unless penetration is within waterproof rooftop unit curb.

.6 All junction boxes will have covers properly and firmly affixed after installation completion.

3.4 I/O Wiring

.1 All input/output device wiring will use #18-2 solid core cable with individually jacked conductors and jacketed sheath over the pair.

.2 Use plenum cable where required.

.3 All I/O wiring will be identified using Panduit adhesive wire-marker at the controller and end device ends. Description of point to include point mnemonic, point type and network location.

.4 All I/O wiring within controller enclosure shall be neat and tidy and suitably bundled and strapped or contained in plastic wire duct or equivalent.

.5 All I/O wiring that requires a transition to a different conductor to meet electrical code requirement shall be executed using a terminal strip.

.6 Low voltage I/O wiring may be mixed together within a conduit. Low and line voltages may not be mixed together within a conduit.

3.5 Control System Commissioning

.1 Upon completion of the installation of the controls system and the calibration of all sensors, this Subcontractor shall carry out all required testing, debugging, and revision of operations as required.

.2 The contractor is to supply digital point and non digital checkout data sheets for all controlled components installed in this contract, including components supplied by others. The data sheets shall indicate each components physical installation is complete, End to End, identification, tagged, the result of the functional test, calibration deviation recorded, setpoints and set-up of each device, digital and non digital.

.3 Each digital input or control device shall be checked by physical operation of the monitored device in the field with the result noted. Each digital output or controlled device shall be commanded or tested On/Off, Open/Close as required and the

corresponding field device checked for correct operation with the result and comments noted.

.4 Each analog input or control device shall have its field values measured with a calibrated test instrument, with the deviation recorded and adjusted, if necessary, at the AI set up. The field measurement and analog point deviation must be reported. A hard copy of the set up for each digital and non digital controller with adjustments is required. Field set up and setpoints of other devices shall be reported.

.5 Each analog output, control or controlled device shall be field tested. The physical test data sheet is to indicate each controlled device function through its range 0, 25, 50, 75, 100% and 1 to 100% as required with no leakage or bypass of the controlled medium.

.6 Submit copies of all test data sheets intended to be used to the Departmental Representative prior to the contractor's verification at least three months before the scheduled substantial completion of the project.

.7 The controls contractor shall provide sequence of operation check sheets to the Departmental Representative in standard letter size for each DDC and non DDC system sequence. Each sequence to be verified with each item/page signed off with comments noted.

.8 All documentation, tagging, identification, as-builts, software, instruction manuals, special control connection to access all devices and panels must be in place before the granting of substantial performance.

3.6 Cleaning

.1 Proceed in accordance with Section 01 01 50 – General Instructions.

.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 Related Sections

.1 Section 01 01 50 — General Instructions

.2 Section 25 05 01 — EMCS: General Requirements

1.2 References

.1 American National Standards Institute (ANSI)

.1 ANSI C12.7-1993, Requirements for Watthour Meter Sockets.

.2 ANSI/IEEE C57.13-1978(R1987), Requirements for Instrument Transformers.

.2 National Electrical Manufacturer's Association (NEMA)

1.3 Submittals

.1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 01 01 50 – General Instructions and 25 05 01 – EMCS: General Requirements.

.2 Include:

.1 Information as specified for each device.

.2 Manufacturer's detailed installation instructions.

.3 Pre-Installation Tests

.1 Submit samples at random from equipment shipped, as requested by Departmental Representative, for testing before installation. Replace devices not meeting specified performance and accuracy.

.4 Manufacturer's Instructions

.1 Submit manufacturer's installation instructions for specified equipment and devices.

1.4 Closeout Submittals

.1 Submit operating and maintenance data for inclusion in operation and maintenance manual in accordance with Section 01 01 50 – General Instructions and 25 05 01 – EMCS: General Requirements.

PART 2 PRODUCTS

2.1 General

.1 Control devices of each category to be of same type and manufacturer.

.2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, shockproof, vibration-proof, heat resistant assembly.

.3 Operating conditions: 0 - 32 °C with 10 - 90 % RH (non-condensing) unless otherwise specified.

.4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.

.5 Transmitters to be unaffected by external transmitters (eg. walkie talkies).

.6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

.7 Devices to be installed in user occupied space must not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.

2.2 Control Valves and Actuators

.1 Provide automatic temperature control valves as scheduled and indicated on drawings. Sufficient clearance above control valves shall be provided to allow removal of superstructure without removing body from line. All valve stems shall be vertical. All electric valves, including zone valves, scheduled for modulating service shall be fully proportional (no floating control) suitable for 0-10 volt, or 4-20 mA input signal.

.2 Control valves, both 2 and 3 way configuration, shall have the following minimum characteristics:

.1 Body shall be brass meeting ANSI Standard B16.15 Class 250 for all valves 50 mm and smaller. Larger valves shall be cast iron, Class 125, meeting ANSI Standard B16.15.

.2 Valve stem shall be 316 stainless steel.

.3 Valves shall have brass plug, composition seat with maximum seat leakage of 0.01% of flow rating per ANSI B16.104, and equal percentage flow characteristic.

.4 Valves for terminal zone coils, fan coils and radiation shall have EPT or TFE packing material and NPT, union or flare connections.

.5 Valves for primary equipment sized 50 mm and smaller shall have screwed connections. Valves sized 65 mm and larger shall have flanged connections.

.6 Ball Valves are not acceptable for control applications.

.3 When more than one control valve is used for temperature or pressure control on a system, or equipment item they shall be sequenced. e.g. two valves on a heating coil or pressure reducing station; heating and cooling coil valves on an air handling system.

.4 Valves on hazardous services shall fail to a safe position. e.g. Valves controlling heating to domestic hot water shall fail closed to heating when not powered.

.5 Actuators shall be of the rotary or piston type for either modulating or two position control. Actuators shall be powered by an overload-proof synchronous motor. Control voltage shall be either 120 VAC, 24 VAC, 10 VDC, or 4-20 mA with spring return on power failure, where required. (ie outdoor air dampers and HVAC primary heating valves). Actuators (motors) shall have repair kits available, and be re-buildable in the field. Provide proportional actuator position feedback on all primary equipment (air handling units) to prove actuator position.

.6 All control valves shall have replaceable bonnets, and packing. The packing shall be replaceable in the field without having to remove the valve from the piping network.

.7 All control valves shall be sized to deliver the specified flow rate in the 100% open position. Control valves using a "limited stroke" to achieve the proper flow coefficient shall not be used.

PART 3 EXECUTION

3.1 General

.1 Check and verify location of thermostats and other exposed control sensors with plans and room details before installation. Locate thermostats and temperature sensors 1.5m above floor.

.2 The installation shall conform to each manufacturer's recommended procedures and to all applicable codes, statutes and ordinances.

.3 Equipment shall be installed so as to allow for easy maintenance access. Equipment shall be installed such that it does not interfere in any way with access to adjacent equipment and personnel traffic in the surrounding space.

.4 All transmitters, interfaces, terminations and control relays, etc. shall be mounted in field cabinets that may be locked.

.5 All wall mounted devices in new finished space shall be mounted on a wall box. The wall box shall be connected to the ceiling space by a conduit stub. On renovations, when sensors are mounted in existing finished walls, wiring or tubing may be fished into the walls without conduit.

.6 Provide tamperproof screws to new and relocated equipment, controls enclosures and devices which are located in inmate accessible areas.

END OF SECTION

PART 1 GENERAL

1.1 Related Sections

.1 Section 25 05 01 — EMCS: General Requirements

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 Sequence of Operation

.1 Room Temperature Control:

.1 Relocate room temperature sensors. Refer to floor plan.

.2 For room served by AHU-N2 (Multi-zone unit), the relocated room temperature sensor shall modulate the zone control damper and maintain room temperature. For room with perimeter radiation, radiation shall be first on and last off.

.3 For rooms served by AHU-N3 (Single duct w/ terminal reheat), the relocated room temperature sensors shall modulate the zone control valves and maintain room temperature. For room with perimeter radiation, radiation shall be first on and last off. Provide control valve for new ceiling radiant panel in Room AD 100.

3.2 Point List

.1 The following point lists are typical of the Analog and Digital output and input points required to achieve the intended sequence of operation and provide the required level of monitoring and control. They are intended to set a minimum level of acceptability. All additional points required to achieve the specified features and sequence of operation shall be provided by the control contractor.

.2

RADIATION (CEILING RADIANT PANEL)							
	POINTS				ALARM/INDICATION		
POINT DESCRIPTION	AI	AO	DI	DO	HI	LO	FAIL
HEATING CONTROL VALVE				VMD			

NOTE: POINT COUNT IS APPROXIMATE. CONTROLS CONTRACTOR SHALL VERIFY EXACT QUANTITY AND PROVIDE ADDITIONAL POINTS AS REQUIRED TO ACHIEVE THE SEQUENCE OF OPERATION DESCRIBED IN THE CONTRACT DOCUMENT.

VMD Valve Motor (Digital)

END OF SECTION

1.1 GENERAL

.1 This Section covers items common to Section of Division 26, 27 and 28. This section supplements requirements of Division 01.

1.2 CODES AND STANDARDS

.1 Do complete installation in accordance with Canadian Electrical Code, CSA C22.1-2012.

.2 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender at time of tender submission.

.3 Perform work in accordance with CSA Z426 - Workplace Electrical Safety and Worksafe BC.

1.3 PERMITS, FEES

.1 Submit to Electrical Inspection Department necessary number of drawings and specifications for examination and approval prior to commencement of work.

.2 Pay associated fees.

.3 Obtain and pay for an electrical permit to cover all electrical, fire alarm, communications and CCTV system work.

.4 Submit a copy of electrical permit to the Departmental Representative prior to commencement of work on site.

.5 Departmental Representative will provide drawings and specifications required by Electrical Inspection Department at no cost.

.6 Notify Departmental Representative of changes required by Electrical Inspection Department prior to making changes.

.7 Furnish Certificates of Acceptance from Electrical Inspection Department on completion of work to Departmental Representative.

1.4 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples in accordance with Section 01 01 50 – General Instructions.

.2 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.3 Where applicable, include wiring, single line and schematic diagrams.

.4 Include wiring drawings or diagrams showing interconnection with work of other Sections.

1.5 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 01 01 50 – General Instructions.

.2 Additional maintenance material requirements are included under various other Sections.

1.6 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for incorporation into operation and maintenance manual specified in Section 01 01 50 – General Instructions.

.2 Include in operations and maintenance data:

.1 Details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.2 Technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.3 Wiring and schematic diagrams and performance curves.

.4 Names and addresses of local suppliers for items included in maintenance manuals.

.5 Copy of reviewed shop drawings.

1.7 CARE, OPERATION AND START-UP

.1 Instruct departmental representative and operating personnel in the operation, care and maintenance of equipment.

.2 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.

1.8 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83 (R1996).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

1.9 MATERIALS AND EQUIPMENT

.1 Equipment and material to be new and CSA certified, and manufactured to standard quoted.

.2 Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from Inspection Department.

1.10 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.2 Nameplates:
.1 Lamicoid 3 mm thick plastic engraving sheet, white face and black core, self adhesive unless specified otherwise.

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

.3 Wording on nameplates and labels to be approved by departmental representative prior to manufacture.

.4 Allow for average of twenty-five (25) letters per nameplate.

.5 Identification to be English.

.6 Nameplates for junction boxes to indicate system and/or voltage characteristics.

.7 Nameplates for pull boxes to indicate system and type of cable.

1.11 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding for 120/208 V wiring throughout.

.3 Identify Telecommunications cabling as indicated.

1.12 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.13 MANUFACTURERS AND CSA LABELS

.1 Visible and legible after equipment is installed.

1.14 WARNING SIGNS

.1 As specified and to meet requirements of Electrical Inspection Department and Departmental Representative.

.2 Use decal signs, minimum 175 x 250 mm size.

1.15 LOCATION OF OUTLETS

.1 Locate outlets as indicated on drawings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 m, and information is given before installation.

1.16 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.
- .1 Local switches: 1 200 mm.
- .2 Wall receptacles: 400 mm.
- .3 Voice and Data outlets: 400 mm.

1.17 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

1.18 CONDUIT AND CABLE INSTALLATION

.1 Refer to drawings for type of conduit and cable to be used.

.2 Install conduit and sleeves prior to pouring of concrete. Sleeves through concrete; schedule 40 plastic pipe, sized for free passage of conduit, and protruding 50 mm.

.3 Install cables, conduits and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

1.19 FIRESTOPPING

.1 Where cables or conduits pass through fire rated ceilings and fire rated walls, pack space full with a ULC approved firestopping system.

1.20 FIELD QUALITY CONTROL

.1 Conduct and pay for testing, commissioning, demonstration and training of the following:
- .1 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.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and associated controls.
- .4 Voice and Data cabling and jacks.
- .5 Fire Alarm System.
- .6 Public Address (P/A) System.
- .7 Door Position Switches.
- .8 CCTV System.

.2 Refer to each Section for additional testing requirements.

.3 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.4 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that each system is taken out of service the shortest possible amount of time.

.5 Submit test results for Departmental Representative review.

1.21 CLEANING

.1 Do final cleaning in accordance with Section 01 01 50 – General Instructions.

.2 At time of final cleaning, clean lighting reflectors, lenses, and other lighting surfaces that have been exposed to construction dust and dirt.

1.22 RECORD DRAWINGS

.1 Refer to Section 01 01 50 – General Instructions.

.2 Indicate conduit and cable runs, junction boxes and circuit numbers.

.3 Indicate communication voice/data outlet numbers.

.4 Additional record drawing requirements are included under various other Sections.

1.23 ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

.1 Refer to Section 01 01 50 – General Instructions.

END OF SECTION

1 General

1.1 PRODUCT DATA

.1 Submit product data in accordance with Section 01 01 50 – General Instructions.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 – General Instructions.

2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger, minimum size 12 AWG.

.2 Copper conductors with 600 V insulation of chemically cross-linked thermosetting polyethylene material rated RW90.

2.2 ARMOURED CABLES

.1 Type AC90. Conductors: Insulated, copper, minimum size 12 AWG.

.2 Armour: interlocking type fabricated from aluminum strip.

3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
- .1 In conduit systems in accordance with Section 26 05 34 – Conduits, Fastenings and Fittings.

.2 Provide a green insulated bond conductor in all conduits sized in accordance with CSA C22.1-2012, Canadian Electrical Code, Part 1.

3.2 INSTALLATION OF ARMOURED CABLES

.1 Use armoured cables for final connection to luminaires installed in T-Bar ceiling.

.2 Terminate cables using connectors approved for armoured cable.

END OF SECTION

1 General

1.1 RELATED WORK

.1 This Section covers items common to Sections of Division 26, 27 and 28. This Section supplements requirements of Division 01.

1.2 REGULATORY REQUIREMENTS

.1 Restraints shall meet the requirements of the National Building Code, B.C. Building Code and the City of Mission Building Code.

.2 All electrical and communications equipment that is new or being relocated is to be seismically restrained.

1.3 SEISMIC RESTRAINT DESIGN AND INSPECTION

.1 Arrange and pay for the services of a professional engineer registered in the province of B.C. "Seismic Engineer" shall provide all required engineering services related to seismic restraints of the electrical and communications equipment.

.2 The Seismic Engineer shall provide assistance to the contractor during the course of the equipment install if necessary.

.3 The Seismic Engineer shall inspect the completed seismic installation and shall submit a letter to the departmental representative stating that the complete seismic installation is installed in accordance with the seismic engineers drawings and it complies with all regulatory requirements.

1.4 SUBMITTALS

.1 Submit shop drawings of all restraining devices, including details of attachments to the structure, either tested in an independent testing laboratory or approved by a B.C. registered professional Engineer.

1.5 SCOPE OF WORK

.1 Provide restraint for electrical equipment, including transformers, panels and suspended luminaires, etc., to prevent injury or hazard to persons and equipment and to retain equipment in its normal position in the event of an earthquake.

.2 Provide all seismic restraint related hardware, including bolts and anchors, from point of attachment to equipment through to and including attachment to structure.

.3 It is the entire responsibility of equipment manufactures to design their equipment so that the strength and anchorage of internal components of the equipment exceeds the force level used to restrain and anchor the unit itself to the supporting structure.

2 Products

2.1 GENERAL

.1 Provide anchor bolts, straps and other mounting materials as specified by Seismic Engineer.

3 Execution

3.1 INSTALLATION

.1 Carry out all seismic restraint works on electrical equipment as per the recommendations of the Seismic Engineer and in accordance with all regulatory requirements.

.2 Co-ordinate the work with other trades as required.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 26 05 00 - Common Work Results - Electrical

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

2 Products

2.1 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm minimum extension all around, for flush-mounted pull and junction boxes.

.3 Minimum size: 104 mm square.

.4 Cast aluminum, one or two gang FS or FD boxes with factory threaded hubs and mounting feet for all boxes mounted on finished wall or ceiling surfaces.

3 Execution

3.1 JUNCTION AND PULL BOX INSTALLATION

.1 Install pull boxes in inconspicuous but accessible locations.

.2 All junction and pull boxes are not indicated. Install pull boxes so as not to exceed 30 m of conduit run between pull boxes.

.3 Ground pull boxes as indicated.

3.2 IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results - Electrical.

.2 Install size 2 identification lamicoids indicating system name on pull boxes and junction boxes.

END OF SECTION

1 General

1.1 REFERENCES

.1 CSA C22.1-2012 Canadian Electrical Code, Part 1.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.4 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 RECESSED OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required for special devices.

.3 102 mm square outlet boxes for lighting fixture outlets.

.4 102 mm square outlet boxes with extension and plaster rings for flush mounting devices in finished walls.

.5 Gang boxes where wiring devices are grouped.

.6 Blank cover plates for boxes without wiring devices.

2.2 SURFACE CONDUIT AND DEVICE BOXES

.1 Cast aluminum, one or two gang FS or FD boxes with factory threaded hubs and mounting feet for all boxes mounted on finished wall or ceiling surfaces.

2.3 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.

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 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit and armoured cable connections. Reducing washers are not allowed.

END OF SECTION

1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.3 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 BASE

.1 Two channel raceway.

.2 Dimensions: 44.45 x 120.65 mm.

.3 1.27 mm galvanized steel.

.4 1.0 x 3.9 mm continuous galvanized steel centre divider.

2.2 COVER

.1 1.27 mm galvanized steel.

.2 120.65 mm wide.

2.3 DUPLEX RECEPTACLE DEVICE COVERPLATE

.1 Suitable for mounting standard 5-15R Duplex Receptacle.

.2 1.27 mm galvanized steel to match raceway cover.

.3 Accessory to raceway cover and base, and from same manufacturer.

2.4 VOICE/DATA OUTLET DEVICE COVERPLATE

.1 Suitable for mounting two Category 5e, RJ45 Data Jacks and one Category 5e, RJ45 Voice Jack.

.2 1.27 mm galvanized steel to match raceway cover.

.3 Accessory to raceway cover and base, and from same manufacturer.

2.5 FITTINGS

.1 Couplings, cover clips, blank end fittings, internal elbows and all other fittings to match raceway base and cover.

.2 Provide all fittings and materials as required for a complete raceway system.

3 Execution

3.1 INSTALLATION

.1 Install surface raceway base, covers, fittings, device coverplates, etc. as indicated.

.2 Surface raceways to be installed true and plumb to building lines.

END OF SECTION

1 General

1.1 LOCATION OF CONDUIT

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

1.2 CONDUIT SIZES

.1 Note that conduit sizes referenced in the 2012, Canadian Electrical Code are used.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 - Waste Management.

1.4 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 CONDUITS

.1 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.2 Rigid steel conduit: to CSA C22.2 No. 45, galvanized steel.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 53 mm and smaller. Two hole steel straps for conduits larger than 53 mm.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating: same as conduit.

.2 EMT couplings and connectors shall be malleable steel, set screw type. Connectors shall have insulated throats. Cast fittings are not acceptable.

2.4 FISH CORD

.1 Polypropylene.

3 Execution

3.1 INSTALLATION

.1 All conduit is to be EMT except for conduit to CCTV cameras in restricted visiting areas, where Rigid Steel Conduit shall be used.

.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.3 Conceal conduits above finished ceilings, except in mechanical and electrical rooms and in unfinished areas.

.4 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

.5 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.6 Mechanically bend steel conduit over 21 mm diameter.

.7 Dry conduits out before installing wire.

.8 Install fish cord in empty conduits.

3.2 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Group conduits wherever possible on surface channels.

.3 Do not pass conduits through structural members except as indicated.

.4 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum 25 mm at crossovers.

3.3 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

END OF SECTION

1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 - Waste Management.

1.3 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 SWITCHES

.1 Specification Grade, 20 A, 120 V, single pole, double 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 molded housing.
- .4 Suitable for back and side wiring.
- .5 Ivory toggle.

.3 Toggle operated fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.

2.2 RECEPTACLES

.1 Specification Grade, duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, with following features:
- .1 Urea molded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Triple wipe contacts and riveted grounding contacts.
- .6 Ivory color.

.2 Other receptacles with ampacity and voltage as indicated.

2.3 COVER PLATES

.1 Stainless steel cover plates for wiring devices.

.2 Sheet steel coverplates with turned over edges for surface mounted boxes.

3 Execution

3.1 INSTALLATION

.1 Switches:
- .1 Install single pole 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 – Common Work Results – Electrical.

.2 Receptacles:
- .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
- .2 Mount receptacles at height in accordance with Section 26 05 00 – Common Work Results - Electrical.

.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.

END OF SECTION

1 General

1.1 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit product data in accordance with Section 01 01 50 – General Instructions.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 - Waste Management.

1.3 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 TYPE `A' LUMINAIRE

.1 General Description:
- .1 Fluorescent.
- .2 Baked white enamel finish.
- .3 2 x 32 W, T8 lamps.
- .4 Lamp Color Temperature: 4100 K.
- .5 0.125" thickness, K12 lens in hinged latched frame.
- .6 1 220 x 310 mm wide.
- .7 Recessed in inverted T-Bar ceiling.
- .8 CSA approved.

.2 Ballast:
- .1 Electronic, Rapid Start.
- .2 ‹10%, THD.
- .3 120 Volt.

2.2 TYPE `B' LUMINAIRE

.1 Supplied by Public Works and Government Services Canada.

.2 Contractor shall pick-up all Type `B' luminaires from the Matsqui Complex, 33344 King Road, Abbotsford, BC, and deliver to site.

.3 Contractor shall supply and install 2 x 32W, T8, 4100K, Lamps for each Type `B' Luminaire.

.4 Luminaires to be supplied are "Kenall, Mighty Mac" – Catalogue #SDA-4-0/0-2-32-SB-1-120-2/9-DLN (5 Lobe Screws).

.5 General Description:
- .1 Institutional grade, fluorescent luminaire.
- .2 Baked white enamel finish.
- .3 2 x 32 W, T8 lamps. (Not Supplied PWGSC. To be supplied by this contractor)
- .4 LED Night Light. (Not required).
- .5 120 V Ballast.
- .6 1 220 x 310 mm wide.
- .7 Surface mounted.
- .8 14 Gauge steel housing and base.
- .9 0.125" Prismatic Polycarbonate Inner Lens and 0.250" Clear Polycarbonate Outer Lens.

3 Execution

3.1 INSTALLATION

.1 Install Luminaires as indicated.

.2 Provide additional bracing above drywall ceilings to fasten Type `B' luminaires.

.3 Provide seismic restraints for all luminaires in accordance with Section 26 05 25 – Seismic Restraints.

.4 Connect to lighting circuits and switches as indicated.

.5 Protect all luminaires from construction dust and debris.

.6 Clean all lighting reflectors, lenses and other lighting surfaces at time of final cleaning.

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

.1 Do unit equipment for emergency lighting work in accordance with CSA C22.2 No. 141-M11985(R1992) except where specified otherwise.

1.2 PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.3 GUARANTEE

.1 Provide a written guarantee, signed and issued in the name of Her Majesty, the Queen in right of Canada, stating that the battery for emergency lighting is guaranteed against defects in material and workmanship for a period of ten years, with a no-charge replacement during the first lustrum and a pro-rate charge on the second lustrum, from the date of the Final Certificate of Completion.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 - Waste Management.

1.5 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 BATTERY PACK

.1 Supply voltage: 120 V ac. Cord and 15P Plug.

.2 Output voltage: 12 V dc.

.3 Minimum Output wattage: 150 W.

.4 Operating time: 30 min.

.5 Battery: lead acid, sealed, maintenance free, 10 year.

.6 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected, modular constructed.

.7 Solid state transfer.

.8 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.9 Signal lights: solid state, life expectancy 100,000 h minimum, for `AC Power ON' and `High Charge'.

.10 Lamp heads: integral on unit adjustable mounting, swivel type, 5 watt, L.E.D. type.

.11 Cabinet: shelf mounted to wall and c/w knockouts for conduits.

.12 Finish: factory standard.

.13 Auxiliary equipment:
- .1 Lamp disconnect switch.
- .2 Test switch.
- .3 Time delay relay.
- .4 DC output terminal block inside cabinet.
- .5 Power cord and plug for AC connection.

2.2 REMOTE HEADS

.1 Surface mounted: ceiling, surface heads mounted on an adjustable swivel base, 12V, 2 x 5W L.E.D. Lamps.

2.3 RELAY CABINET

.1 310 x 310 x 150 mm Cabinet.

.2 Steel EEMAC-1 enclosure, grey.

.3 Continuous piano hinged, latched cover.

.4 Plywood mounting backboard inside.

.5 Relays: 120 V coil, 20 Amp contacts, Plug-in type with mounting base.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install unit equipment and remote mounted heads as indicated.

.2 Direct heads as indicated.

3.2 RELAY CABINET INSTALLATION

.1 Connect battery pack 120 V supply circuit through 120 V relay contacts. Connect relay coils through all 120 V lighting circuits in which the battery pack lighting heads are

located. Loss of 120 V supply on any lighting circuit to energize all battery pack D.C. Emergency lighting heads.

.2 Provide size 4 lamicoid nameplate for relay cabinet to read: "D.C. Emergency Lighting Relay Cabinet".

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 26 05 00 – Common Work Results – Electrical.

.2 Section 26 05 31 – Junction and Pull Boxes.

.3 Section 26 05 32 – Outlet Boxes and Conduit Boxes.

.4 Section 26 05 33 – Surface Raceways.

.5 Section 26 05 34 – Conduits, Fastenings and Fittings.

1.2 STANDARDS AND CODES

.1 Comply with latest issues and all addendums of the following standards:
.1 TIA/EIA, 568-B series standards – Commercial Building Telecommunications Standards.
.2 J-STD, 607-A – Commercial Building Ground and Bonding Requirements for Telecommunications.
.3 NECA/BICSI 568-2001 – Standard for Installing Commercial Building Telecommunications Cabling.
.4 Canadian Electrical Code including all BC amendments and bulletins.
.5 National Building Code.

.2 All products shall be fully standard-compliant and shall be the product of "AMP" NORDX manufacturer so that existing warranties of equipment is not voided.

1.3 CONTRACTOR QUALIFICATIONS

.1 The cabling contractor shall be a certified systems vendor of "AMP" NORDX components, and/or cabling, and use only technicians fully trained and qualified on installation and testing of the components installed.

.2 All staff performing any type of work contained in this Section shall be certified in the installation, termination and testing of all aspects of Category 5e UTP cabling and components by:
.1 "AMP" NORDX or,
.2 A recognized educational institution or,
.3 Being the holder of the designation of Registered Communications Distribution Designer (RCDD).

1.4 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.6 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 CATEGORY 5e UTP HORIZONTAL CABLE

.1 "NORDX" Four (4) pair, unshielded, twisted, solid copper core, 100 ohm, 24 AWG, Category 5e, FT4 rated.

.2 Category 5e cable for both voice and data horizontal cabling. Blue color for data cables and White color for voice cables.

.3 Transmission requirements shall conform to or exceed all applicable sections of the TIA/EIA 568-B current specifications and addendums for Category 5e cable and components.

.4 Electromagnetic radiation: cables shall comply with Class A limits of FCC Part 15, Subpart J for computing devices.

.5 Nearby sources of radio and electrical interference such as radio transmitters, HVAC, arc welders, motors, intercom or radar installations shall be evaluated for any possible effects.

2.2 CATEGORY 5e PATCH CORDS

.1 Modular Patch Cords:
.1 Mechanical: All UTP Patch Cords shall be fabricated with stranded conductors.
.2 Transmission: All UTP Patch cords shall meet the same transmission performance requirements as stated for Category 5e Horizontal UTP.
.3 Wired "straight throught".

.2 4-pair, 24 AWG, 8P/8W, T569A (ISDN) wired, RJ45 plug at each end.

.3 Provide the following required lengths and quantities:
.1 3.0 metres – 10 total
.2 1.0 metre – 10 total.

2.3 IDC CONNECTORS

.1 Wall-mounted Insulation Displacement Type (IDC) BIX termination connector strips.

.2 Category 5e for all horizontal cabling to set run, wall outlets.

.3 6 x 4-pair connection strips for all horizontal runs.

.4 Connection strips to suit existing mounting rails.

2.4 DATA PATCH PANELS

.1 Existing "AMP" NORDX patch panel suitable for individual snap-type modular jacks.

2.5 MODULAR VOICE AND DATA JACKS

.1 For installation on stainless steel face plates.

.2 "AMP" NORDX Non-keyed, 4 pair, 8P/8W modular jacks, Category 5e, T568A (ISDN) wiring.

.3 Snap-in type connectors.

.4 Color code for jacks:
.1 Voice – Black.
.2 Data – White.

.5 Arrange voice and data jacks in identical sequence at every outlet, with data jacks on top and voice on the bottom.

2.6 CATEGORY 5e UTP CONNECTORS

.1 Applies to both voice and data terminations.

.2 All UTP connectors at each horizontal cable run shall meet the following specifications:
.1 Data horizontal cable runs shall use 8P/8W female RJ45 components at both ends.
.2 Voice horizontal cable runs shall use 8P/8W female RJ45 components at the faceplate end and direct IDC termination in the Telephone Room.

.3 Cables shall be wired straight through, no crossover is allowed. Pin 1 at one end is connected to Pin 1 at the other end of the cables.

.4 Components:
.1 Configured to support 8 position EIA/TIA, ISDN cabling, 1000Base T and Token Ring standards.
.2 Meet or exceed technical criteria outlines in TIA/EIA-568, "Transmission Performance Specifications for 4-Pair, 100 ohm, Category 5e Cabling".
.3 Insulation Displacement Type (IDC), modular, non-keyed, utilizing BIX block type connectors.

.5 Connectors at outlet end; install in appropriate stainless steel coverplate.

2.7 CABLE LABELS

.1 Label all new voice and data cables.

.2 Bold face laser quality printed labels, black print on white background.

.3 Self adhesive, one piece label and clear cover wrapped around cable.

.4 Wording on labels to be approved by Departmental Representative prior to manufacture.

3 Execution

3.1 CATEGORY 5e UTP HORIZONTAL CABLE INSTALLATION

.1 Install each cable in one continuous run from the Lan Cabinet or BIX IDC Connector to the faceplate. Breaks or spliced not allowed.

.2 No single cable run shall exceed 90 metres in length, measure from the terminations in the Cabinet or BIX Connector to each RJ45 faceplate jack. Ensure the distance is not exceeded before installing the cabling system.

.3 Locate all cables:
- .1 At least 130 mm from power lines carrying 2 kVA or less.
- .2 At least 300 mm from power lines carrying 2 kVA to 5 kVA.
- .3 At least 600 mm from power llines carrying more than 5 kVA.
- .4 At least 300 mm from fluorescent fixtures.

.4 Ensure that all clearances between the installed cables and any type of electrical equipment, lines, and lighting are met and/or exceeded such that EMI is well within acceptable industry specifications.

.5 Should the Contractor encounter cable runs that cannot be installed to meet required clearance specifications, then the Contractor shall install fully satisfactory shielding.

.6 Cable terminations:
- .1 Terminate data cables with 8P/8W female RJ45 components at both ends.
- .2 Terminate voice cables with 8P/8W female RJ45 components at faceplate end, direct IDC termination in the Telephone Room.

.7 Install all UTP cables according to the standards for a Category 5e installation in CSA-T529.

.8 Cable bends shall not be less than the minimum radius specified by the manufacturer for the particular cable in use and shall be made without strain or stress to the cable.

.9 All cables shall be installed in conduit raceway system unless otherwise indicated on contract drawings.

.10 All cables shall be clearly labeled at both ends.

.11 Use no more than 25 lbs of force to install the voice and data cabling in raceways.

3.2 CABLE SLACK FOR TERMINATED CABLES

.1 For each cable run terminated, there shall be a minimum cable slack of 3 metres at the originating end (i.e. Patch Panel), and 300 mm at the outlet location.

.2 Place cable slack in the LAN Cabinet or as deemed appropriate by the Departmental Representative, on condition that storage slack is neat.

3.3 UTP CABLE TERMINATIONS

.1 All terminations to the UTP cable shall be properly connected using industry-standard Insulation Displacement Connection conventions and procedures to 8P/8W, T568A connector and in full compliance with the manufacturer's installation specifications and instructions.

.2 Maintain the cable twist up to the connection point at both ends of the cables. Remove a maximum of 12 mm of the cable jacket measured from the connection point.

.3 Terminate all four horizontal cable pairs at the RJ45 jack, patch panel and BIX connector strip.

.4 Label each voice and data jack and voice connector strip as indicated using bold face laser quality labels. Label voice and data jacks as indicated.

3.4 UTP CABLE LABEL INSTALLATION

.1 Install label on each end of cable.

.2 Install label not less than 150 mm from termination end of cable.

.3 All labels to be clearly visible and readable after final termination of cables without having to move or rotate cables.

3.5 CATEGORY 5e UTP CABLE TESTING

.1 Testing, General:
.1 Perform a basic link test to verify and ensure full functional capabilities.
.2 Test each cable on a pair-to-pair basis ensuring continuity and eliminating the possibilities of shorts or reversals.
.3 Use testing equipment based on TDR (Time Domain Reflectometry) technology.
.4 Test each cable to ensure compliance with transmission requirements outlined in the specification.
.5 Test all cables.

.2 Test all cables with a Level II-E tester for conformance with basic link performance as described in EIA/TIA-568 standards.

.3 The test results information for each link shall be recorded in the memory of the field tester upon completion of the test.

.4 The test results records saved by the tester shall be transferred to a windows-based database utility that allows for the maintenance, inspection, and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered, i.e. "As saved in the tester" at the end of each test and that these results cannot be modified at a later time.

.5 The database for the completed job shall be stored and delivered on CD-ROM including the software tools required to view, inspect and print an selection of the test reports.

.6 Documentation of tests shall be given in report form and will, at a minimum, contain the following data:

OPERATOR: DATE:
LOCATION: CABLE TYPE:

CABLE # TESTER, MAKE AND MODEL

TEST RESULTS (PAIRS):
PINS 1,2 / PINS 3,6 / PINS 4,5 / PINS 7,8
LENGTH:
ATTENUATION:
IMPEDENCE:
WIRE MAP:
NEXT (PAIR-TO-PAIR):
PSNEXT:
RETURN LOSS:
ELFEXT (PAIR-TO-PAIR):
PSELFEXT:
PROPAGATION DELAY:
DELAY SKEW:

.7 No marginal passes or conditional passes will be accepted.

.8 The Departmental Representative shall be notified 5 working days before testing is completed. At the completion of testing, the Departmental Representative will select a random sample of up to 5% of the installed links for retesting by the Contractor for comparison with the submitted test data. Should the retest show a "Fail" result, or should any measure parameter vary by more than 10% from the test results previously submitted, the installation Contractor shall, at his own expense, repeat the entire testing in the presence of the Departmental Representative.

.9 Provide paper copy of all test results for incorporation into Maintenance Manuals specified in Section 01 01 50 – General Instructions.

3.6 CATEGORY 5e UTP CABLE DOCUMENTATION AND CERTIFICATION

.1 Provide record drawings upon completion:
- .1 Indicate all changes.
- .2 Indicate cable Ids adjacent to outlets.
- .3 Indicate conduit runs, pull boxes and conduit sizes on record drawings.

.2 **Provide a certificate document issued by the cable/component manufacturer, guaranteeing transmission capabilities of the cabling system to support 1000 Mbps applications for a period of 25 years.**

.3 Installation technicians shall be certified through the manufacturer's certification program. Technicians shall provide evidence of their training certification, or Contractor shall supply documentation verifying their current participation in the manufacturer 's certification program.

.4 Manufacturer's certification:
- .1 The manufacturer's certification shall guarantee that design and installation on the part of the certified Contractor will not negate or void any portion of the certified system.
- .2 In the event that the Contractor is no longer in business, the full certification remains valid and will be covered by the manufacturer.

.5 The installed structured cabling system shall be covered by a warranty which includes, as a minimum:
- .1 25 Year Coverage.
- .2 Warranty against defects in material and workmanship from the date of the interim acceptance of installation.
- .3 Repair or replacement of a failed component, covering parts and labour, at no charge to the Owner.
- .4 Single point of contact for all warranty service.

.6 Upon request at no additional cost, provide a manufacturer's technical representative to conduct an on-site visit to ensure complete technical compliance.

.7 Provide paper copy of all test results for incorporation into Maintenance Manuals specified in Section 01 01 50 – General Instructions.

.8 Provide electronic copy of all test results on CD/DVD format.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 – General Instructions.

.2 Section 26 05 00 – Common Work Results - Electrical.

1.2 SCOPE OF WORK

.1 Removal of existing ceiling mounted P/A Speakers as indicated.

.2 Installation and reconnection of one existing P/A Speaker in new T-bar ceiling as indicated.

.3 Test all existing P/A Speakers prior to removal to confirm all speakers/zones are presently functioning.

.4 Test re-installed existing P/A Speaker to confirm speaker operation.

1.3 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.5 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 SPEAKERS

.1 Existing to be removed or relocated as indicated.

2.2 WIRING

.1 2 conductor, copper, 16 gauge, shielded.

3 Execution

3.1 INSTALLATION

.1 Re-install existing P/A Speaker in new T-bar ceiling as indicated.

.2 Connect to existing P/A Zone as indicated.

.3 Install all wiring in conduit as indicated.

2.2 TESTING

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results – Electrical.

.2 Test to confirm operation of relocated speaker on existing P/A zone.

.3 Adjust taps on speaker to provide an SPL of not less than 10 dBA above the expected ambient noise level.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 – General Instructions.

.2 Section 26 05 00 – Common Work Results - Electrical.

1.2 SHOP DRAWINGS

.1 Submit shop drawings and product data in accordance with Section 01 01 50 – General Instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.4 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 DOOR POSITION SWITCHES

.1 Overhead Door type Magnetic Contacts.

.2 Surface mounted.

.3 Universal Magnet: 29 x 21 mm.

.4 SPDT Switch c/w 460 mm Stainless Steel Armoured cable.

.5 Gap: 76 mm.

.6 Cast Aluminum construction.

2.6 WIRING

.1 All wiring shall be solid, FT4 rated, copper, 4 conductor, minimum #22 AWG.

.2 All wiring to be in conduit as indicated.

3 Execution

3.1 INSTALLATION - GENERAL

.1 Install all devices in accordance with manufacturer's written installation instructions to locations indicated.

.2 Provide additional blocking as required to install switch to wall as indicated.

.3 Connect to normally closed contact position when mobile shelving is in fully closed position as indicated.

3.2 WIRING INSTALLATION

.1 All wiring to be installed in conduit as indicated.

.2 Terminate door position switch wiring on existing LTU Terminal Block in existing console in CER Room as indicated. Label cables indicating "A & D Mobile Shelving".

.3 Coil 10 metres of spare cable for each Door Position Switch at existing console for future re-routing of cables to new CER Room as indicated.

3.3 TESTING AND DEMONSTRATION

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results.

.2 Test all door position switches to ensure correct annunciation on existing Facility Alarm Annunciation System (FAAS) in MCCP. All programming of existing FAAS for new door position switch alarms is to be carried out by others (N.I.C.).

.3 Perform all tests in presence of Departmental Representative and CSC on-site ADGA Technician.

END OF SECTION

1 General

1.1 SCOPE OF WORK

.1 Work under this contract includes but is not limited to the relocation of 2 existing CCTV Cameras as indicated.

.2 Prior to disconnection and removal of existing CCTV Cameras, Test Cameras in presence of Departmental Representative and CSC on-site ADGA Technician to ensure cameras are properly functioning and recording.

.3 Test re-installed CCTV Cameras in the presence of Departmental Representative and CSC on-site ADGA Technician and demonstrate proper operation of cameras and recording.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.3 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 CAMERAS

.1 Existing "Sony" Model DH120T.

3 Execution

3.1 INSTALLATION OF CAMERAS

.1 Relocate existing CCTV cameras is indicated.

.2 Cameras to be wall mounted at same height as existing.

.3 Pull back existing Category 6 UTP cabling and reroute in new Rigid Steel Conduit to new Camera locations as indicated.

.4 Re-terminate existing Category 6 UTP cables as required using new RJ45 jacks to match existing.

.5 Contact Departmental Representative upon completion of reconnection of existing relocated CCTV cameras. Departmental Representative will arrange for on site electronics service technicians to re-aim and adjust field-of-view of cameras.

END OF SECTION

1 General

1.1 EXISTING FIRE ALARM SYSTEM

.1 The existing fire alarm system on site is a Chubb-Edwards EST3, consisting of several remote Alarm Panels and Annunciators.

1.2 SCOPE OF WORK

.1 Work under this contract includes but is not limited to:

- .1 Supply & Installation of three (3) new Addressable Smoke Detectors and one (1) Addressable 2-Stage Manual Pull Station as indicated.
- .2 Supply & Installation of new conduit and wiring from new smoke detectors and pull station to existing Fire Alarm Panel in Room N218 as indicated.
- .3 Connection of new Addressable Smoke Detectors and Addressable 2-Stage Manual Pull Station to existing Addressable Zone 2 in existing Fire Alarm Panel in Room N218.
- .4 Reprogramming of existing Fire Alarm System including all Remote Annunciators as required to add 3 new Addressable Smoke Detectors and 1 new Addressable 2-Stage Manual Pull Station.
- .5 Arrange and pay for all work including testing and verification by G.E. Security (Chubb/Edwards). Test and verify operation all new devices in accordance with CAN/ULC-S536 amd CAN/ULC-S537. Submit Verification report.

1.3 REFERENCES

.1 CAN/ULC-S524 Installation of Fire Alarm Systems

.2 CAN/ULC-S536 Inspection and Testing of Fire Alarm Systems

.3 CAN/ULC-S537 Verification of Fire Alarm Systems

.4 National Building Code of Canada

1.4 REQUIREMENTS OF REGULATORY AGENCIES

.1 System:

- .1 To TB OSH Chapter 3-04.

.2 System Components:

- .1 Listed by ULC and comply with applicable provisions of NBCC and meet requirements of authority having jurisdiction.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

1.6 OPERATION AND MAINTENANCE DATA

.1 Provide verification report for incorporation into manual specified in Section 01 01 50 - General Instructions.

2 Products

2.1 FIRE ALARM CONTROL PANEL

.1 Existing G.E. Security (Chubb/Edwards) EST3, Addressable control panel.

2.2 ADDRESSABLE SMOKE DETECTORS

.1 Photo-electric type, ceiling mounted.

.2 Addressable, variable sensitivity.

.3 Electronics to communicate detector's status to addressable module.

.4 Compatible with existing Chubb/Edwards EST3 Fire Alarm Control Panel.

2.3 ADDRESSABLE PULL STATIONS

.1 To match existing Chubb/Edwards "SIGC270PBC" Pull Stations.

.2 Addressable, 2-Stage.

.3 Compatible with existing Chubb/Edwards EST3 Fire Alarm Control Panel.

2.4 WIRING

.1 Twisted copper conductors, rated 300 V. Listed by CSA and ULC as suitable for fire alarm duty. Red jacket.

.2 Minimum #18 AWG, and in accordance with manufacturer's specifications

3 Execution

3.1 INSTALLATION

.1 Install all new devices in accordance with CAN/ULC-S524.

.2 Install all components and connect.

.3 Provide necessary raceways, cable and wiring to make interconnection as required by equipment manufacturer.

.4 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 and CAN/ULC-S537.

.2 Tests and verification shall be performed by G.E. Security (Chubb/Edwards)

.3 Fire alarm system:
- .1 Test all devices as required.
- .2 Test each device and alarm circuit to ensure smoke detectors transmit alarm to control panel and remote annunciators and actuate alarm and ancillary devices.
- .3 Simulate grounds and breaks on alarm and signalling circuits to ensure proper operation of trouble signals.

.4 Produce a list of all devices and tests to be performed. Have a column for:
- .1 the device, module, cable, control unit function, etc.
- .2 the test
- .3 pass/fail
- .4 initials of the tester
- .5 time & date of test

.5 Hand over verification report, test reports, and certificate for Fire Alarm system to Departmental Representative.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 02 41 17 - Demolition and Removal Work

.2 Section 03 05 10 - Cast-in-Place Concrete.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International):
.1 ASTM D698-07e1 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
.2 ASTM C136-06 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
.3 ASTM C117-04 Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.

1.3 SITE CONDITIONS

.1 Commence trenching following demolition and removal of concrete slab on grade.

1.4 PROTECTION

.1 Effect approved measures to minimize dust as result of this work. Refer to Section 01 01 50.

.2 Protect building interior from damage and ensure operations do not interfere with CSC site operations or drainage.

2 Products

2.1 MATERIALS

.1 Type 1 fill: clean, hard, durable crushed gravel or stone, free from shale clay, friable materials, organic matter and other deleterious substances and graded within the following limits when tested to ASTM C136 and ASTM C117 and giving a smooth curve without sharp breaks when plotted on a semi-log chart:

ASTM Sieve Designation	% Passing
75 mm	100
19 mm	50 - 100
4.75 mm	30 - 60
0.3 mm	5 - 20
0.075 mm	0 - 5

.2 Type 4 Fill: clean coarse, washed sand, free from clay, shale and organic matter.

3 Execution

3.1 SITE PREPARATION

.1 Protect floors from damage during trenching and backfilling work inside building.

.2 Remove excavated material from building and ensure Work does not interfere with CSC site operations.

.3 Dispose of excavated material on CSC property as directed by the Departmental Representative.

3.2 STOCKPILING

.1 Stockpile new fill materials in areas designated by Departmental Representative. Protect fill materials from contamination.

3.3 TRENCH EXCAVATION

.1 Excavate trench below floor to uncover existing plumbing lines and to accommodate new plumbing line plus allowing 100 mm to accommodate new sand bedding below pipe and as directed by Departmental Representative.

.2 Protect exposed sides of trench from disturbance by construction operations as approved by the Departmental Representative.

.3 Dispose of surplus and unsuitable excavated material on CSC Property in approved dump area.

.4 Hand trim, make firm and remove loose material and debris from excavations. Where material in trench is disturbed, compact soil to density at least equal to density noted below.

3.4 FILL TYPES AND COMPACTION

.1 Use fill of types as indicated or specified below. Unless otherwise specified, compact all placed fills to the following densities:

.1 Type I Fill: 98% Standard Proctor Maximum Dry Density, to ASTM D698, Method C.

.2 Type 4 Fill: 95% Standard Proctor Maximum Dry Density, to ASTM D698, Method C.

.3 Notify Departmental Representative five (5) days prior to backfilling of trenches for mechanical services.

3.5 BACKFILLING

.1 Do not proceed with backfilling operations until Departmental Representative has inspected and approved installations.

.2 Place backfill material in uniform layers not exceeding 100 mm compacted thickness up to underside of concrete slab on grade. Compact each layer before placing succeeding layer.

.3 Under concrete slab at new plumbing line:

.1 Pipe bedding and immediate protective cover: place minimum 100 mm thickness of Type 4 Fill over excavated trench bottom, grade to pipe inverts and compact. Cradle half diameter of pipe in haunch zone using type 4 fill. After pipe is in place, cover with minimum 300 mm depth of type 4 fill.

.2 Fill above protective cover: in areas within buildings, fill remainder of trench with Type 1 fill to underside of slab on grade.

.3 Compaction: compact bedding and immediate protective cover to 95% density. In areas within buildings and where paving and walks occur, compact remainder of fill to 98% density

3.7 RESTORATION

.1 Upon completion of work, remove surplus materials and debris, clean area, and correct defects noted by Departmental Representative.

END OF SECTION

APPENDIX I

ANALYTICAL RESULTS
(ASBESTOS AND LEAD)

Asbestos Analytical Services Ltd.
7 - 2883 East Kent Avenue N., Vancouver, BC. V5S 3T9

ASBESTOS ANALYSIS REPORT

Project Location: A&D Building, Kent Institution,
4732 Cemetary Road, Agassiz, BC
Reference #s: BE-VC-017372
Number of Samples: 14

AASL Report #: **B00369**
Analyst: Gabrielle Sutton
Report Date: 26AUG2013
Method: NIOSH Method 9002

# B00369	Sample	Sub-Sample	Sample Description / Location	Results	ASB
1. 1	**AD-01**	Layer 1 - beige fibrous	Fire Proofing Insulation, Ceiling Space, A&D Building	Asbestos Fibres Not Detected 10 - 30 % Cellulose Fibres 1 - 10 % Fibrous Glass > 70 % Non-Fibrous	---
1. 2	AD-01	Layer 2 - yellow fibrous	Fire Proofing Insulation, Ceiling Space, A&D Building	Asbestos Fibres Not Detected 90 - 100 % Fibrous Glass > 5 % Non-Fibrous	---
2. 1 **	**AD-02**	Layer 1 - pale grey tile	12" x 12" White Vinyl Tile with Mastic, Floor, A&D Building	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
2. 2	AD-02	Layer 2 - black mastic	12" x 12" White Vinyl Tile with Mastic, Floor, A&D Building	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
3. 1	**AD-03**	Layer 1 - thin cream (paint)	Drywall Joint Compound, Ceiling, A&D Building, Bathroom	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
3. 2	AD-03	Layer 2 - off-white	Drywall Joint Compound, Ceiling, A&D Building, Bathroom	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
3. 3	AD-03	Layer 3 - cream fibrous	Drywall Joint Compound, Ceiling, A&D Building, Bathroom	Asbestos Fibres Not Detected 90 - 100 % Cellulose Fibres > 1 % Non-Fibrous	---
4. 1	**AD-04**	Layer 1 - thin cream (paint)	Drywall Joint Compound, Ceiling, A&D Building, Corridor	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
4. 2	AD-04	Layer 2 - off-white	Drywall Joint Compound, Ceiling, A&D Building, Corridor	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
5. 1 **	**AD-05**	Layer 1 - white & pale beige, pliable	Grey Linoleum with Floor Tiles and Mastic, Floor, A&D Building, Inmates Effects Storage	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
5. 2	AD-05	Layer 2 - yellow glue	Grey Linoleum with Floor Tiles and Mastic, Floor, A&D Building, Inmates Effects Storage	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
5. 3 **	AD-05	Layer 3 - pale grey tile	Grey Linoleum with Floor Tiles and Mastic, Floor, A&D Building, Inmates Effects Storage	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
5. 4	AD-05	Layer 4 - black mastic	Grey Linoleum with Floor Tiles and Mastic, Floor, A&D Building, Inmates Effects Storage	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
6 **	**AD-06**	Single Phase - beige fibrous	White 1' x 1' Ceiling Tiles, Ceiling, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Cellulose Fibres > 5 % Non-Fibrous	---
7. 1	**AD-07**	Layer 1 - beige fibrous	Brown Ceiling Tiles Mastic Pucks, Ceiling, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Cellulose Fibres > 5 % Non-Fibrous	---
7. 2 **	AD-07	Layer 2 - light brown mastic	Brown Ceiling Tiles Mastic Pucks, Ceiling, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---

Asbestos Analytical Services Ltd.

# B00369	Sample	Sub-Sample	Sample Description / Location	Results	ASB
7. 3	AD-07	Layer 3 - thin off-white (paint)	Brown Ceiling Tiles Mastic Pucks, Ceiling, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
7. 4	AD-07	Layer 4 - off-white, thin	Brown Ceiling Tiles Mastic Pucks, Ceiling, A&D Building, Visitor Phone Room	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
8. 1	**AD-08**	Layer 1 - thin off-white (paint)	Drywall Joint Compound, Ceiling, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
8. 2	AD-08	Layer 2 - off-white	Drywall Joint Compound, Ceiling, A&D Building, Visitor Phone Room	1 - 5 % Chrysotile Asbestos > 95 % Non-Fibrous	T
9 **	**AD-09**	Single Phase - light beige fibrous	White 2' x 2' Ceiling Tiles, Above Windows, A&D Building, Visitor Phone Booth	Asbestos Fibres Not Detected 20 - 40 % Cellulose Fibres 20 - 40 % Fibrous Glass > 30 % Non-Fibrous	---
10 **	**AD-10**	Single Phase - black, rubbery	Black Window Mastic, Windows from Phone Booths, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
11. 1	**AD-11**	Layer 1 - thin white (paint)	Grey Putty, Windows to Cinder Block Wall, A&D Building, Visitor Phone Room	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
11. 2 **	AD-11	Layer 2 - grey	Grey Putty, Windows to Cinder Block Wall, A&D Building, Visitor Phone Room	1 - 10 % Chrysotile Asbestos > 90 % Non-Fibrous	T
12. 1	**AD-12**	Layer 1 - thin dark blue (paint)	Brown Mastic, Bottom of Door, A&D Building, Visitor Phone Room Door	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
12. 2 **	AD-12	Layer 2 - brown mastic	Brown Mastic, Bottom of Door, A&D Building, Visitor Phone Room Door	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
12. 3	AD-12	Layer 3 - thin cream (paint)	Brown Mastic, Bottom of Door, A&D Building, Visitor Phone Room Door	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
13 . 1	**AD-13**	Layer 1 - thin dark brown / white (paint)	Grey Putty, Door Frames, A&D Building, General Office	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---
13. 2 **	AD-13	Layer 2 - grey	Grey Putty, Door Frames, A&D Building, General Office	Asbestos Fibres Not Detected 1 - 5 % Fibrous Glass > 95 % Non-Fibrous	---
14 **	**AD-14**	Single Phase - beige mastic	Brown Mastic, On Counter, A&D Building, Front Desk	Asbestos Fibres Not Detected 90 - 100 % Non-Fibrous	---

Comments

Samples analyzed in accordance with NIOSH Laboratory Method 9002
American Industrial Hygiene Association (AIHA) BAPAT Program Laboratory Number 204301
Estimated Limit of Detection is <0.5 %
ASB = Asbestos present/absent in material
T = Asbestos Present
AASL Asbestos Analytical Services Ltd. will not accept any responsibility as to the manner of interpretation or application of these results.

** Sample preparation included ashing process.

Analyst: *Original Signed By*
Gabrielle Sutton, B.A.
Date: August 26, 2013

Original Signed By
Reviewed By: Gabrielle Sutton, B.A.

DST consulting engineers

LEAD ANALYSIS REPORT

Client: PWGSC
Attention: Amy Moizumi
Project Name: Pre-Demo Hazmat Assessment A&D BLDG
Project Number: BE-VC-017372
Date: August 29, 2013
Date Submitted: August 21, 2013

LEAD-BASED COATING SAMPLE ANALYTICAL RESULTS

Sample Number	Location / Description	Color	Result (mg/cm2)	Lead-Based Coating
LS-01	Cinder Block Walls – A&D Building	White	0.02	No
LS-02	**Steel Bars Over Windows – Entrance**	**Dark Brown**	**0.06**	**Yes**
LS-03	**Steel Window Frames - Entrance**	**Dark Brown**	**0.22**	**Yes**
LS-04	**Steel Fire Door – Entrance**	**Dark Brown**	**0.06**	**Yes**
LS-05	Wood Door and Frame – General Office	Brown	0.02	No
LS-06	**Steel Cage – Holding Area**	**Dark Brown**	**0.06**	**Yes**
LS-07	**Drywall Ceiling – A&D Building**	**White**	**0.16**	**Yes**
LS-08	2"x2" Ceramic Floor Tiles – Bathrooms	Brown	0.03	No
LS-09	**Steel Door Frame – Bathroom**	**Grey**	**0.16**	**Yes**
LS-10	**Steel Door Frame – Bathroom**	**White**	**0.09**	**Yes**
LS-11	**Steel Fire Door – Bathroom**	**Grey**	**0.16**	**Yes**
LS-12	**Cinder Block Walls – Inmate Bathroom**	**Yellow**	**0.08**	**Yes**
LS-13	**Cage – Inmate Bathroom**	**Red**	**0.19**	**Yes**
LS-14	**Steel Door and Frame – Visitor Phone Room**	**White**	**0.19**	**Yes**
LS-15	**Steel Window Frames – Visitor Phone Room**	**Beige**	**0.07**	**Yes**

DST Consulting Engineers Inc.
Unit B – 4125 McConnell Drive
Burnaby, BC V5A 3J7
Tel (604) 436-4588

LS-16	**Steel Window Frames – Visitor Phone Room**	**Light Brown**	**0.15**	**Yes**
LS-17	Cinder Block Walls – Visitor Phone Room	Black	0.02	No
LS-18	Ceiling Tiles – Visitor Phone Room	White	0.02	No

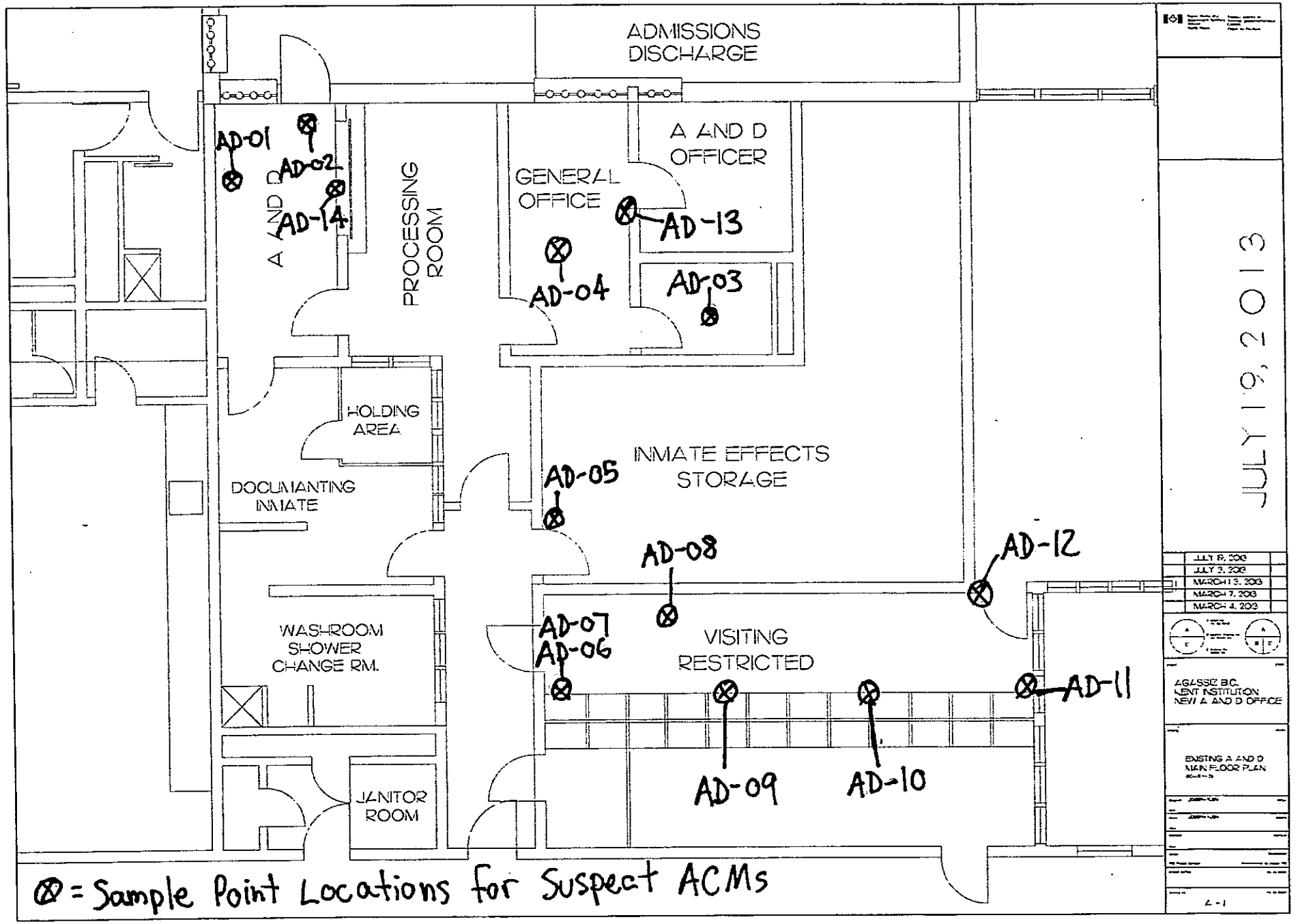
ANALYTICAL METHODOLOGY:

A Niton X-Ray Fluorescence (XRF) spectroscopy detector was used to make measurements on suspect building painted surfaces. The Niton XRF is designed to detect and quantify the amount of lead present primarily in painted surfaces. Measurements were made following Niton XRF standard operating procedures for lead in surface coating measurements.

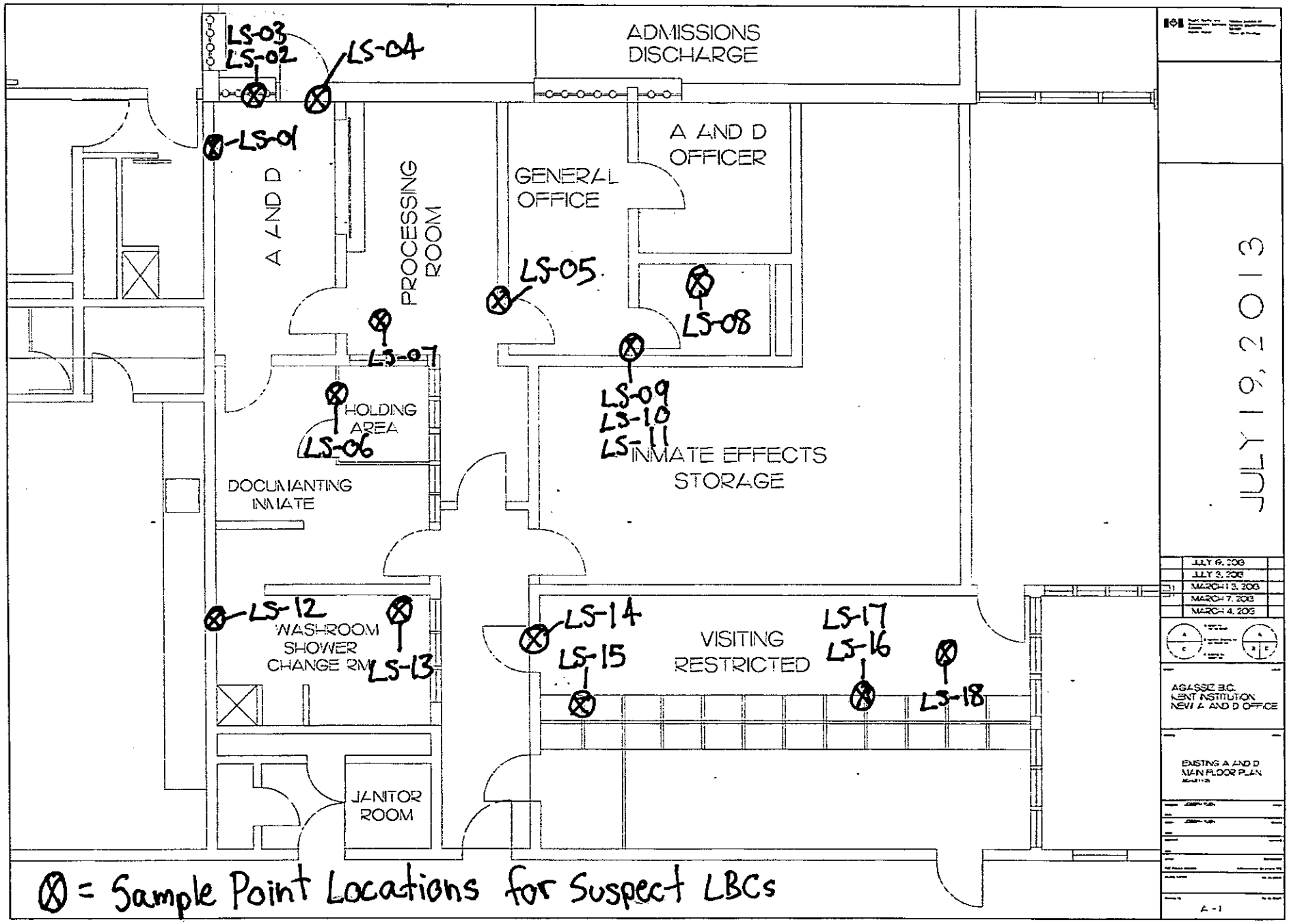
Suspect surface coating samples analyzed were identified to have hazardous levels of lead (600 or greater) with a detection limit of $\geq$ 0.05 of lead per square centimeter of surface area (mg/cm2).

APPENDIX II

DRAWINGS OF SAMPLE POINT LOCATIONS (ASBESTOS AND LEAD)



⊗ = Sample Point Locations for Suspect ACMs


LS-03
LS-02
LS-04
ADMISSIONS
DISCHARGE
LS-01
A AND D
PROCESSING
ROOM
GENERAL
OFFICE
A AND D
OFFICER
LS-05
LS-08
LS-07
LS-09
LS-10
LS-11
HOLDING
AREA
LS-06
INMATE EFFECTS
STORAGE
DOCUMENTING
INMATE
LS-12
WASHROOM
SHOWER
CHANGE RM
LS-13
LS-14
LS-15
VISITING
RESTRICTED
LS-17
LS-16
LS-18
JANITOR
ROOM
⊗ = Sample Point Locations for Suspect LBCs
JULY 19, 2013
JULY 9, 2013
JULY 3, 2013
MARCH 13, 2013
MARCH 7, 2013
MARCH 4, 2013
AGASSIZ B.C.
KENT INSTITUTION
NEW A AND D OFFICE
EXISTING A AND D
MAIN FLOOR PLAN
A-1