Public Works and Government Services Canada

Travaux Publics et Services Gouvernmentaux Canada

Requisition No. EZ899-173106

DRAWINGS AND SPECIFICATION
For

OFFICE RENOVATION
Abbotsford, BC
Matsqui Institution,
Building M2A (Admin) SIO
33344 King Road

Project No.: R.084072.001
January 2017

APPROVED BY:

A/ _____ 2017-02-15
Regional Manager, AES Date

_____ 2017.02.16
Construction Safety Coordinator Date

TENDER:

_____ 2017-02-21
Project Manager Date

Real Property Services Branch, Professional and technical Services, Pacific Region
Room 219 - 800 Burrard St, Vancouver, B.C. V6Z 0B9

SINDEX

DIVISION	SPECIFICATION SECTION	NUMBER OF PAGES
01	**GENERAL REQUIREMENTS**	
01 01 50	General Instructions	13
01 14 10	Security Requirements	6
01 35 33	Health and Safety Requirements	7
01 91 00	Commissioning	3
02	**EXISTING CONDITIONS**	
02 41 19	Demolition and Removal Work	5
02 82 10	Hazardous Materials Abatement and Removal	6
Division 03	N/A	
04	**MASONRY**	
04 04 99	Masonry	4
05	**METALS**	
05 55 00	Metal Fabrications	4
06	**WOOD, PLASTICS AND COMPOSITES**	
06 10 11	Rough Carpentry	2
07	**THERMAL AND MOISTURE PROTECTION**	
07 21 16	Blanket Insulation	3
08	**OPENINGS**	
08 11 14	Steel Doors and Frames	4
08 71 10	Door Hardware	5
08 80 50	Glazing	3
09	**FINISHES**	
09 21 16	Gypsum Board Assemblies	5
09 22 16	Non-Structural Metal Framing	3
09 51 13	Acoustic Tile	2
09 65 18	Vinyl Composition Tile	3
09 65 20	Resilient Base	4

09 69 50	Carpet Tile	3
09 91 23	Finish Painting	9

Division 10 to 21 N/A

22 PLUMBING

22 13 17	Drainage, Waste and Vent Piping	3

23 HEATING, VENTILATION & AIR CONDITIONING

23 05 00	Common Work Results – Mechanical	12
23 05 05	Installation of Pipework	3
23 05 29	Hangers & Supports for Piping & Equipment	6
23 05 48	Vibration & Seismic Controls for Ductwork, Piping & Equipment	4
23 05 53	Mechanical Identification	5
23 05 93	Testing, Adjusting and Balancing	5
23 07 19	Thermal Insulation for Piping	7
23 08 00	Commissioning of Mechanical Systems	3
23 09 33	Electric and Electronic Control System for Mechanical Systems	3
23 23 00	Refrigerant Piping	5
23 81 50	Split System DX Units	5
23 90 00	Mechanical Schedules	1

Division 24 to 25 N/A

26 ELECTRICAL

26 05 00	Common Work Results - Electrical	9
26 05 21	Wires and Cables 0 – 1000v	1
26 05 25	Seismic Restraints	2
26 05 28	Grounding Secondary	2
26 05 31	Junction, Pull Boxes and Cabinets	2
26 05 32	Outlet Boxes and Conduit Boxes	2
26 05 34	Conduits, Fastenings and Fittings	2
26 27 26	Wiring Devices	2
26 28 21	Moulded Case Circuit Breakers	2
26 28 23	Non-Fused Disconnect Switches	1
26 50 00	Lighting Fixtures	2
26 52 01	Unit Equipment for Emergency Lighting	2

27 COMMUNICATIONS

27 05 13	Telecommunications Equipment and Cabling	8
27 10 05	Fibre Optic Cabling	4

28 ELECTRONIC SAFETY AND SECURITY

28 23 01 CCTV Security Monitoring System 8

Division 29 to 33 N/A

Appendix A
Maintenance Handover Report 2

Appendix B
Hazardous Materials Assessment for the Matsqui Institution Building M2A Security Intelligence Office (SIO)/Administrative Office 39

LIST OF DRAWINGS

Bound Separately

ARCHITECTURAL

A000 Title Page, Site & Location Plan
A101 Existing Photos
A102 Existing Photos
A201 Floor Plans - Demolition & New
A301 Reflected Ceiling Plans - Demolition & New
A401 Elevations & Sections
A902 Details & Schedules

MECHANICAL

M-1 Partial Main Floor Plan Mechanical

ELECTRICAL

E-1 Electrical Panel Schedules Mechanical Equipment Schedule, Single Line Diagram Symbol Legend
E-2 Partial Floor Plan - Power and Communications Layout
E-3 Partial Floor Plan - Power and Communications Layout
E-4 Partial Floor Plan - Lighting Layout
E-5 Partial Floor Plan - Fibre Optic Cabling
E-6 Partial Floor Plan - Security Wiring Diagrams
E-7 Partial Floor Plan - Security Control Consoles and CCTV Monitors (For Reference only)

END OF INDEX

1 SUMMARY OF WORK

.1 Work covered by Contract Documents:

.1 Work under this Contract comprises interior renovation of rooms 102, 104, 104A, 108 & 112 in Building M2a; including mechanical and electrical work and remedial work as indicated, at Matsqui Institution, 33344 King Rd., Abbotsford, BC.

.1 Include for the arrangement and payment for the services of specialized contractors, listed in Section 26 05 00 paragraph 1.1.2, to perform the work described in Section 26 05 00; paragraphs 1.5.2, 1.5.8 and 1.5.11.

.2 Contractor's Use of Premises:

.1 Contractor has controlled use of immediate construction area for Work, storage, and access as directed by the Departmental Representative.

.2 Use of areas inside Matsqui 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 Matsui Institution site and Building M2a outside the Work area will be operational during work of this Contract.

.1 Areas protected by temporary dust barriers are within the Work area and Corridor 135 is considered outside the work area except as protected by temporary barriers.

.2 Maintain adequate egress along Corridor 135 during normal working hours.

2 WORK RESTRICTIONS

.1 Within Work areas provide temporary dust barriers at doorways and openings in walls to protect adjoining rooms from dust migration to approval of Departmental Representative. Coordinate Work affecting existing building operations. Construct dust barriers to prevent passage of fumes and excessive noise beyond Work area .

.2 Protect duct systems from dust and contaminants migrating outside of the Work area via ducts.

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

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

.5 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.

.6 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 Contractor and delivery 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 to facilitate access to site areas inside Institution via the Principal Entrance. 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 twelve (12) 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 five (5) 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.

.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 Security protocol 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 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 noted in para .2 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 Rejected Work:
.1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
.2 Make good other Contractor's work damaged by such removals or replacements promptly.
.3 Reports:
.1 Submit (4) four copies or one scanned pdf copy of inspection and test reports to Departmental Representative.

.4 Equipment and Systems:
.1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
.2 Refer to specific Sections for definitive requirements.

9 TEMPORARY UTILITIES

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

.2 Temporary Ventilation:
.1 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 Temporary Ventilation:
.1 Prevent accumulations of dust, fumes, mists, vapours or gases in occupied areas 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 work areas 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.

.3 Maintain strict supervision of operation of temporary ventilating equipment to:
.1 Conform with applicable codes and standards.
.2 Enforce safe practices.
.3 Prevent abuse of services.
.4 Prevent damage to finishes.

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

.3 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.

.4 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.

.5 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/mobile platforms:
.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 Site Storage/Loading:
.1 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.

.4 Construction Parking:
.1 Parking space outside double fence and temporary parking for delivery vehicles at the construction site is available as directed by the Departmental Representative. Remove vehicles as directed.

.5 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.

.6 Equipment, Tools and Material Storage:

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

.7 Sanitary Facilities:

.1 Local building sanitary facilities in vicinity are available for use by Contractor workers as directed by Departmental Representative. Maintain washroom facilities in clean condition.

11 TEMPORARY BARRIERS AND ENCLOSURES

.1 Enclosure of Work Area:

.1 Provide temporary dust and vapour tight hoarding protection for work areas until dust/vapour generating work is complete.

.2 Design enclosures to support it's own weight and fasten to existing walls/structure. Seal doors at corridor to prevent migration of dust.

.3 Make good damage to existing construction cause by enclosure construction.

.2 Protection of Building Finishes:

.1 Provide protection for new and existing finished surfaces, partially finished building surfaces 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 sheet materials, framing, on flat solid supports inside work area.

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

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

.7 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 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.

.9 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 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.

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

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

.10 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.

13 EXAMINATION AND PREPARATION

.1 Existing Utilities:

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

.2 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.

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

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

.5 Remove redundant service lines where encountered, as directed 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, 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 experienced installer to perform cutting and patching for sight-exposed surfaces.
.8 Cut rigid materials using purpose made 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, hardware, baked enamel. 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 or seal, seamless floor finishes, as recommended by manufacturer.
.10 Inspect finishes, and ensure specified workmanship and operation.
.11 Cleaning required in exterior areas as a result of Work of this Contract.
.1 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds resulting from work of this Contract.
.2 Remove dirt and other disfiguration from exterior surfaces as a result of Work.
.3 Sweep clean paved areas used during work of this contract.
.12 Clean or replace filters of mechanical equipment.

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 containers. 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. Correct deficiencies in 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 demonstrated to Department's personnel.
.4 Fire alarm modifications have been tested and signed off by the fire alarm technician.
.5 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) sets of CD's in AutoCad file format (version: 2007 or newer) with all asbuilt information on the diskettes. 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 Four (4) sets of printed as-built drawings.
.3 On electrical as-builts include:
.1 Indicate conduit and cable runs, junction boxes and circuit numbers.
.2 Indicate communication voice/data outlet numbers.
.3 Additional record drawing requirements are included under various other electrical Sections.
.4 Convert reviewed as-built Autocad drawings and Shop Drawings, to PDF format for inclusion into electronic O&M manual.

.2 Maintenance data:
.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:
.1 Section 23 05 00 Common Work Results - Mechanical clause 1.11 for specific operations and maintenance manual details and Section 26 05 00 Common Work Results - Electrical clause 1.7 &1.8 for Record Drawings, O& M manual specific to Electrical data.

.2 Section 23 05 93 Testing, Adjusting and Balancing for commissioning of Mechanical systems.

.3 Maintenance Materials, Special Tools and Spare Parts:

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

.1 Mechanical: Section 23 05 00 Common Work Results - Mechanical clause 1.8.

.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 O&M 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 Substantial 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.

.3 Refer to Mechanical Section 23 05 00 Common Work Results - Mechanical, clause 1.8.

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:
.1 an intoxicant, including alcoholic beverages, drugs and narcotics
.2 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,
.3 an explosive or a bomb or a component thereof,
.4 currency over any applicable prescribed limit, $25.00, and
.5 any item not described in paragraphs (.1 to .4) 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 National Fire Code of Canada (NFCC 2010):
- .1 FCC No. 301-1982, Standard for Construction Operations.
- .2 FCC No. 302-1982, Standard for Welding and Cutting.
- .3 Part 5 - Hazardous Processes and Operations & Division B.

.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 (BCBC 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 19 - 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 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

PART 1 GENERAL

1.1 Description of Work

.1 Includes general requirements for commissioning facilities and facility systems.

.2 Provide third party commissioning agent(s) for mechanical and electrical systems. Provide costs of commissioning in tender price.

.3 Refer to sections of Mechanical, Electrical and Communications disciplines.

1.2 Definitions

.1 Acronyms:

AFD - Alternate Forms of Delivery, service provider.

BMM - Building Management Manual.

Cx - Commissioning.

EMCS - Energy Monitoring and Control Systems.

O&M - Operation and Maintenance.

PI - Product Information.

PV - Performance Verification.

TAB - Testing, Adjusting and Balancing.

.2 Cx - a required program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's Performance Verification responsibilities have been completed and approved. Objectives:

.1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.

.2 Ensure appropriate documentation is compiled into the BMM.

.3 Effectively train O&M staff.

1.3 Quality Assurance

.1 Testing organization: current member in good standing of AABC certified to perform specified services.

.2 Comply with applicable procedures and standards of the certification sponsoring association.

.3 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.4 References

.1 Associated Air Balance Council (AABC): National Standards for Field Measurement and Instrumentation, Total Systems Balance, Air Distribution-Hydronics Systems.

1.5 Submittals

.1 Prior to start of Work, submit name of organization proposed to perform services. Designate who has managerial responsibilities for coordination of entire testing, adjusting and balancing.

.1 Submit documentation to confirm organization compliance with quality assurance provision.

.2 Submit 3 preliminary specimen copies of each of report forms proposed for use.

.3 Ten (10) days prior to Substantial Performance, submit 3 copies of final reports on applicable forms.

.4 Submit reports of testing, adjusting and balancing postponed due to seasonal, climatic, occupancy, or other reasons beyond Contractor's control, promptly after execution of those services.

1.6 Procedures

.1 Comply with procedural standards of certifying association under whose standard services will be performed.

.2 Notify Departmental Representative 3 days prior to beginning of operations.

.3 Accurately record data for each step.

.4 Report to Departmental Representative any deficiencies or defects noted during performance of services.

.7 Commissioning work to be completed prior Contractor’s request for Substantial Performance:

.1 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.

.2 Equipment, components and systems have been commissioned.

.3 O&M training has been completed.

1.7 Contractor’s Responsibilities

.1 Prepare each system for testing and balancing.

.2 Cooperate with testing organization and provide access to equipment and systems.

.3 Provide personnel and operate systems at designated times, and under conditions required for proper testing, adjusting, and balancing.

.4 Notify testing organization 7 days prior to time project will be ready for testing, adjusting, and balancing.

.5 Commission cost to be borne by Contractor.

1.8 Preparation

.1 Provide instruments required for testing, adjusting, and balancing operations.

.2 Make instruments available to Departmental Representative to facilitate spot checks during testing.

.3 Retain possession of instruments and remove at completion of services.

.4 Verify systems installation is complete and in continuous operation.

.5 Verify lighting is turned on when lighting is included in cooling load.

.6 Verify equipment such as computers, laboratory and electronic equipment are in full operation.

1.9 Final Reports

.1 Organization having managerial responsibility shall make reports.

.2 Ensure each form bears signature of recorder, and that of supervisor of reporting organization.

.3 Identify each instrument used, and latest date of calibration of each.

1.10 Completion of Commissioning

.1 Upon completion of Cx leave systems in normal operating mode.

.2 Except for warranty and seasonal verification activities specified in Cx specifications, complete Cx prior to issuance of Interim Certificate of Completion.

.3 Cx deliverables have been submitted and accepted by Departmental Representative.

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 Security Requirements - Section 01 14 10.

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

.4 Section 02 82 10 - Hazardous Materials Abatement and Removal.

.5 Section 09 65 18 - Vinyl Composition Tile.

.6 Appendix B - Hazardous Materials Assessment report.

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), 2012, 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 Should unidentified Asbestos Containing Materials (ACM) or other hazardous substance 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 Vinyl asbestos tiles may exist below plank flooring being removed : Take one material sample per room in contract area where tile exists under plank flooring and include samples of adhesive, to determine if any asbestos containing materials exist in samples taken. Room 104 has been identified as having ACM in flooring tile.

.2 Ship samples to Asbestos Analytical Services laboratory (AASL) following the National Institute for Occupational Safety and Health (NIOSH) Method 9002. Submit test results to Department Representative. Pay costs for testing, shipping and handling.

.3 Unidentified hazardous material removal is additional work and will be paid either as an extra to the contract price in accordance with General Conditions, or removed under a separate contract by the Departmental Representative.

.4 The existing building will be occupied and operational by the Institution during work of this Contract. Maintain building 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.

.2 Protect adjoining floor areas from migrating dust and fumes from work area.

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, 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

2.1 REPAIR MATERIALS

.1 Patching grout: non shrink grout-fast set, sanded, cement-based, expanding grout produced to achieve fast set times and high, early strength, designed for use as a plastic or flowable grout meeting the requirements of ASTM C 1107 classification “B” for post set dimensional stability and the ASTM C 928 requirements for length change stability.

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.

.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 work areas with Departmental Representative to verify extent and location of items designated for removal and disposal and items to remain.

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

3.2 PREPARATION

.1 Conform to schedule for all removal work.

.2 Remove items for reuse, store and protect.

.3 Provide for scanning of concrete floor in area where fasteners and holes are drilled into floor, using approved sonar equipment, to locate any conduit, or rebar etc. Submit 2D and 3D pictures of encountered obstructions.

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 DEMOLITION

.1 Remove suspended ceiling in room 112 and surface applied acoustic ceiling tiles in all rooms and remove adhesive to facilitate the new Work. Dispose of acoustic tile and debris off site.

.2 Remove stud and masonry walls full height as indicated. Remove ceilings interfering with wall removal and rebuild to match existing.

.1 Demolish masonry in small units to prevent damage to adjoining surfaces not being removed. Remove reinforced concrete curb at base of masonry walls being removed.

.2 Cut off fasteners and rebar flush with surfaces exposed in final assembly or where they interfere with new Work.

.3 Remove/salvage wall safe and hand over to Departmental Representative.

.4 Sawcut masonry walls at new enlarged door sizes, straight and square. Build poly wood frame bulkhead on corridor side at doors, to prevent migration of dust during sawcutting.

.1 Provide negative air inside office area and direct exhaust air outside through window(s).

.2 Schedule saw cutting Work for after 1600 hours.

.3 Cover return air grilles inside offices at upper corridor wall during saw cutting and other dust generating work.

.3 Remove doors, PS frames, hardware, adjoining interior window as indicated, and remove lockset in door 112 to remain as indicated. Salvage all locksets and hand over to Departmental Representative.

.4 Remove exterior security screens from windows. Remove fasteners and fill holes with cementitious filler to match existing surfaces

.5 Remove laminate flooring from within office renovation area. Remove adhered vinyl composition tiles and adhesive existing under removed laminate flooring.

.1 Remove all rubber base and adhesive exposed in final assembly.

.2 Protect existing flooring from damage in adjoining areas outside renovation areas.

.3 Identify areas for repair and complete Work to meet new flooring requirements.

.4 Remove floor supply registers and salvage/protect for reuse. Cover supply air openings to prevent construction dust and debris entering underfloor duct system. Install salvaged registers following new flooring installation. Fasten registers to concrete floor with oval head stainless steel fasteners into expansion anchors drilled into concrete floor.

.5 At removed tile flooring and adhesive, scrape off any remaining adhesive using purpose made shot blast and dust collection equipment to remove all adhesive to meet new flooring manufacturer's installation requirements. Do not use VOC fume generating solvents to remove adhesive.

.6 Remove horizontal blinds from exterior windows, store/protect and reinstall. Clean blinds to remove all dust and dirt, prior to installation.

3.5 REPAIRS

.1 Patch and repair walls, floors and ceiling finishes damaged by demolition/removal work except where new finishes will cover or replace these areas as indicated.
.1 Patch holes in masonry and concrete substrates at walls, floors and ceilings using specified cement based patching compound in accordance with manufacturer's instructions.

.2 New materials to match existing in quality, colour and appearance except as specified otherwise. Reuse salvaged materials where noted.

.3 Install salvaged and cleaned horizontal blinds where removed.

3.6 REMOVAL FROM SITE

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

END OF SECTION

1 General

1.1 SUMMARY

.1 Comply with requirements of this Section when performing the following work:
.1 Remove existing tile flooring (Vinyl Asbestos Tile and adhesive) in Room 104.
.2 Remove insulation wrap with asbestos containing materials, including insulation from RWL in Room 104.

.2 Cut, scrape and remove materials mentioned above using hand tools or power tools equipped with a HEPA filter.

1.2 SECTION INCLUDES

.1 Requirements and procedures for Hazardous Materials Abatement & Removal.

1.3 RELATED SECTIONS

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

.2 Section 02 41 14 - Demolition and Removal Work.

.3 Appendix B - Hazardous Materials Assessment report.

1.4 REFERENCES

.1 Department of Justice Canada (Jus).
.1 Canadian Environmental Protection Act, 1999 (CEPA).
.2 Transport Canada (TC).
.3 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.5 DEFINITIONS

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

.2 Amended Water: water with non-ionic surfactant wetting agent added to reduce water tension to allow thorough wetting of fibres.

.3 Asbestos-Containing Materials (ACMs): materials identified under Existing Conditions including fallen materials and settled dust.

.4 Hazardous Materials Work Area: area where work takes place, which will, or may, disturb ACMs.

.5 Authorized Visitors: Engineers, Consultants or designated representatives, and representatives of regulatory agencies.

.6 Non-Friable Material: material that when dry cannot be crumbled, pulverized or powdered by hand pressure

.7 Occupied Area: area of the building that is outside Hazardous Materials Work Area.

.8 Polyethylene: polyethylene sheeting or rip-proof polyethylene sheeting with tape along edges, around penetrating objects, over cuts and tears, and elsewhere as required providing protection and isolation.

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

1.6 REGULATORY REQUIRMENTS

.1 Comply with Federal, Provincial, and local requirements pertaining to asbestos, provided that in case of conflict among these requirements or with these specifications the more stringent requirement applies. Comply with regulations in effect at time work is performed.

1.7 HAZARDOUS MATERIALS ASSESSMENT

.1 Refer to **Appendix B** - Hazardous Materials Assessment report.

1.8 SUBMITTALS

.1 Submit proof satisfactory to Departmental Representative that suitable arrangements have been made to dispose of Hazardous Materials-containing waste in accordance with requirements of authority having jurisdiction.

.2 Submit copy of “Hazardous/Special Waste Disposal request Form” provided to provincial authorities, in accordance with the provincial “Absestos Policy Directive”

.3 Submit proof of Contractor's Asbestos Liability Insurance.

.4 Submit to Departmental Representative necessary permits for transportation and disposal of Hazardous Materials-containing waste and proof that Hazardous Materials-containing waste has been received and properly disposed.

1.9 INSTRUCTION AND TRAINING

.1 Before commencing work, provide to Engineer satisfactory proof that every worker has had instruction and training in hazards of Hazardous Materials exposure, in personal hygiene and work practices, and in use, cleaning, and disposal of respirators and protective clothing. Renovation space to be provided with HEPA filter air filtration during work.

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

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

1.10 WORKER PROTECTION

.1 Protective equipment and clothing to be worn by workers while in the Hazardous Materials Work Area include:

.1 Non-powered reusable or replaceable filter-type respirator equipped with HEPA filter cartridges, personally issued to the worker and marked as to efficiency and purpose, suitable for protection against asbestos and acceptable to the Provincial Authority having jurisdiction.

.2 Disposable-type protective clothing that does not readily retain or permit penetration of asbestos fibres, consisting of full-body covering including head covering with snug-fitting cuffs at wrists, ankles, and neck.

.2 Eating, drinking, chewing, and smoking are not permitted in Hazardous Materials Work Area.

.3 Before leaving the Hazardous Materials Work Area , dispose of protective clothing as contaminated waste as specified.

.4 Ensure workers wash hands and face when leaving Hazardous Materials Work Area. Facilities for washing are located as indicated on drawings.

.5 Ensure that no person required to enter an Hazardous Materials Work Area has facial hair that affects the seal between the respirator and the face.

1.11 QUALITY ASSURANCE

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

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 33 - Health and Safety Requirements.

1.12 WASTE MANAGEMENT AND DISPOSAL

.1 Place materials defined as hazardous or toxic in designated containers.

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

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

.4 Disposal of Hazardous Materials waste generated by removal activities must comply with Federal, Provincial, and Municipal regulations. Dispose of Hazardous Materials waste in sealed double thickness 6 ml bags or leak proof drums. Label containers with appropriate warning labels.

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

1.13 EXISTING CONDITIONS

.1 During tender evaluate existing site conditions and Hazardous Materials Assessment report.

1.14 SCHEDULING

.1 Not later than ten (10) days before beginning Work on this Project notify following in writing:
- .1 Regional Office of WorkSafeBC.

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

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

.4 Hours of Work: perform work outside of normal working hours, Monday to Friday.

1.15 OWNERS INSTRUCTIONS

.1 Before beginning Work, provide Departmental Representative satisfactory proof that every worker has received instruction and training in hazards of Hazardous Materials exposure, personal hygiene and work practices, and use, cleaning, and disposal of respirators and protective clothing.

.2 Instruction and training related to respirators includes, as a minimum:
- .1 Fitting of equipment.
- .2 Inspection and maintenance of equipment.
- .3 Disinfecting of equipment.
- .4 Limitations of equipment.

.3 A competent, qualified person must provide instruction and training.

1.16 COORDINATION AND SCOPE

.1 Schedule and Coordinate the work with Section 02 41 19 - Demolition and Removal Work.

.2 It is intended that the existing Flooring and adhesive be removed by scraping the material from the concrete substrate. Do not use procedures that damage the underlying concrete substrate.

.3 The remnants of adhesive left after removal will be removed under Section 02 41 19- Demolition and Removal Work.

2 Products

2.1 MATERIALS

.1 Drop Sheets:
- .1 Polyethylene: 0.15 mm thick.
- .2 FR polyethylene: 0.15 mm thick woven fibre reinforced fabric bonded both sides with polyethylene.

.2 Wetting Agent: 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with water in a concentration to provide thorough wetting of Hazardous Materials-containing material.

.3 Waste Containers: contain waste in two separate containers.
.1 Inner container: 0.15 mm thick sealable polyethylene waste bag.
.2 Outer container: sealable metal or fibre type where there are sharp objects included in waste material; otherwise, outer container may be sealable metal or fibre type or second 0.15 mm thick sealable polyethylene bag.
.3 Labelling requirements: affix pre-printed cautionary asbestos warning in both official languages that is visible when ready for removal to disposal site.

3 Execution

3.1 PROCEDURES

.1 Before beginning Work, isolate Hazardous Materials Work Area using, minimum, pre-printed cautionary Hazardous Materials warning signs in both official languages that are visible at access routes to Hazardous Materials Work Area.
.1 Remove visible dust from surfaces in the work area where dust is likely to be disturbed during course of work.
.2 Use HEPA vacuum or damp cloths where damp cleaning does not create a hazard and is otherwise appropriate.
.3 Do not use compressed air to clean up or remove dust from any surface.

.2 Prevent spread of dust from Hazardous Materials Work Area using measures appropriate to work to be done.
.1 Use FR polyethylene drop sheets over flooring in Hazardous Materials Work Area where dust and contamination cannot otherwise be safely contained.

.3 Wet materials containing Hazardous Materials to be cut, ground, abraded, scraped, drilled, or otherwise disturbed unless wetting creates hazard or causes damage.
.1 Use garden reservoir type low - velocity fine - mist sprayer.
.2 Perform Work to reduce dust creation to lowest levels practicable.
.3 Work will be subject to visual inspection and air monitoring.
.4 Contamination of surrounding areas indicated by visual inspection or air monitoring will require complete enclosure and clean-up of affected areas.

.4 Clean-Up:
.1 Frequently during Work and immediately after completion of Work, clean up dust and Hazardous Materials-containing waste using HEPA vacuum or by damp mopping.
.2 Place dust and Hazardous Materials-containing waste in sealed dust-tight waste bags. Treat drop sheets and disposable protective clothing as Hazardous Materials waste; wet and fold these items to contain dust, and then place in plastic bags.
.3 Clean exterior of each waste-filled bag using damp cloths or HEPA vacuum and place in second clean waste bag immediately prior to removal from Hazardous Materials Work Area.

.4 Seal waste bags and remove from site. Dispose of in accordance with requirements of Provincial and Federal Authority having jurisdiction. Supervise dumping and ensure that dump operator is fully aware of hazardous nature of material to be dumped and those guidelines and regulations for Hazardous Materials disposal are followed.

.5 Perform final thorough clean-up of Work areas and adjacent areas affected by Work using HEPA vacuum.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 02 41 19 - Demolition and Removal Work.

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.

.2 ASTM International (ASTM)
.1 ASTM C207 - 06(2011) Standard Specification for Hydrated Lime for Masonry Purposes.
.2 ASTM C144 - 11 Standard Specification for Aggregate for Masonry Mortar.
.3 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 Maintain dry beds for masonry and use dry masonry units only.

1.5 PROTECTION

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

.2 **WASTE MANAGEMENT AND DISPOSAL**

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

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

.5 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, 140 mm wide (to match existing walls except as noted otherwise.
.3 Special shapes: Provide purpose-made "H" shapes for lintels. 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: 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 silica type to ASTM C144.

2.4 MORTAR TYPES

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

2.5 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 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 walls: 3.8 mm steel wire, knurled, ladder type, to ASTM A1064.

3 Execution

3.1 INSTALLATION

.1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
.1 Bond: running bond with vertical joints centred on adjacent stretchers above and below alternating course.
.2 Coursing height:
.1 CMU: to match existing
.3 Tooled joints:
.1 Concave joints.

.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, with minimum of cutting.

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.

.3 Concrete block lintels and support:
.1 Install reinforced concrete block lintels and concrete filled cores/support columns at wall infills as indicated. Install concrete filled cores/support column at new widened door openings.

.4 Support of loads:
.1 Use concrete to para 2.5.1.

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 new bond beams, 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 infill walls and at widened door openings as indicated.

.2 Drill into concrete slabs and masonry walls, embed bars into wall/floors and embed with epoxy adhesive, 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 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.

3.10 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 02 41 19 - Demolition and Removal Work

.2 Section 09 22 16 - Non-structural Metal Framing.

1.2 REFERENCE STANDARDS

.1 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 A 307-10, Specification for Carbon Steel Bolts and Studs, 60,000psi Tensile.
.3 ASTM A 653/A653M-11, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.4 ASTM F1267 - 12 Standard Specifications For Expanded Metal - Steel.

.2 Canadian General Standards Board (CGSB)
.1 CAN/CGSB-1.40-M97, Primer, Structural Steel, Oil Alkyd Type.
.2 CAN/CGSB-1.181-99, Ready-Mixed, Organic Zinc-Rich Coating.

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.
.3 Submit product data for fasteners.

.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.
.1 For finishes, coatings, primers and paints.
.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

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.

.2 Welding materials: to CSA W59.

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

.4 Exterior fasteners: stainless steel or galvanized expansion type anchors/inderts

.5 Floor register fasteners: stainless steel with expansion type inserts, non-corroding, oval head Robertson or Phillips heads.

.6 Galvanized sheet steel: commercial grade steel to ASTM A653M with ZF120 zinc wiped finish.

.7 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 -24 mm x LWD - 53 mm ± 1 mm, designed for penetration resistance, sheet thickness 1.98 mm, 72-75% open area and 3.4 kg/m². Acceptable Product: Exmet C3/4-13F.
.1 Fasteners:
.1 Provide wafer head screws, self drilling/threading.

.8 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.

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

.10 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.

2.3 EXTERIOR WINDOW SECURITY SCREENS

.1 Fabricate perimeter frame from 38 x 38 x 3.2 mm steel angles mitred and welded at corners. Weld two horizontal 25 mm x 3.2 mm steel bars at 1/3rd points to angle leg perimeter frame. Spot weld flattened expanded steel mesh at each strand to angle leg and at 1/3rd points to horizontal steel bars. Angle frame to be fastened to concrete structure similar to existing window security screens. Predrill four fastener holes on each jamb side of steel angle frame.

.2 Hot dip galvanize security screen assembly after fabrication.

2.4 WINDOW SHEET STEEL PLATE COVER

.1 Fabricate 3.5 mm thickness sheet steel plates window covers for room 102 as indicated. Drill holes to accommodate fasteners at spacing indicated. Oversize plate cover to window opening to prevent spalling masonry during drilling holes for fasteners.

.2 Shop paint plates both sides.

2.5 FINISHES

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

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

.3 Hot-dip galvanize: exterior security screens.

2.6 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 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 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 as indicated or as acceptable to the Departmental Representative.

.3 Fabricate items from steel as indicated.

.4 Use self-tapping shake-proof countersunk flat headed screws on items requiring assembly by screws or as indicated. Use screws, bolts and expansion bolts for interior work as indicated. Use welded connections where indicated.

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

.6 Ensure exposed welds are continuous for length of each joint. File or grind sharp edges of exposed welds flush.

3.2 SECURITY MESH WALL REINFORCEMENT

.1 Fasten security mesh to steel studs with wafer head screws at maximum 300 mm oc along all framing members.

.2 Butt join mesh panels at solid bearing and fasten each panel to steel stud framing.

.3 Refer to Wall Type schedule for walls with security mesh.

3.3 EXTERIOR WINDOW SECURITY SCREENS

.1 Fasten security screen angle frame to concrete structure using expansion anchors, four on each jamb side.

.2 Provide SS washers at fasteners to permit vertical alignment and prevent distorting angle frame at gap between angle frame and concrete structure.

3.4 SHEET STEEL PLATE WINDOW COVER

.1 Drill holes in masonry and install plates plumb to cover two windows in Room 102. Ensure insulation is installed over window before plate installation. Patch spalled masonry before proceeding with plate installation.

.2 Touch-up damaged primed surfaces to math shop primer.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - General Instructions.

.2 Section 09 22 21 - Non-Structural Metal Framing.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)
- .1 CAN/CSA-O141-05(R2009), Softwood Lumber.
- .2 CSA O121-08, Douglas Fir Plywood.
- .3 CSA O151-09, Canadian Softwood Plywood.

.2 National Lumber Grades Authority (NLGA)
- .1 Standard Grading Rules for Canadian Lumber 2014.

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

.4 American Society for Testing and Materials (ASTM)
- .1 ASTM F1667 - 11AE1 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.

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 Departmental Representative.

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.

2.2 PANEL MATERIALS

.1 Panel standards: type, grade and thickness as specified, in accordance with following standards:
- .1 Douglas fir plywood (DFP): to CSA 0121, standard construction.
- .2 Canadian softwood plywood (CSP): to CSA O151, standard construction.

2.3 PANEL MATERIALS END USES

.1 Security wall plywood panels: DFP or CSP square edge, SEL TF grade (B1 face, C inner plys and C back), 12.7 mm thick, for wall security and sound deadening.

2.4 ACCESSORIES

.1 Nails, spikes and staples: ASTM F1667.

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

.3 Proprietary fasteners: plated pan head screws with self drilling point.

3 Execution

3.1 INSTALLATION

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

.2 Install SEL TF ply with B1 surface exposed screwed to 1.2 mm steel studs (applied over exp. mesh) using self drilling pan head screws spaced at 300 oc along framing members. Exp. mesh and plywood are installed on attack side of wall.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 09 21 16 - Gypsum Board Assemblies.

.2 Divisions 22 & 23 - Insulation for mechanical work.

1.2 REFERENCES

.1 Underwriters Laboratories of Canada (ULC).
.1 To CAN/ULC S102-10 Standard Method of Test for Surface Burning Characteristics of building Materials and Assemblies.
.2 CAN/ULC-S114 - 05 Fire test for determination of Non-combustibility in building materials.
.3 CAN/ULC S129- 15 Standard Method of Test for Smoulder Resistance of Insulation (Basket Method).
.4 CAN/ULC-S702 -14 Mineral Fibre Thermal Insulation for Buildings

.2 ASTM International (ASTM)
.1 ASTM C167 - 15, Standard Test Method for Thickness and Density of Blanket or Batt Thermal Insulations.
.2 ASTM C423 - 09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
.3 ASTM C665 - 06 Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing..
.4 ASTM E90-09 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
.5 ASTM E413 -16 Classification for Rating Sound Insulation

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 for Submittal Procedures clause.
.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 01 50 - General Instructions for Submittal Procedures clause. Indicate VOC's insulation products and adhesives.

.2 Manufacturer's Instructions:
.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 01 50 - Genweral 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 for recycling in accordance with Waste Management Plan.

2 Products

2.1 INSULATION

.1 Sound attenuation batts:

.1 Non-combustible, lightweight, semi-rigid stone wool batt insulation to, CAN/ULC-S702 Type 1, that provides fire resistance to CAN/ULC-S114 and sound control to ASTM C423.

.1 Fire performance:

.1 Non-combustibility: To CAN/ULC S114.

.2 Surface Burning Characteristics: To CAN/ULC S102.

.1 Flame spread: 0.

.2 Smoke developed: 0

.2 Smoulder resistance: 0.09% to CAN/ULC S129.

.3 Acoustical Performance:

.1 Airborne sound transmission loss: To ASTM E90.

.2 Rating sound insulation: To ASTM E413.

.3 Sound absorption co-efficients: To ASTM C423.

Sound Absorption Co-efficiences at Frequencies							
Thickness mm	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC
25	0.14	0.25	0.65	0.90	1.01	1.01	0.70
38	0.18	0.44	0.94	1.04	1.02	1.03	0.85
50	0.28	0.60	1.09	1.09	1.05	1.07	0.95
76	0.52	0.96	1.18	1.07	1.05	1.05	1.05
102	0.86	1.11	1.20	1.07	1.08	1.07	1.10

.4 Density: To ASTM C612, 45 kg/m^3.

.5 Size: 616 x 1219 (cut to fit stud spacing of 304mm)

.6 Thickness: 89 mm for walls and 76 mm for windows with new cover plate. (Room 102)

3 Execution

3.1 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of sound protection to building elements and spaces.

.2 Install sound attenuation blanket to wall type W1, W2 and room 102 windows between new steel plate covers and existing windows.

.3 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.4 Do not compress insulation to fit into spaces.

.5 Do not enclose insulation until installations have been approved by Departmental Representative.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 06 10 11 - Rough Carpentry, wood blocking in steel stud walls.

.2 Section 08 71 10 - Door Hardware, including sound-stripping.

.3 Section 08 80 50 - Glazing.

1.2 REFERENCE STANDARDS

.1 American Society for Testing and Materials (ASTM International):
.1 ASTM A 653 / A653M -15, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A794 -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, Specification for Commercial Steel Doors and Frames, 2006.
.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 2006.

.4 Canadian Standards Association (CSA International):
.1 G40.20/G40.21-04(2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
.2 CSA W59-03(2008), Welded Steel Construction (Metal Arc Welding) (Metric Version).

.5 CAN/ULC-S704-11, Thermal Insulation, Polyurethane and Polyisocyanurate.

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.
.2 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and in door schedule.

1.4 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 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 Engineer.

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

2 Products

2.1 MATERIALS

.1 Sheet Steel (WGCS): commercial grade steel to ASTM A653M, Class 1, hot-dip galvanized with ZF75 zinc wiped 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.

.4 Glazing Stops: 1.2 mm base metal thickness commercial grade steel to ASTM A653M with ZF120 zinc wiped finish, screw fixed. Commercial grade steel of thickness and design listed by ULC for fire rated assemblies.

2.2 COMPONENTS

.1 Frames:
  .1 Interior door frames: 1.6 mm base thickness steel.

.2 Doors:
  .1 Interior doors designated ICM: 1.2 mm base thickness steel. (Insulated core)
  .2 Interior doors Designated SCM: 1.6 mm base thickness steel (steel stiffened core)

.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 Steel frame anchors: thickness and design listed by ULC for labeled door and frame assemblies. 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 Reinforcing channel: to CAN/CSA G40.21, Type 300 W.

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

.10 Top caps: galvanized steel for all interior SCM doors, 0.9 mm base metal thickness.

2.3 DOOR TYPES

.1 (ICM) Doors: flush steel with steel reinforcement for hardware with bonded core of polyurethane or isocyanurate board insulation to CAN/ULC-S704, to door thickness, with all steel hardware reinforcements and complete with steel top cap.

.2 SCM 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.

2.4 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 except where specified otherwise.

.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 Prepare doors for hardware as scheduled.

2.5 FRAMES

.1 Cut mitres and joints accurately and weld continuously on inside of frame profile.

.2 Provide welded frames, throat size to match wall thickness.

.3 Provide adjustable jamb anchors for fixing to steel stud wall framing and existing type anchors for fixing to masonry.

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

2.6 DOORS

.1 Assemble components using spot or arc welding.

.2 Make provision for glazing where indicated and provide necessary glazing stops.

.3 Glazing Stops:
.1 Snap-in metal type.

.4 Mechanical locked open seams are acceptable for ICM doors and spot welded, filled and sanded for SCM doors.

.5 Equip corridor doors with flush steel top caps to prevent water accumulation.

.6 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 framed walls and to masonry walls with specified anchors accordance with reviewed shop 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 Fill frames with fibreglass insulation for all interior door/frame assemblies specified with sound-stripping.

.5 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 and thresholds: 13 mm.

.3 Adjust operable parts for correct function.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 08 11 14 - Steel Doors and 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
.1 ANSI/BHMA A156.1-2013, Standard for Butts and Hinges.
.2 ANSI/BHMA A156.2-2011 American National Standard for Bored & Preassembled Locks and Latches.
.3 ANSI/BHMA A156.7-2014, Template Hinge Dimensions.
.4 ANSI/BHMA A156.13-2012 Standard for Mortised Locks and Latches Series 1000.
.5 ANSI/BHMA A156.16- 2013 Auxiliary Hardware.
.6 ANSI/BHMA A156.18-2012 Materials and Finishes.
.7 ANSI/BHMA A156.115 -2006 Hardware Preparation in Steel Doors or Steel Frames.

.3 ASTM E1408-91(2000) Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems (Withdrawn 2009)

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 lockset, for incorporation into maintenance manual specified in Section 01 01 50.

1.4 DELIVERY AND STORAGE

.1 Store finishing hardware in locked, clean and dry area.

1.5 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 (2BB).

.3 Mortised Locksets:
.1 Mortise locksets: to ANSI/BHMA A156.13, Series 1000 mortise lock, Grade 1 operational and security, function as noted in hardware schedule. Acceptable product: Stanley/Best Access 45H Series.
.2 Lever handles: forged, curved return.
.3 Escutcheons: rectangular.
.4 Normal strikes: box type, lip projection not beyond jamb.
.5 Cylinders: see para. 2.3.1.
.6 Finish: 626.

.4 Cylindrical Lockset:
.1 Locksets to ANSI/BHMA A156.2, Series 4000, Grade 1, function as noted in hardware schedule. Acceptable product: Stanley/Best Access 9K series:
.1 Lever handles: curved return.
.2 Roses: round.
.3 Normal strikes: lip projection not beyond jamb.
.4 Cylinders: see para. 2.3.1.
.5 Finish: 626.

.5 Architectural door trim: (new)
.1 Door stops: to ANSI/BHMA A156.16, L02162 floor mounted, or L02101 wall mounted concealed fastening 626.

.6 Sound seals:
.1 Seals tested to ASTM E1408-91.
.2 For jamb frame:
.1 Extruded aluminum frame with natural anodized finsih and replaceable vinyl bulb stripping, adjustable, purpose made for reducing sound transmission.

.2 Adhesive backed combination intumescent and high temperature silicone gasket, self-extinguishing and non-toxic, seals against smoke, fire, air, sound and weather.

.3 Door bottom seal: recess mounted assembly to door bottom, with automatic drop strip, adjustable to door undercut, purpose made to reduce sound transmission.

.4 Threshold for Sound Attenuated doors, size 4.8 mm rise x 50 to 75 mm wide, smooth surface, natural anodized finish.

2.3 KEYING

.1 Order all permanent cylinders for new locksets. Order key cylinders and keys from BEST ACCESS SYSTEMS, 7-pin removable core system to match keyway for Matsqui Institution. Departmental Representative will arrange for installation of permanent cylinders after final completion of Contract. Include three keys with each permanent cylinder.

.1 Provide all new locksets with removable core construction cylinders or provide temporary locksets. Key all construction cores alike. Provide two keys to operate construction cores.

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:

Item	Door #	Rm to Rm	Door Type	Frame Type	Sound Rating	Hardware Description
1	102N	Corridor 135 to Contraband Storage102	SCM	PS		1 ½ - pair Template 2BB hinges 114 x 104 mm 1 - Mortised lockset with deadbolt Function (Best) TD Dormitory 1 - door closer PA 1 - door stop. 1 - auto door bottom seal 1 - alum. threshold 1 - set double sound seals Para. 2.2.5.2
2	104N1	Corridor 135 to SIO Boardroom 104	SCM	PS		1 ½ - pair Template 2BB hinges 114 x 104 mm 1 - Mortised lockset with deadbolt Function (Best) AB Office 1 - door closer PA 1 - door stop. 1 - auto door bottom seal 1 - alum. threshold 1 - set double sound seals Para. 2.2.5.2

Item	Door #	Rm to Rm	Door Type	Frame Type	Sound Rating	Hardware Description
3	104N2	SIO Boardroom 104 to SIO Assistant Office 104A	ICM	PS		1 ½ - pair Template 2BB hinges 114 x 104 mm 1 - Mortised lockset with deadbolt Function (Best) AB Office 1 - door closer PA 1 - door stop. 1 - auto door bottom seal 1 - alum. threshold 1 - set double sound seals Para. 2.2.5.2
4	108N	Assistant SIO Office 104A to SIO Office 108	HM	PS		1 ½ - pair Template 2BB hinges 114 x 104 mm 1 - Mortised lockset without deadbolt Function (Best) A Office 1 - door closer PA 1 - door stop. 1 - auto door bottom seal 1 - alum. threshold 1 - set double sound seals Para. 2.2.5.2
5	104N3	Corridor 135 to SIO Office 108	HM	PS		1 ½ - pair Template 2BB hinges 114 x 104 mm 1 - Mortised lockset with deadbolt Function (Best) AB Office 1 - door closer PA 1 - door stop. 1 - auto door bottom seal 1 - alum. threshold 1 - set double sound seals Para. 2.2.5.2
7	112	Room 108 SIO Office to Electronic Monitor Rm 112	HM	PS		<u>Reuse Existing Hardware:</u> 1 ½ - pair 114 x 104 mm template hinges <u>New Hardware:</u> 1 - cylindrical lever lockset Function (Best) AB Entrance 1 - door stop floor mtd.

3 Execution

3.1 INSTALLATION

.1 Install hardware in accordance with manufacturer's printed instructions and ANSI/BHMA A166.115.

.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 and locksets.

.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 08 11 14 - Steel Doors and Frames.

1.2 REFERENCES

.1 CSA International:
  .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
  .2 CAN/CGSB-19.13-M87 Sealing Compound, One-Component, Silicone Base, Solvent Curing.

.2 Environmental Choice Program (ECP).
  .1 CCD-045-95, Sealants and Caulking.

.3 Glass Association of North America (GANA).
  .1 GANA Glazing Manual - 50th Anniversary Edition (2008)
  .2 Laminated Glazing Reference Manual, 2006 Edition.

1.3 DEFINITIONS

.1 Two-ply laminated glass: Two sheets of monolithic glass bonded together with polyvinyl butyral (PVB) interlayer for sound control, by heat and pressure.

1.4 SUBMITTALS

.1 Submit catalogue illustrations of glass specified in accordance with Section 01 01 50.
  .1 Submit manufacturer’s product data sheet and glazing instructions.

.2 Submit glass sample of specified laminated glass.

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 Engineer.

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

1.6 QUALITY PERFORMANCE

.1 Comply with published recommendations of glass product manufacturers and organizations referenced in clause 1.2, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section or referenced standards.

2 Products

2.1 GLASS MATERIALS

.1 Safety glass:
.1 To CAN2 12.1M , transparent, 8.8 +\- mm thickness:
.1 Type 1 laminated glass, Class B-float with 1.2 mm thickness acoustic attenuated pvb layer.
.2 Category 1.

.2 Monolithic Two-Ply Laminated Glass:
.1 Laminated Glass Makeup:
.1 Outer Ply:
.1 Glass Type: float.
.2 Nominal Thickness: 3 mm.
.3 Glass Strength: annealed.
.2 Interlayer:
.1 Interlayer Type: acoustic attenuated pvb.
.2 Interlayer Tint: clear transparent
.3 Nominal Thickness: 1.2 mm.
.3 Inner Ply:
.1 Glass Type: float.
.2 Nominal Thickness: 3 mm.
.3 Glass Strength: annealed.

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 Engineer 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.

.5 Primer-sealers and cleaners: to glazing manufacturer's standard.

3 Execution

3.1 MANUFACTURER’S INSTRUCTIONS

.1 Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Prime surfaces scheduled to receive sealant.

.3 Do not cut or abrade laminated glass.

3.3 INSTALLATION: FROM INTERIOR - DRY METHOD (TAPE AND TAPE)

.1 Perform work in accordance with Laminators Safety Glass Association - Standards 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.

3.4 CLEANING

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

.2 Remove traces of primer.

.3 Remove glazing materials from finish surfaces.

.4 Remove labels after work is complete.

.5 Clean glass using approved non-abrasive cleaner in accordance with manufacture's instructions.

.6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 06 11 10 - Rough Carpentry.

.2 Section 09 22 16 - Non-Structural Metal Framing.

.3 Section 09 51 13 - Acoustic Ceilings.

1.2 REFERENCED STANDARDS

.1 ASTM International:
.1 ASTM C423 - 09a Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
.2 ASTM C475 / C475M - 15 Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
.3 ASTM C840 - 13 Standard Specification for Application and Finishing of Gypsum Board.
.4 ASTM C954 - 15 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 - 14 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 - 14a Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
.7 ASTM C1396 / C1396M - 14a Standard Specification for Gypsum Board.
.8 ASTM C1766 - 15 Standard Specification for Factory-Laminated Gypsum Panel Products.
.9 ASTM E90-09, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.2 CAN/ULC-S702-09 Amt1, Mineral Fiber Thermal Insulation for Buildings.

1.3 SUBMITTALS

.1 Submit samples and product data in accordance with Section 01 01 50 - General Instructions for Submittal Procedures.

.2 Submit samples and product data of corner and casing beads.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.

.2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.5 SITE ENVIRONMENTAL REQUIREMENTS

.1 Ventilation: Ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse, recycling, composting and anaerobic digestion in accordance with Section 01 01 50 - General Instructions for waste management.

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

.3 Divert unused gypsum from landfill to gypsum recycling facility for disposal approved by Departmental Representative.

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

.5 Divert unused wood materials from landfill to recycling, composting facility approved by Departmental Representative.

.6 Divert unused paint and caulking material from landfill to official hazardous material collections site approved by Departmental Representative.

2 Products

2.1 GYPSUM BOARD

.1 Sound attenuating gypsum board:

.1 Laminated noise-reducing gypsum board to ASTM C1396/C1396M, ASTM C1766, consisting of two layers of dense gypsum board encased in smooth, moisture and mold resistant paper facings laminated together with a viscoelastic polymer compound.

.1 Type and Thickness: Type X, 15.9 mm thick, 1220 mm wide x maximum practical length, ends square cut, edges squared for bottom or base layer, beveled for top or finished layer, Ecologo certified minimum 25% recycled content.

2.2 FASTENINGS AND ADHESIVES

.1 Steel drill screws: to ASTM C 1002, ASTM C 954, plain finish.

.2 Stud adhesive: to CAN/CGSB 71.25M.

2.3 ACCESSORIES

.1 Acoustic sealant: one part silicone to ASTM C919 and ASTM C920, primerless, Type S, Grade NS, Class 25, SWRI validated, Ecologo certified, maximum VOC 60 g/L

.2 Gypsum board joint compound: ASTM C 475, asbestos-free.

.3 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.

.4 Resilient furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.5 Sound attenuation batts, Type 1, to CAN/ULC S702.2:
.1 Sound attenuation batt Insulation, self-supporting semi-rigid batts, to fit interior wall stud cavity, manufactured from basaltic rock with a melting point in excess of 1177°C.
.2 Surface burning characteristics; Flame Spread 5, Smoke Developed 0, when tested in accordance with CAN4-S102, ASTM E-84, and UL 723.
.3 Material listed as non-combustible by ULC and ULI; tested in accordance with CAN4-S114 and ASTM E-136.
.4 Acoustical performance: to ASTM C423: NRC 1.05 at 75 mm thickness.

3 Execution

3.1 SOUND INSULATION

.1 Install sound attenuation batts to all new wall spaces indicated. Fit insulation closely around electrical boxes, pipes, ducts, fill door frames and other objects in or passing through insulation.

3.2 ERECTION

.1 Refer to drawings for wall and bulkhead assemblies with noise reducing gypsum board.

.2 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.

.3 Install gypsum board, tape and fill joints in accordance with manufacturer’s instructions.

.4 Erect screw channels for framed gypsum board ceilings in accordance with ASTM C 840 except where specified otherwise.

.5 Install work level to tolerance of 1:1200.

.6 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.7 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.

.8 Furr pipes and exposed services where indicated.

3.3 GYPSUM BOARD APPLICATION

.1 Do not apply gypsum board until framing and strapping, anchors, blocking, electrical and mechanical work are approved.

.2 Apply single of sound attenuating gypsum board to plywood on one side of wall using stud adhesive and screws at top and bottom of wall at 300 oc. Apply single of sound attenuating gypsum board to framing members on other side of wall using screw fasteners at 300 oc along framing members.

.3 Apply 10 mm diameter bead of acoustic sealant to all new walls, continuously around periphery of each face of sound attenuating gypsum board/structure junction where walls abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, ducts, pipes, in walls where perimeter sealed with acoustical sealant.

3.4 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, at masonry walls, concrete ceiling and where indicated.

3.5 TAPING AND FILLING

.1 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.

.2 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.

.3 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.4 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for painting.

3.6 SCHEDULES

.1 Construct all new gypsum board walls as sound rated wall assemblies as indicated.

.1 STC 55 (estimated) wall assembly (Wall Type T1 and T2):
.1 One layer 16 mm sound attenuated Type X gypsum board one side on metal studs.
.2 Sound Batt insulation in cavity.
.3 One layer 16 mm sound attenuated Type X gypsum board one side on plywood substrate.
.4 Acoustic caulking at perimeter of wall and at penetrations.

END OF SECTION

1 General

1.1 RELATED WORK

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

.2 Section 05 50 00 - Metal Fabrication, for attachment of expanded metal mesh to metal framing.

.3 Section 06 11 10 - Rough Carpentry; plywood backing.

.4 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-15e1, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
.2 ASTM A1003 / A1003M - 15 Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
.3 ASTM C 645-14e1, Specification for Nonstructural Steel Framing Members.
.4 ASTM C 754-15, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

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 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 Heavy duty interior studs: to ASTM A 653/A653M, grade D, ZF75 zinc coating designation, to depths indicated or scheduled, roll formed using minimum 1.2 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 tracks:
.1 For heavy duty interior studs: to paragraph 2.1.1.1, 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 Provide wafer head screws, self drilling/threading for fastening steel studs to tracks.

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 (concrete floor and precast concrete double Ts) and secure at 610 mm o.c. maximum except as noted otherwise.

.3 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 3 mm clearance for deflection.
.3 Fasten top track to structure.
.4 Installation of expanded sheet steel mesh panels specified in Section 05 55 00.

.4 Erect studs to 1:1000 tolerance.

.5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.6 Co-ordinate erection of studs with installation of special supports or anchorage for work specified in other Sections.

.7 Provide continuous horizontal channel reinforcement at 1220 mm above finished floor.

.8 Install steel studs or furring channel between studs for attaching electrical and other device boxes.

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.

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 - General Instructions submittals clause.

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 - General Instructions submittals clause 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 Surface mounted ceiling tile: to CAN/CGSB-92.1M:
- .1 Wet formed mineral composition with standard painted finish.
- .2 Fissured pattern.
- .3 Flame spread rating of 25 or less.
- .4 Smoke developed 50 or less.
- .5 Noise reduction coefficient (NRC) designation of 0.65.
- .6 CAC: minimum 35.
- .7 Light reflectance: minimum 70%.
- .8 Edges: flat.
- .9 Colour: white.
- .10 Size: Imperial 300 x 300 x 19 mm thick.
- .11 Shape: flat.
- .12 Tile cement: as recommended by manufacturer.
- .13 Accessories: perimeter moulding, as recommended by system manufacturer.

3 Execution

3.1 ACOUSTICAL CEILING INSTALLATION

.1 Lay out system according to reflected ceiling plan.

.2 Install wall mould/trim at exposed edges.

.3 Make finished ceiling systems square to adjoining walls.

.4 Install 300 x 300 mm ceiling tiles, using tile cement in accordance with manufacturer's instructions. Trim exposed cut edges of ceiling tiles with white metal or PVC J trim.

.5 Scribe acoustical units to fit adjacent work. Butt joints tight, install trim/mould at exposed edges.

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 02 41 19 - Demolition and Removal Work.

.3 Section 09 65 13 - Resilient Base.

1.2 REFERENCE STANDARDS

.1 ASTM International:
.1 ASTM D4078 - 02(2008) Standard Specification for Water Emulsion Floor Polish
.2 ASTM F710 - 08 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
.3 ASTM F1066 - 04(2010)e1 Standard Specification for Vinyl Composition Floor Tile.
.4 ASTM F1869 - 09 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

1.3 SUBMITTALS

.1 Provide maintenance data for resilient flooring for incorporation into maintenance manual specified in Section 01 01 50.

.2 Submit duplicate 152 x 76 mm samples of resilient flooring for colour selection by Departmental Representative in accordance with Section 01 01 50.

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Air temperature and structural base temperature at flooring installation area must be above 20°C for 72 h before, during and 48 h after installation.

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 MATERIALS

.1 Vinyl composition tile (VCT): to ASTM F 1066, Composition 1 - non asbestos, Class 2 - through pattern tile, smooth surface, 3 mm thickness, 300 x 300 mm size, in colour selected by Departmental Representative.

.2 Colors will be selected from the range currently available from the resilient flooring manufacturer.
.1 Concrete floor: premixed latex modified ce

.3 Primer and adhesive: type recommended by flooring manufacturer to suit substrate and installation, Ecologo certified.

.4 Sub-floor filler:
ment mixed with water to produce cementitious paste.

.5 Wax: to ASTM D4078, type recommended by flooring manufacturer.

3 Execution

3.1 INSPECTION

.1 Ensure floors are dry and acceptable to manufacturer's recommendations.

.2 Perform moisture condition test in each areas. A minimum of 1 test per 100 m², prior to installation. Moisture emissions from concrete subfloors must not exceed 1.4 kg per 93 m² per 24 hours for acrylic adhesive and polyurethane adhesive via the Calcium Chloride Test Method (ASTM F1869). If subfloor moisture exceeds the allowable maximum for installing flooring, contact the flooring distributor for a solution.

3.2 SUB-FLOOR PREPARATION

.1 Remove ridges and bumps.

.2 Meet ASTM F710 Standard for Concrete or other monolithic floors.

.3 Maintain air temperature and structural base temperature at flooring installation area between 18°C and 26°C for 48 hours before, during and 24 hours after installation.

.4 Perform alkali tests to ensure pH levels of concrete subfloor surface do not exceed pH 9.9. Concrete must be neutralized if above pH 9.9.

.5 Do not proceed with work until results of moisture condition and/or pH tests are acceptable.

.6 Apply subfloor filler to low spots and cracks to achieve floor level to a tolerance of 1:1000, allow to cure. Do not install resilient flooring over gypsum-based toppings, underlayment, leveling or patching compounds.

3.3 FLOORING APPLICATION

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

.2 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system.

.3 Install tile flooring in accordance with the current manufacturer’s installation instructions.
.1 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
.2 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern.
.3 As installation progresses, and after installation, roll flooring in 2 directions resilient tile with 45 kg minimum roller to ensure full adhesion.
.4 Cut tile and fit neatly around fixed objects.

.4 Terminate flooring at centerline of door in openings and where adjacent floor finish or colour is dissimilar.

.5 Install pvc reducer strips at unprotected or exposed edges where flooring terminates or butts with flooring of different thickness.

3.4 CLEANING AND SEALING

.1 Cleaning: Remove temporary coverings and protection of adjacent work areas.
.1 Repair or replace damaged installed products.
.2 Apply wax to vinyl composition tile in accordance with manufacturer’s instructions.

.2 Clean installed products in accordance with manufacturer’s instructions prior to occupancy.

3.5 PROTECTION OF FINISHED WORK

.1 Cover and protect finished installation from damage from other trades using a non-staining, temporary floor protection system, such as a reusable textured plastic sheeting.

.2 Protection:
.1 Protect the newly installed flooring from foot traffic for 24 hours and heavy rolling traffic for 72 hours.
.2 Protect installed product and finish surfaces from damage during construction.

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 02 41 19 - Demolition and Removal Work.

.3 Section 09 65 18 - Vinyl composition Tile.

.4 Section 09 69 50 - Carpet Tile.

1.2 REFERENCE STANDARDS

.1 ASTM International:
.1 ASTM D4078 - 02(2015) Standard Specification for Water Emulsion Floor Polish.
.2 ASTM E84 - 16 Standard Test Method for Surface Burning Characteristics of Building Materials.
.3 ASTM E648 - 15e1 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
.4 ASTM F137 - 08(2013) Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
.5 ASTM F1515 - 15 Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
.6 ASTM F1861 - 08(2012)e1 Standard Specification for Resilient Wall Base.

1.3 SUBMITTALS

.1 Provide maintenance data for resilient flooring for incorporation into maintenance manual specified in Section 01 01 50.

.2 Submit duplicate samples of resilient base for colour selection by Departmental Representative in accordance with Section 01 01 50.

.3 Product Data for adhesives, including printed statement of VOC content and chemical components.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by Johnsonite, but not less than 13 deg C or more than 29 deg C.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Air temperature and structural base temperature at flooring installation area must be above 20°C for 72 h before, during and 48 h after installation.

.2 Maintain the ambient relative humidity between 40% and 60% during installation.

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 Resilient base: manufactured from a proprietary thermoset rubber formulation. Meets performance requirements for:
.1 ASTM F-1861, Type TS, Group 1.
.2 ASTM E 648, Standard Test Method for Critical Radiant Flux of 0.45 watts/cm^2 or greater, Class I.
.3 ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials, Class B, Smoke <450.
.4 Flexibility: Does not crack, break, or show any signs of fatigue when bent around a 6.4 mm diameter cylinder when tested according to ASTM F 137 Standard Test Method for Flexibility of Resilient Flooring Materials protocols.
.5 Color Stability: Meets or exceeds ASTM F 1861 requirements for color stability when tested to ASTM F 1515 Standard Test Method for Measuring Light Stability of Resilient Flooring protocols.
.6 Phthalate, chlorine and halogen free.
.7 Description:
    .1 Thermoset Rubber Wall Base profile 3.17 mm thick with toe.
    .2 Color: black.
    .3 Height 102 mm.
    .4 Length: 120' coils.
    .5 Preformed outside and inside corners: 3.17 mm thick with 102 mm returns and toe.

.2 Primer and adhesive: type recommended by base manufacturer to suit substrate and installation, Ecologo certified.

3 Execution

3.1 INSPECTION

.1 Ensure walls are dry and acceptable to manufacturer’s recommendations.

.2 Examine substrates, with installer present, for compliance with requirements for conditions affecting performance of the work.

.3 Verify that finishes of substrates comply with tolerances and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient base.

.4 Proceed with installation only after unsatisfactory conditions have been corrected

3.2 BASE APPLICATION

.1 APPLICATION

.2 Comply with manufacturer's written instructions for installing resilient base.

.3 Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

.4 Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

.5 Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

.6 Do not stretch resilient base during installation.

.7 Preformed corners: Install preformed corners before installing straight pieces.

.8 Job-formed corners:
.1 Outside corners: Form by bending without producing discoloration (whitening) at bends.
.2 Inside corners: Butt one piece to corner then scribe next piece to fit.

3.3 CLEANING AND PROTECTION

.1 Comply with manufacturer's written instructions for cleaning and protection of resilient products.

.2 Perform the following operations immediately after completing resilient product installation:
.1 Remove adhesive and other blemishes from exposed surfaces.
.2 Damp-mop surfaces to remove marks and soil.

.3 Protect resilient base from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

3.4 FLOORING AND BASE SCHEDULE

Base Type	Rooms
Applied rubber base	All walls in rooms, 102, 104, 104A, 108 and 112. Patch and repair in room135 to match existing.

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 65 18 - Vinyl Composition Tile.

.3 Section 09 65 20 - Resilient Base.

1.2 REFERENCE STANDARDS

.1 ASTM International:
.1 ASTM E648 - 15e1 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
.2 ASTM E662 - 15a Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials

.2 ULC 102.2-10 Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

1.3 SAMPLES

.1 Submit full size carpet tile, edging specified for colour selection, in accordance with Section 01 01 50 - General Instructions, Submittal clause.

1.4 PRODUCT DATA

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

.2 Data to clearly indicate floor preparation, tile installation and other details required by Departmental Representative to clarify work.

1.5 MAINTENANCE DATA

.1 Provide maintenance data for carpet tile for incorporation into Maintenance Manual specified in Section 01 01 50 - General Instructions, Submittal clause.

1.6 MAINTENANCE MATERIALS

.1 Deliver 10 tiles of carpet tile required for this project for maintenance use. Store where directed. Clearly identify box.

.2 Maintenance materials to be same production run as installed materials.

1.7 ENVIRONMENTAL CONDITIONS

.1 Ensure that air temperature is maintained between 10°-20°C in floor area and carpet tile materials for minium 48 hours before installation.

2 Products

2.1 MATERIALS

.1 Carpets required by NBCC 2010 to have flame spread rating or smoke developed classification accordance with CAN/ULC S102.2 for floor surface covering.

.2 Carpet tile:

.1 Pile fibre: 100% BCF type 6 solution dyed, from recycled content nylon, manufactured with 25% Pre-Consumer Recycled Content and 100% recyclable.

.2 Backing: proprietary backing system manufactured from 40% post consumer recycled content measured as a percentage total carpet tile weight, reinforced resilient synthetic composition, dimensionally stable, to manufacturer's standard with anti-microbial and odour treatment and 100% recyclable.

.3 Carpet tile size: approximately 50 x 50 cm square.

.4 Construction: tufted patterned scroll loop in multi colour blend and meeting the following minimum physical requirements:

- .1 Face pile weight: 623 g/m².
- .2 Average Density 6492 (UM 44D)
- .3 Soil/Stain treatment. Commercial anti-soil protection.
- .4 Anti-microbial treatment: Commercial anti-microbial protection.
- .5 Yarn system: Type 6 SD nylon.
- .6 Pile thickness: 3.1 mm minium.
- .7 Stitches: 10 SPI / 1/12 machine gauge.
- .8 Total thickness: 6 mm minimum.

.5 Smoke and flame:

- .1 Radiant Panel to ASTM E648: .>0.45, Class 1.
- .2 Smoke Density to ASTM E-662: <450.

.6 Electrostatic:

- .1 Propensity: AATCC - 134: <3.5 KV.

.7 Colour as selected by Departmental Representative.

.3 Edging: matching colour, vinyl or rubber extrusion of type recommended by carpet tile manufacturer.

.4 Adhesive: release type with Eco Logo Certification, of brand recommended by carpet tile manufacturer.

.5 Subfloor filler: white premix latex requiring only water to produce cementitious paste or type recommended by carpet tile manufacturer.

3 Execution

3.1 WORKMANSHIP

.1 Install carpet tile over existing subfloor, after finishing work is completed, using release adhesive or tape system.

.2 Finish installation to present smooth wearing surface free from raised corners or edges.

.3 Ensure colour, pattern and texture match within any one area.

3.2 SUB-FLOOR TREATMENT

.1 Clean and prepare existing flooring to receive carpet tiles in accordance with carpet manufacturer's instructions.

.2 Remove ridges and bumps. Fill low spots, cracks, joints, holes and other defects as recommended by installer.

3.3 CARPET TILE INSTALLATION

.1 Lay out guide lines on floor in accordance with manufacturer's instructions adhesive to entire floor areas designated for carpet tile. Install carpet tile as scheduled.

.2 Install carpet tiles in accordance with manufacturer's strict instructions in random pattern.

.3 Lay flooring with joints parallel to room lines to produce symmetrical tile pattern. Border tiles minimum half tile width.

.4 Lay flooring tight to non-removable built-in fixtures without interrupting floor pattern.

.5 Terminate flooring at centerline of door in openings where adjacent floor finish is dissimilar. Install edge strips at unprotected or exposed edges where carpet tile terminates.

3.4 PROTECTION OF FINISHED WORK

.1 Vacuum carpet tile clean.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 01 01 50 - Submittal Procedures, Waste Management And Disposal.

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 Coordinate use of existing ventilation system with Departmental Representative and ensure its operation during and after application of paint as required.

.4 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 Surfaces:
- .1 Apply block filler over new masonry surfaces.
- .2 INT 4.2D High performance architectural latex G4 finish.

.2 Gypsum Board wall and bulkhead surfaces:
- .1 Prepare new surfaces to manufacturer’s instructions.
- .2 INT 9.2A Latex G3 finish (over latex sealer).

.3 Metal doors, frames and miscellaneous metal:
- .1 INT 5.1R High performance architectural latex coating G5 semigloss finish.

.4 Existing surfaces:
.1 Prepare existing surfaces to manufacturer's instructions.
.2 INT 5.1R High performance architectural latex coating G4 satin finish.

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 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.3 Do not paint over nameplates.

.4 Keep sprinkler heads and stainless work free of paint.

.5 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

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 B32-08, Standard Specification for Solder Metal.
- .2 ASTM B306-13, Standard Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564-12, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canadian Standards Association (CSA International).

- .1 CAN/CSA-B70-12, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .2 CSA-B125-12, 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, 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.

.2 The use of ABS piping inside building is not permitted.

2.4 PVC Piping

.1 Drainage piping under the building may be as follows, at the contractor's option:

.1 Underground sanitary drainage piping under building, 100mm in diameter or larger, certified to the current version of CSA B181.2, PVC Drain, Waste and Vent Pipe and Fittings.

.2 The use of PVC drain pipe inside building is not permitted.

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 above ground piping parallel and close to walls and ceilings to conserve headroom and space, and to grade as indicated.

3.2 Testing

.1 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.

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 22 Plumbing

.2 Division 23 Heating Ventilation & Air Conditioning

.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. Hazardous building materials under Mechanical Divisions include but not limited to:

.1 Asbestos containing duct mastic, pipe elbows, plumbing gaskets.

.2 Asbestos containing insulation warp for storm piping in Room 104.

.3 Lead based paint for existing sprinkler piping.

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" in this 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 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.

.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.

.2 Workmanship shall be in accordance with well-established practice and standards accepted and recognized by Departmental Representative and the Trade. Departmental Representative has the right to reject any items of work that does not conform to the Contract and accepted standards of performance, quietness of operation, finish and appearance.

.3 Employ only tradesmen holding valid Provincial Trade Qualification Certificates. Tradesmen shall perform only work that their certificate permits.

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-trades.

1.8 Maintenance

.1 Furnish spare parts in accordance with Section 01 01 50 – General Instructions as indicated in the detailed product specification clauses.

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 Discrepancies and Omissions

.1 Bidders finding discrepancies in, or omissions from, Drawings, Specifications, or other documents, or having any doubt as to the meaning or intent of any part thereof, shall at once notify the Departmental Representative, who will send explanatory written instructions to all bidders. No verbal information will be considered valid.

.2 Should there be conflict(s) within or between the Specifications and/or Drawings, the most stringent or higher quality requirement shall apply.

1.11 Mandatory Requirements for O&M Manuals

.1 Employ an independent firm with 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.

  - 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

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.

PART 2 PRODUCTS

2.1 Not used.

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 for new and relocated equipment located in inmate accessible areas.

3.2 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.

.3 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 Halocarbons Management

.1 Comply with all of:

.1 Federal Halocarbon Regulations, 2003;

.2 Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems (the Environment Canada “Refrigeration Code of Practice”) Cat. No.: En14-207/2015E-PDF, April, 2015.

.2 Work on Halocarbon Systems includes installation, servicing, leak testing or charging of a refrigeration system or an air-conditioning system or doing any other work on the system that may result in the release of a halocarbon.

.3 All work on Halocarbon Systems shall be carried out only by a “Certified Person” as defined by the Federal Halocarbon Regulations 2003.

.1 Provide copies of all technicians’ certificates to the Departmental Representative.

.4 Halocarbons listed under Item 1 through 10 of Schedule 1 of Federal Halocarbon Regulations, 2003 (SOR/2003-289) are not acceptable refrigerants.

.5 Document **all** work on Halocarbon Systems using CSCs halocarbon forms. Obtain the latest forms from Departmental Representative. Affix the completed form to equipment, and submit a copy of the form to Departmental Representative.

.6 Comply with the following timelines:

.1 Upon delivery of halocarbon-containing equipment to site, submit the following information to Departmental Representative within 24 hours of service;

.1 Make

.2 Model

.3 Serial number

.4 Type of halocarbon

.5 Halocarbon charging capacity of system (kg or lbs)

.6 Factory Halocarbon Charge (kg or lbs)

.7 Cooling capacity (kW, Btuh, or Tons)

.2 Leak-test factory-charged halocarbon-containing equipment containing over 10kg of refrigerant in accordance with the Refrigeration Code of Practice within one week of equipment delivery to site.

.3 Leak-test field-charged halocarbon-containing equipment in accordance with Section 4.4 of the Refrigeration Code of Practice at the time of field charging of system.

.4 For all work on Halocarbon Systems, submit forms to Departmental Representative within 48 hours of work.

.5 For release of halocarbons >10 kg and <100 kg, submit forms to Departmental Representative within 24 hours of discovery of release.

.6 For release or potential release of halocarbons > 100 kg, submit forms to Departmental Representative **immediately**.

.7 Conduct annual leak tests of halocarbon-containing equipment with 19kW (5.4 tons) or greater cooling capacity in accordance with the Federal Halocarbon Regulations, 2003 until such time as Interim Certificate of Completion is issued.

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 & Support for Piping & Equipment

.4 This Section applies to all related work under Divisions 22 and 23.

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.

.7 Install in accordance with Section 23 05 29 – Hanger & Support for Piping & Equipment.

.8 Provide minimum 200mm ground clearance for piping exposed to weather.

3.4 Sleeves

.1 General: Install where pipes pass through masonry, concrete structures, fire rated assemblies (where steel sleeves are part of the listed 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 304 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.

.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 2015.

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.

2.4 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 Perforated band iron, wire or chain hangers will not be approved.

.4 All hangers for copper pipe shall be copper, copper clad, felt lined or use plastic tape wrapped pipe at hanger.

2.6 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.

2.7 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.

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.

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 23 05 00 Common Work Results – Mechanical

.3 This Section applies to all related work under Divisions 22 and 23.

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 Elastomeric Mounts

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

2.4 Springs

.1 Design stable springs: ratio of lateral to axial stiffness is equal to or greater than 1.2 times ratio of static deflection to working height. Select for 50% travel beyond rated load. Units complete with leveling devices.

.2 Ratio of height when loaded to diameter of spring between 0.8 to 1.0.

.3 Cadmium plate for outdoor installations.

.4 Colour code springs.

2.5 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.

2.6 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 Suspended equipment:

.1 Use one or more of following methods depending upon site conditions or as indicated:

.1 Install tight to structure.

.2 Cross brace in every direction.

.3 Brace back to structure.

.4 Cable restraint system.

.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 To be compatible with requirements for anchoring and guiding of piping systems.

.3 Wet weight of piping shall be to be used for designing seismic restraint systems.

.4 Small pipes may be rigidly secured to larger pipes for restraint purposes, but not reverse.

.5 Where cable is used for restraining vibration isolated piping systems, install cable with sufficient slack to avoid short-circuiting of vibration isolators.

.5 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".

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 This Section applies to all related work under Divisions 22 and 23.

1.2 References

.1 Canadian Standards Association (CSA International):

.1 CAN/CSA 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 Identification of Piping Systems

.1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.

.2 Pictograms:

.1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.

.3 Legend:

.1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.

.4 Arrows showing direction of flow:

.1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.

.2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.

.3 Use double-headed arrows where flow is reversible.

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

.2 Length to accommodate pictogram, full length of legend and arrows.

.6 Materials for background colour marking, legend, arrows:

.1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.

.2 Other pipes: pressure sensitive vinyl with protective overcoating, waterproof contact adhesive undercoating, suitable for ambient of 100% RH and continuous operating temperature of 150 degrees C and intermittent temperature of 200 degrees C.

.7 Colours and Legends:

.1 Where not listed, obtain direction from 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
Condensate Drain	Green	COND.

2.4 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.

2.5 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 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 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 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.

.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 Departmental Representative 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.

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 Prior to calling Substantial Completion, 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 Include final TAB report in O&M manual. Provide one (1) copy of final TAB Report to Departmental Representative.

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 Pay 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 AABC, NEBB, SMACNA and 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).

PART 2 - PRODUCTS

2.1 Not Used

.1 Not used.

PART 3 - EXECUTION

3.1 General

.1 Test and balance existing equipment and systems serving the renovated areas and buildings.

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 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 / ASTM C547.

.2 Maximum "k" factor: to CAN/CGSB-51.9.

.4 TIAC Code A-2: Rigid molded calcium silicate without factory applied vapour retarder jacket.

.1 Calcium silicate: to CAN/CGSB-51.2 / ASTM C533.

.2 Maximum "k" factor: to CAN/CGSB-51.2.

.5 TIAC Code A-3: Rigid molded mineral fibre with factory applied vapour retarder jacket.

.1 Mineral fibre: to CAN/CGSB-51.9 / ASTM C547.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/CGSB-51.9 / ASTM C547.

.6 TIAC Code C-2: Mineral fibre blanket faced with factory applied vapour retarder jacket (as scheduled in PART 3 of this section).

.1 Mineral fibre: to CAN/ULC-S702 / ASTM C553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to CAN/ULC-S702 / ASTM C553.

.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 Seal vapor barrier penetrations with vapor barrier adhesive.

3.3 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.

3.4 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-2.

.1 Securements: SS Bands at 300mm on centre.

.2 Seals: lap seal adhesive, lagging adhesive.

.3 Installation: TIAC Code 1501-H.

.4 Direct contact with pipe and hanger is not acceptable. Install hanger outside of sheet metal protection shield covering an insert section of high density calcium silicate insulation.

.4 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.

.5 TIAC Code: A-6.

.1 Seals: lap seal adhesive, lagging adhesive.

.2 Installation: TIAC Code: 1501-CA; per manufacturer's recommendation.

.6 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.

.7 Thickness of insulation to be as listed in following table.

.1 Run-outs to individual units and equipment not exceeding 4000mm long.

Application	**Temp °C**	**TIAC Code**	**Run out**	**To NPS1**	**1 ¼-2**	**2 ½-4**	**5-6**	**8 & over**
Refrigerant	4 – 13	A-6	25	25	25	25	25	25
RWL		C-2	25	25	25	25	25	25
Cooling Coil Condensate Drain		C-2	25	25	25	25	25	25

.7 Finishes:

.1 Exposed indoors: Canvas or PVC jacket.

.2 Concealed, indoors: ASJ, no further finish.

.3 Exposed outdoors: Aluminum jacket.

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 91 00 Commissioning

.2 Section 23 05 93 Testing, Adjusting and Balancing

1.2 Quality Assurance

.1 The commissioning of mechanical systems shall be executed in accordance with the intent of:

.1 ASHRAE Guideline 1.1-2007, HVAC&R Technical Requirements for the Commissioning Process.

.2 ANSI/ASHRAE/IES Standard 202-2013, Commissioning Process for Buildings and Systems.

1.3 General

.1 Commissioning of the mechanical systems, including the HVAC, and Plumbing and Drainage Systems, shall be carried out by an independent Commissioning Agent acceptable to the Departmental Representative with technicians specifically trained in commissioning procedures.

.2 The Mechanical Subcontractor shall retain a Commissioning Agent, who shall be active in the commissioning process and actively encourage his own forces and sub-trades to work together to achieve optimum system performance for the mechanical systems in a timely manner. Refer to Section 01 91 00 – Commissioning for additional requirements.

.3 It is not intended that this work shall, in any way, replace normal factory startup service for equipment or relieve the Contractor or his sub-trades of their responsibility for providing first-class installation in satisfactory working order.

.4 As part of the final commissioning report, submit a Certificate stating that the commissioning procedures have been completed, that complete factual reports have been distributed and that directions have been given to the Contractor to correct faults and omissions and finally, that follow-up testing, after the correction of faults and omissions has been completed and recorded.

.5 Be responsible for the performance and commissioning of all equipment supplied under the Sections of Division 22, 23. Commissioning is the process of advancing the installation from the stage of static completion to full working order in accordance with the contract documents and design intent. It is the activation of the completed installation.

.6 In consultation with the General Contractor, ensure that sufficient time is allowed and fully identified on the construction schedule for the proper commissioning of all mechanical systems.

1.4 Commissioning and Demonstration

.1 Submit a schedule for the commissioning phase of the work. This schedule shall show:

.1 Equipment start-up schedule.

.2 Submission dates for the various documents required prior to substantial completion.

.3 Timing of the commissioning, testing, balancing, and demonstration process.

.2 Commissioning is concluded when the air and water system is balanced and the installation is in full working order and acceptable for use. The work shall include the following:

.1 Balancing of the air systems as specified in this section.

.2 Set up air diffusers, registers and grilles for optimum distribution/comfort.

.3 Plug all air pressure and flow measuring holes.

.4 Adjust vibration isolators and earthquake restraints for optimum performance.

.5 Verification and certification of the sealing of all HVAC penetrations through fire separations (rated & non-rated) and sound separations.

.6 Verification of water tightness of all roof and exterior wall penetrations.

.7 Verification that coil drain pan operates.

.8 Set up all automatic temperature control devices.

.9 Set up and test all alarm and protective devices.

.3 In addition to the piping, equipment and systems listed above provide commissioning of all plumbing piping, equipment and systems including the following:

.1 Sanitary waste and venting.

.4 At the conclusion of commissioning, demonstrate the operation of the systems to the Departmental Representative. For demonstration and instruction to Operating staff requirements, refer to this section of the specification and also to section 25 05 01 EMCS: General Requirements.

.5 The verification process shall include the demonstration of the following:

.1 Operation of all automatic temperature control devices.

.2 Operation of all alarm and protective devices.

.3 Operation of all equipment and systems under each mode of operation, and failure.

.6 At the completion of commissioning, testing, balancing and demonstration submit the following to the Departmental Representative:

.1 A letter certifying that all work specified under this contract is complete, clean and operational in accordance with the specification and drawings.

.2 Completed copies of all commissioning check lists plus copies of start-up reports from specialty contractors and vendors.

.3 “As-Built” record drawings, as specified.

.4 A list of all alarm and protective devices tested, with the final operating settings.

.7 Training

.1 During "Substantial Performance" review, the Mechanical Contractor, Control Subcontractor, and other Subcontractors designated by the Departmental Representative shall provide training to the operating personnel in the proper operation and maintenance of all systems and equipment installed under the contract.

.2 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 Departmental Representative at this meeting.

.3 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.

PART 2 - PRODUCTS

2.1 Not Used

PART 3 - EXECUTION

3.1 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 Works Results - Mechanical

1.2 References

.1 American National Standards Institute (ANSI)

.1 IEEE C57.13-2013, Standard Requirements for Instrument Transformers.

.2 National Electrical Manufacturer's Association (NEMA)

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 Include:

.1 Information as specified for each device.

.2 Manufacturer's detailed installation instructions.

.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:

.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 Deliver, store and handle materials in accordance with manufacturer's written instructions.

1.6 Waste Management Disposal

.1 Separate and recycle waste materials 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.

PART 2 PRODUCTS

2.1 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 23.

.3 All line voltage wiring shall be copper with RW90 X-Link P.E. insulation #12 minimum size. AWG wire shall be sized to meet code.

.4 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 co-axial communication wiring. Line voltage alternating current wiring shall not be run in the same conduit, or cabling as low voltage wiring.

.5 Use 1m of flexible conduit for all connections to vibrating equipment. Use liquid tight flex cable and connections where required.

.5 Line voltage will not be run with signal or trunk wiring or be present in the same junction box.

.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 shall be no splices in any of the control wiring except at devices or control panels.

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 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 Equipment shall be installed in locations providing adequate ambient conditions for its specified functioning, allowing for adequate ventilation.

.6 Permanently identify each wire, cable, conduit and tube at each terminal.

.7 All wall mounted devices in new finished space shall be mounted on a wall box.

3.3 Enclosure and Conduit

.1 Relays, transformers, and controls devices shall be installed in controls enclosures.

.2 All wires penetrating the enclosure that are not required to be in conduit must be neatly bundled and strapped in place.

.3 The wiring diagram shall be affixed on the inside of the door/cover of the enclosure.

.4 The inside bottom of the enclosure shall be clean of dirt, metal shavings, and debris.

.5 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.

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 01 91 00	Commissioning
.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 07 19	Thermal Insulation for Piping
.7	Section 23 08 00	Commissioning of Mechanical Systems

1.2 References

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B16.22-2013, Wrought Copper and Copper Alloy Solder - Joint Pressure Fittings.

.2 ASME B16.24-2011, Cast Copper Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.

.3 ASME B16.26-2013, Cast Copper Alloy Fittings for Flared Copper Tubes.

.4 ASME B31.5-2013, Refrigeration Piping and Heat Transfer Components.

.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 280-2013, Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

.3 Canadian Standards Association (CSA International)

.1 CSA B52-13, Mechanical Refrigeration Code.

.4 Environment Canada (EC)

.1 EPS 1/RA/1-96, Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

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

.1 Material Safety Data Sheets (MSDS).

.6 Federal Halocarbon Regulations, 2003.

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 and product data in accordance with Section 01 01 50 – General Instructions.

.2 The Refrigeration contractor shall prepare and include the coil and condensing unit balance curves detailing the S.S. temperature, the estimated line loss, and the system balance point that meets the required total and sensible cooling capacities at the specified ambient temperatures. A refrigerant piping schematic, showing refrigerant pipe sizes, lengths, and refrigerant receiver size requirement, shall also be submitted to confirm installation is in accordance with manufacturer's recommendations, and does not contravene warranty requirements

.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 Provide maintenance and engineering data for incorporation into manual specified in Section 01 01 50 – General Instructions.

.2 Provide halocarbons documentations in accordance with Section 23 05 00 – Common Works Results – Mechanical.

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.

.2 Provide 12 months service for all refrigeration system components and fluids at no additional cost to Owners. Start of 12 month service period shall be the first summer occasion on which unit is adjusted for cooling conditions.

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 in appropriate on-site bins for recycling.

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

PART 2 PRODUCTS

2.1 Tubing

.1 Processed for refrigeration installations, deoxidized, dehydrated and sealed.

.1 Hard copper: to ASTM B 280, type ACR.

.2 Annealed copper, Type L: to ASTM B 280, with minimum wall thickness as per CSA B52 and ASME B31.5. .

2.2 Fittings

.1 Service: design pressure 2070 kPa and temperature 121 degrees C.

.2 Brazed:

.1 Fittings: wrought copper to ASME B16.22.

.2 Joints: silver solder, 15% Ag-80% Cu-5%P or copper-phosphorous, 95% Cu-5%P and non-corrosive flux.

.3 Flanged:

.1 Bronze or brass, to ASME B16.24, Class 150 and Class 300.

.2 Gaskets: suitable for service.

.3 Bolts, nuts and washers: to ASTM A 307, heavy series.

.4 Flared:

.1 Bronze or brass, for refrigeration, to ASME B16.26.

2.3 Pipe Sleeves

.1 Hard copper or steel, sized to provide 6 mm clearance around between sleeve and uninsulated pipe or between sleeve and insulation.

2.4 Valves

.1 22 mm and under: Class 500, 3.5 Mpa, globe or angle non-directional type, diaphragm, packless type, with forged brass body and bonnet, moisture proof seal for below freezing applications, brazed connections.

.2 Over 22 mm: Class 375, 2.5 Mpa, globe or angle type, diaphragm, packless type, back-seating, cap seal, with cast bronze body and bonnet, moisture proof seal for below freezing applications, brazed connections.

PART 3 EXECUTION

3.1 Installation

.1 Install in accordance with CSA B52, EPS1/RA/1 and ASME B31.5 Section 23 05 05 - Installation of Pipework.

.2 The installation shall be completed in compliance with Federal Halocarbon Regulations, 2003.

3.2 Brazing Procedures

.1 Bleed inert gas into pipe during brazing.

.2 Remove valve internal parts, solenoid valve coils, sight glass.

.3 Do not apply heat near expansion valve and bulb.

3.3 Piping Installation

.1 General:

.1 Soft annealed copper tubing: bend without crimping or constriction.

.2 Hard drawn copper tubing: do not bend.

.3 Minimize use of fittings.

.2 Hot gas lines:

.1 Pitch at least 1:240 down in direction of flow to prevent oil return to compressor during operation.

.2 Provide trap at base of risers greater than 2400 mm high and at each 7600 mm thereafter.

.3 Provide inverted deep trap at top of risers.

.4 Provide double risers for compressors having capacity modulation.

.1 Large riser: install traps as specified.

.2 Small riser: size for 5.1 m/s at minimum load. Connect upstream of traps on large riser.

.5 Insulation

.1 Insulate with vapour-sealed elastomeric insulation in accordance with Section 23 07 19 – Thermal Insulation for Piping.

.2 Insulation shall be sealed at seams and butt joints with adhesive.

.3 Outdoor exposed piping shall be finished with aluminum jacket in accordance with Section 23 07 19 – Thermal Insulation for Piping.

3.4 Pressure and Leak Testing

.1 Close valves on factory charged equipment and other equipment not designed for test pressures.

.2 Leak test to CSA B52 before evacuation to 2MPa and 1MPa on high and low sides respectively.

.3 Test Procedure: build pressure up to 35 kPa with refrigerant gas on high and low sides. Supplement with nitrogen to required test pressure. Evacuate the system down to 500 microns and shall certify the system stayed at 500 microns for 1/2 hour after shutting off the vacuum pump and connection line. Test for leaks with electronic or halide detector. Repair leaks and repeat tests.

3.5 Start-up and Commissioning

.1 Charge refrigerant, start-up and submit written report to Departmental Representative.

.2 Commissioning:

.1 In accordance with Section 01 91 00 – Commissioning, and Section 23 08 00 – Commissioning of Mechanical Systems.

.3 Halocarbons Management:

.1 In accordance with Section 23 05 00 – Common Works Results – Mechanical.

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 01 35 33	Health and Safety Requirements
.3	Section 01 91 00	Commissioning
.4	Section 23 05 48	Vibration & Seismic Controls for Ductwork, Piping & Equipment
.5	Section 23 08 00	Commissioning of Mechanical Systems
.6	Section 23 23 00	Refrigerant Piping

1.2 References

.1 Air-Conditioning and Refrigeration Institute (ARI)

.1 ARI 210/240-2008, Standard for Unitary Air Conditioning and Air-Source Heat Pump Equipment.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-C656-14, Performance Standard for Split-System and Single Package Central Air Conditioners and Heat Pumps.

.2 CSA B52-13, Mechanical Refrigeration Code.

.3 Environment Canada, (EC)/Environmental Protection Services (EPS)

.1 EPS 1/RA/2-1996, Code of Practice for Elimination of Fluorocarbons Emissions from Refrigeration and Air Conditioning Systems.

.2 Environment Canada-1994, Ozone-Depleting Substances Alternatives and Suppliers List.

.4 Federal Halocarbon Regulations, 2003.

1.3 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 in force.

.2 Capacity: flow rate, static pressure, BHP, HP, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.3 Performance ratings: based on tests performed in accordance with ANSI/AMCA/ARI 210.

1.4 Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Shop Drawings, Product Data and Samples. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:

.1 Submit shop drawings and product data 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.

.2 Instructions: submit manufacturer's installation instructions.

.4 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 01 50 – General Instructions.

.2 Provide halocarbons documentations in accordance with Section 23 05 00 – Common Works Results – Mechanical.

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 Split System DX Units

.1 General:

.1 Indoor, wall-mounted, DX evaporator with matching condensing unit. Air conditioning only or heat pump as scheduled.

.2 For use with R-410A refrigerant.

.2 Indoor Evaporator – Cassette type:

.1 Indoor, DX, cassette unit. Complete with coil, fan, fan motor, piping connection, electrical controls, drain pan, built-in condensate drain pump. Unit shall be round-flow air distribution type, impact resistant with a washable decoration panel. The supply air is distributed via motorized louvers which can be horizontally and vertically adjusted from 0° to 90°.

.2 Unit cabinet: constructed of high-impact polystyrene; fully insulated.

.3 Fan: direct-drive turbo fan type. Statically and dynamically balanced with permanent lubricated bearings. Three choices of speeds, plus quiet and auto setting.

.4 Coil: Aluminum fins mechanically bonded to copper tubing. Split heat exchanger for dehumidification with re-warming control. Condensate drain pan with drain connection.

.5 Controls: microprocessor-based control for space temperature, fan speed and self-diagnostics.

.6 Filters: cleanable.

.7 Electrical: Power is supplied from condensing unit.

.8 Accessories: as scheduled.

.2 Indoor Evaporator – Wall-mounted:

.1 Indoor, DX, wall mounted unit. Complete with coil, fan, fan motor, piping connection, electrical controls, drain pan, condensate drain pump.

.2 Unit cabinet: constructed of high-impact polystyrene; fully insulated.

.3 Fan: direct-drive by a single motor. Statically and dynamically balanced with permanent lubricated bearings. Five choices of speeds, plus quiet and auto setting. Auto-swing louvre for adjustable airflow control.

.4 Coil: Aluminum fins mechanically bonded to copper tubing. Condensate drain pan and drain connection. Condensate pump in drain pan with a built in safety alarm.

.5 Controls: microprocessor-based control for space temperature, fan speed and self-diagnostics.

.6 Filters: 65% efficiency.

.7 Electrical: Power is supplied from condensing unit.

.8 Sound level shall not exceed:

Indoor Unit Nominal Cooling Capacity	**Cooling Mode Sound Level (H/M/L) dB(A)**	**Heating Mode Sound Level (H/M/L) dB(A)**
2.6 kW [9,000 Btuh)	42 / 33 / 26	42 / 35 / 28
3.4 kW [12,000 Btuh)	43 / 35 / 27	43 / 36 / 29
4.3 kW [15,000 Btuh)	45 / 37 / 29	44 / 38 / 31

.9 Accessories: as scheduled.

.3 Outdoor Condensing Unit:

.1 Factory assembled air-cooled condensing unit. Complete with inverter-driven compressor, outdoor coil, fan, metering devices, controls and full charge of refrigerant.

.2 Cabinet: constructed of galvanized steel, bake-enamel finish. Removable access panels. Outdoor compartment shall be isolated and acoustically lined.

.3 Fan: direct-drive, propeller type. Motor shall be inverter drive, permanently lubricated bearings, inherently protected. Capable of operating in "silent operation" which lowers outdoor fan speed.

.4 Compressor: swing, inverter-driven type. Complete internal thermal overload protection, crankcase heater. Compressor assembly shall be installed on rubber vibration isolators.

.5 Outdoor coil: non-ferrous construction with corrugated fin tube, with an anti-corrosion coating. Optional aluminum plate fins mechanically bonded to copper tubing.

.6 Refrigeration components: service valves with gage ports on both liquid and suction lines, accumulator, 4-way reversing valve, pressure relief, fully charge of refrigerant.

.7 Controls and safety: operating controls and safeties shall be factory assembled and tested. Include high-pressure and low-pressure switches, outdoor fan motor protection, system diagnostics, compressor motor current and temperature overload protection, high pressure relief.

.8 Electrical: single point connection.

PART 3 EXECUTION

3.1 Installation

.1 Install where indicated and in accordance with manufacturer's instructions.

.2 Install outdoor units. For flashing, roofing, weatherproofing, refer to Architectural drawings.

.3 Size anchor bolts to withstand seismic acceleration and velocity forces as specified in Section 23 05 48 – Vibration and Seismic Controls for Ductwork, Piping and Equipment.

.4 Make duct connections through flexible connections.

.5 Make piping connections.

.6 Nothing to obstruct ready access to components or to prevent removal of components for servicing.

.7 The installation shall be completed in compliance with Federal Halocarbon Regulations, 2003.

.8 Install refrigerant piping in accordance with Section 23 23 00 – Refrigerant Piping.

.9 Provide interlock wiring between indoor / outdoor units and hardwired remote controller in strict accordance with manufacturer's installation instructions. All low voltage and control wiring shall 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 existing wall cavities may be run free-air.

3.3 Start-up and Commissioning

.1 Charge refrigerant, start-up and submit written report to Departmental Representative.

.2 Commissioning:

.1 In accordance with Section 01 91 00 – Commissioning, and Section 23 08 00 – Commissioning of Mechanical Systems.

.3 Halocarbons Management:

.1 In accordance with Section 23 05 00 – Common Works Results – Mechanical.

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

SPLIT SYTEM HEAT PUMP UNITS										
Indoor Unit	IHP-1		IHP-2		IHP-3		IHP-4			
Location	Room 104		Room 108a		Room 108		Room 112			
Type	Cassette		Wall-mounted		Cassette		Wall-mounted			
Cooling Capacity										
Nominal. - kW (MBH)	5.3	18.0	2.6	9.0	5.3	18.0	2.6	9.0		
Maximum - kW (MBH)	See capacity		3.6	12.3	See capacity		3.6	12.3		
Minimum - kW (MBH)	control range		1.6	5.3	control range		1.6	5.3		
Heating Capacity										
Rated - kW (MBH)	5.9	20.0	3.5	12.0	5.9	20.0	3.5	12.0		
Maximum - kW (MBH)	See capacity		5.3	18.0	See capacity		5.3	18.0		
Minimum - kW (MBH)	control range		1.3	4.4	control range		1.3	4.4		
MCA	0.4		0.4		0.4		0.4			
Power Supply	208/1/60		208/1/60		208/1/60		208/1/60			
Weight - kg. (Lb.)	27.3	60	15.9	35	27.3	60	15.9	35		
Outdoor Condensing Unit	CU-1		CU-2		CU-3		CU-4			
Location	See plan		See plan		See plan		See plan			
Capacity Control Range	35% - 100%				35% - 100%					
MCA	16.5		14.5		16.5		14.5			
MOCP	20		20		20		20			
Power	208/1/60		208/1/60		208/1/60		208/1/60			
Weight - kg. (Lb.)	68	150	45	100	68	150	45	100		
System Performance										
SEER	17.2		26.1		17.2		26.1			
EER	13.9		15.8		13.9		15.8			
HSPF	10.1		11.5		10.1		11.5			
Heating COP	3.0		4.5		3.0		4.5			
Notes	1,2,3		1,2		1,2,3		1,2			

Refer to Specification for accessories not scheduled. Refer to drawings for installation details.

As part of the shop drawing submission, the Refrigeration contractor shall prepare and include the coil and condensing unit balance curves detailing the S.S. temperature, the estimated line loss, and the system balance point that meets the required total and sensible cooling capacities at the specified ambient temperatures. A refrigerant piping schematic, showing refrigerant pipe sizes, lengths, and refrigerant receiver size requirement, shall also be submitted to confirm installation is in accordance with manufacturer's recommendations, and does not contravene warranty requirements. Refrigeration contractor shall employ equipment manufacturer's service representative to supervise system start up and instructing of Owner's personnel.

Notes:

1. Single point power connection at condensing unit.
2. Funished with condensate pump, hard-wired remote controller.
3. Maximum cassette height = 254mmm [10"]

1.1 GENERAL

.1 The General Conditions, Supplements and Amendments shall govern this Section (read in conjunction with Instructions to Tenders/Bidders). This Section covers items common to Sections of Division 26, 27 and 28. This section supplements requirements of Division 01.

.2 Reference to “Electrical Division” shall mean all related Electrical Sections and components including Division 26, 27 and 28.

.3 The word “Provide” shall mean “Supply & Install” the product and services specified. “As Indicated” means that the item(s) specified are shown on the drawings.

.4 Provide materials, equipment and devices of specified design, performance, intent and quality; and, current models with published certified ratings for which replacement parts are readily available. Provide project management and on-site supervision to undertake administration, meet schedule, ensure timely performance, ensure co-ordination and establish orderly completion and the delivery of a fully commissioned installation.

.5 The most stringent requirements of this section, other electrical sections and drawings shall govern.

.6 All work shall be in accordance with the Contract Drawings and Specifications and their intents, complete with all necessary components, including those not normally shown or specified but required for a complete installation.

.7 Arrange and pay for the services of specialized contractors (listed below) to perform the works on this project as described in the Sub-section 1.5 – Summary of Work in this specification section.

.1 Specialized contractors:
- .1 Cartel Systems; Contact: Neal Midgley at nmidgley@cartelsys.com
- .2 Bell Canada; Contact: Richard Conti at richard.conti@bell.ca
- .3 Mitel Communications;Contact: Lori Mountain at lori.mountain@mitel.com

1.2 CODES AND STANDARDS

.1 Do complete installation in accordance with Canadian Electrical Code, CSA C22.1-2015.

.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 DEFINITIONS

.1 Electrical and Electronic terms: unless otherwise specified or indicated, terms used in these specifications and on drawings are those defined by IEEE SP1122.

1.4 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, and Telecommunications 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.

1.5 SUMMARY OF ELECTRICAL WORK

Boundaries of work are shown on the architectural drawing A-0000 and electrical drawings.

Work under this contract includes but is not limited to;

.1 Provide new power, data, CCTV, Video Conference (VC) and telephone outlets c/w conduits and wiring in the spaces as indicated on drawings. Remove and relocate existing outlets to suit the new layout.

.2 Arrange and pay for services of Mitel Canada for coordination and termination of the new and existing telephone lines in CER room # 136 and other terminal boxes.

.3 Provide new LED lighting fixtures complete with new power circuits and switching configuration as indicated on drawings. Remove and dispose of the existing fluorescent fixtures and lighting control circuit material.

.4 Provide new Cat 6 telephone cables between the BIX interconnect blocks on termination panel in the existing CER room#136 and the outlets in new SIO office, unless noted otherwise. Perform tests on the cables and submit test reports. Final cross connections on the termination panels shall be performed by Mitel Canada.

.5 Provide new Cat 6 cables between the existing IT Cabinet in mechanical room # 127 and the data outlets in the SIO offices. Perform tests on the cables and submit test reports. Provide patch cables as indicated. Final cross connections and configuration in IT cabinet shall be performed by department representative.

.6 Provide new outdoor and indoor disconnect switches for mechanical equipment c/w new feeders and breakers from the existing panel boards in mechanical/electrical room as indicated on drawings. Indoor heat pump units will be wired to the outdoor units to receive power.

.7 Provide new Fiber Optic Patch panels and network switches c/w Fiber Modules (one set in existing IT rack in CER room # 136 and one set in wall mounted new IT Cabinet in room # 112).

.8 Arrange and pay for services of Cartel Systems to relocate existing Inmate Telephone System (ITS) Audio Recording System (Eventide) from existing SIO office from Building M13 to room # 112 in Building M2a including but not limited to;

- .1 Perform all coordination, relocation and re-programming works of ITS Audio Recording System (Eventide) Equipment.
- .2 Provide all final wiring, cross connections and terminations between ITS Termination Panel in CER room # 136 and Eventide recording system in room # 112.
- .3 Provide KVM (Keyboard-Video-Mouse) cable to run from retrieval workstation.

.9 Provide new Ethernet Routing Switch and a Fiber Optic Module c/w SC to LC Fiber Patch cable in existing IT cabinet located in mechanical / electrical room.

.10 Provide new indoor / outdoor 12 strand fiber optic cable c/w conduits from new Fiber Optic module / Patch panel in CER room # 136 to the Fiber Optic Module / Patch panel in room # 112.

.11 Arrange and pay for the services of Bell Canada to relocate Bell Canada ITS Computer and modem from existing SIO offices in Building M13 to new SIO offices in Building M2a and ensure complete operation of the system. Exact location of the equipment within the new SIO offices shall be confirmed on site.

.12 Provide new (2x25pair) PVC telephone cables c/w with BIX interconnect blocks on both ends between the termination panel in CER room #136 and BIX Block board in room # 112 for Eventide Audio Recording System. Perform tests on the cables and submit test reports. Final cross connections, cabling and terminations in the CER room and room # 112 shall be performed by Cartel Systems.

.13 Provide new telephone outlet c/w two Cat 6 cables and RJ45 jacks and connect to BIX interconnecting blocks for Bell Canada's Inmate Telephone System (ITS) computer and modem in room # 112. Final cross connections, cabling and terminations in the CER room and room # 112 shall be performed by Bell Canada. Coordinate and confirm exact location of the outlet with Bell Canada on site.

.14 Provide new telephone outlet c/w two Cat 6 cables and RJ45 jacks and connect to BIX interconnecting blocks for connection between the Eventide Equipment and computer and modem on SIO Office Monitoring console in room # 112. Final cross connections, cabling and terminations in the CER room and room # 112 shall be performed by Cartel Systems. Coordinate and confirm exact location of the outlet on site.

.15 Provide new CCTV monitors (four in room # 108 and four in room #112), all Cat 6 and video cabling; total of four Network Video User Stations (NVUS) and KVM Switches over IP solution for a complete operational CCTV monitoring system. Refer to Specifications/Section 28 23 01 - CCTV Security Monitoring System for detailed requirements.

.16 Provide infrastructure for a wall mount Video Conference system (VC) in room # 104 including but not limited to;

- .1 Power, data and RJ45 microphone outlets as indicated on the drawings.
- .2 One 55" HD 1080p LED TV with side mounted external speakers and wall mount consoles for video conference equipment.
- .3 Refer to Specifications/Section 27 05 13 – Telecommunications Equipment and Cabling. Coordinate with Department Representative for detailed requirements of VC system.
- .4 The VC System with camera, microphone and computer shall be provided by Department Representative.

.17 Provide single operator control consoles (one in room#108 and one in Room #112) c/w wire ways, power and data/tel outlets and CCTV outlets as shown on the drawings. Refer to Specifications/Section 28 23 01 - CCTV Security Monitoring System for detailed requirements of CCTV system.

.18 Provide a universal wall mount cabinet with Fiber optic module, patch panel and network switch in room # 112. Refer to Specifications/Section 28 23 01 - CCTV Security Monitoring System for detailed requirements of wall mount cabinet.

1.6 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.

1.7 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.

1.8 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.

1.9 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 all aspects of its care and operation.

1.10 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.

1.11 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.

1.12 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.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

.2 Wording on nameplates and labels to be approved by departmental representative prior to manufacture.

.3 Allow for average of twenty-five (25) letters per nameplate.

.4 Identification to be English.

.5 Nameplates for junction boxes to indicate system and/or voltage characteristics.

.6 Nameplates for pull boxes to indicate system and type of cable.

1.13 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 347/600 V, and 120/208V wiring throughout.

1.14 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

1.15 MANUFACTURERS AND CSA LABELS

.1 Visible and legible after equipment is installed.

1.16 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.

1.17 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 Telephone outlets: 400 mm.

1.18 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

1.19 CONDUIT AND CABLE INSTALLATION

.1 Refer to drawings for type of conduit and cable to be used.

.2 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.3 Run parallel or perpendicular to building lines.

1.20 CUTTING, CORING AND PATCHING

.1 Make arrangements with General Contractor for all cutting, coring and patching in this work.

.2 Conduct ground penetrating radar (GPR) scans prior to coring or cutting existing concrete slabs or walls.

.3 Fill up all new conduit penetrations (and existing communication conduits – 6x103mm- from CER room to outside) with approved compound.

1.21 FIRESTOPPING

.1 Where cables or conduits pass through fire rated ceilings and fire rated walls, pack space full with a ULC approved firestopping system.

1.22 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.

.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 contract.

.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.

1.23 POWER INTERRUPTIONS

.1 Contractor shall work closely with Institutional personnel to arrange all interruptions of any portion of the existing electrical distribution systems.

.2 All interruptions to existing electrical distribution systems and shutdown of existing Panel boards in the contract shall be carried out outside normal working hours, or on weekends. Normal working hours of the Institution are considered to be 0730 to 1600 hours, Monday through Friday, except holidays.

.3 Contractor shall submit request for any power shutdown 10 working days prior to such power shutdown.
Request shall indicate start time of interruption and duration of interruption. Indicate in request exactly what buildings and/or systems will be affected by the requested power shutdown.

.4 No interruptions to power shall be carried out without the approval of the Departmental Representative.

1.24 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.

1.25 RECORD DRAWINGS

.1 Refer to Section 01 01 50 – General Instructions.

.2 Indicate conduit and cable runs, junction boxes and circuit numbers.

1.26 ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT

.1 Refer to Section 01 01 50 – General Instructions.

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 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.

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.

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 Abbotsford 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, wall mount CCTV monitors, communication and security cabinets, and 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 REFERENCES

.1 CSA C22.1-2015 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 EQUIPMENT (GENERAL)

.1 Clamps for grounding of conductor, size as required.

.2 System and circuit, equipment, grounding conductors, bare stranded copper, untinned, soft annealed, size as indicated.

.3 Insulated grounding conductors: green, type RW90.

.4 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Bonding jumpers, straps.
- .5 Pressure wire connectors.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install complete permanent, continuous, communications, equipment, grounding systems including, conductors, connectors, accessories, as indicated, to conform to requirements of departmental representative, and local authority having jurisdiction over installation.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Use mechanical connectors for grounding connections to equipment provided with lugs.

.5 Soldered joints not permitted.

.6 Provide a green insulated bond conductor in all conduits and ducts.

3.2 SYSTEM AND CIRCUIT GROUNDING

.1 Install system and circuit grounding connections to neutral of secondary 120/208V system.

3.3 EQUIPMENT GROUNDING

.1 Install grounding connections to typical equipment included in, but not necessarily limited to transformers, panels, telephone protection blocks, and communication cabinet.

3.4 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results - Electrical.

.2 Perform ground continuity and resistance tests using method appropriate to site conditions and to approval of departmental representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing equipment.

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.

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 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.

2.2 TELEPHONE CABINETS

.1 16 Gauge sheet steel, painted grey.

.2 Dimensions as indicated.

.3 Front Door; Continuous piano hinge, pad-lockable haspe.

.4 19 mm Plywood mounting backboard inside painted grey.

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 TELEPHONE CABINET INSTALLATION

.1 Install telephone cabinet as indicated.

.2 Install all equipment as indicated within cabinet.

.3 Ground cabinet to communications ground bar using #6 insulated ground wire in EMT conduit.

3.3 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.

.3 Install size 6 identification lamicoid on Telephone Cabinet.

END OF SECTION

1 General

1.1 REFERENCES

.1 CSA C22.1-2015 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 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 2015, 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 / RACEWAYS

.1 Underground ducts: rigid type DB2, size as indicated.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.3 Rigid steel conduit: to CSA C22.2 No. 45, galvanized steel, threaded.

.4 Flexible metal conduit: to CSA C22.2 No. 56, steel.

2.2 CONDUIT FASTENINGS

.1 One hole steel straps to secure surface conduits 50 mm and smaller.
.1 Two hole steel straps for conduits larger than 50 mm.

.2 Channel type supports for two or more conduits at 1.5 m on centre.

.3 Threaded rods, 6 mm diameter, to support suspended channels.

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 Install concrete encased DB2 ducts for electrical and communications systems as indicated and in accordance with CAN/CSA A23.1.

.2 All wiring to be in Electrical metallic tubing (EMT) type conduit unless otherwise indicated on drawings.

.3 Install wiring in threaded Rigid Steel Conduit where indicated on drawings.

.4 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.5 Conceal conduits above T-Bar Ceiling.

.6 Where conduits become blocked, remove and replace blocked section. Do not use liquids to clean out conduits.

.7 Bend conduit cold. Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 21 mm diameter.

.9 Dry conduits out before installing wire.

.10 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.

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 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 White toggle.

.3 Toggle operated fully rated for fluorescent lamps, and up to 80% of rated capacity of motor loads.

2.2 LED DIMMER SWITCHES

.1 Rating : 1200 VA, 120 V AC, single pole. CSA approved.

.2 Operating Range: 0-10 V

.3 Designed for dimmable LED driver/lamps.

.4 Dimmer to be compatible and as recommended by manufacturer of Type `A' luminaire supplied and installed.

.5 Manually operated with the following features:
- .1 Slide control dimmer, and ON/OFF Switch.
- .2 Building radio/TV interference filter.
- .3 White color.

2.3 RECEPTACLES

.1 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 White 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 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.

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 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker, quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40°C ambient.

.2 Common-trip breakers with single handle for multi-pole applications.

.3 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.

.4 Circuit breaker interrupting capacity: 25 kA (symmetrical), or as indicated.

.5 All new circuit breakers to match the existing panel boards.

2.2 THERMAL MAGNETIC BREAKERS

.1 Moulded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping and instantaneous tripping for short circuit protection.

2.3 COUNTERFEIT CIRCUIT BREAKERS

.1 Counterfeit circuit breakers are defined to mean any circuit breaker not authorized by the panel manufacturer.

.2 Submit a letter from the manufacturers authorized technical representative that all breakers supplied within this project are not counterfeit and they are authorized by the panelboard manufacturer for use in each panelboard.

3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

.2 Provide lamicoid nameplates as indicated.

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 DISCONNECT SWITCHES

.1 Non-fusible disconnect switches in CSA indoor / outdoor enclosures.

.2 Provision for padlocking in on and off switch positions by three locks.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Quick-make, quick-break action.

.5 ON-OFF switch position indication on switch enclosure cover.

3 Execution

3.1 INSTALLATION

.1 Install disconnect switches.

.2 Install size 2 lamicoid nameplate indicating system name, voltage and phase, or as indicated.

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.

.2 Submit shop drawings for all fixtures including complete photometric data. Photometric data must be produced by a recognized independent testing laboratory.

.3 Details of fixtures listed in specifications, may include features considered exclusive to one manufacturer. It is not the intent of this specification to limit the submission of fixtures to one manufacturer and other manufacturers may submit bids on equal equipment.

.4 All fixtures shall be delivered to the site completely assembled and in original cartons. Ensure the availability of a dry and protected storage space before delivery of fixtures.

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 LED LUMINAIRE – CEILING MOUNT

.1 General Description:
- .1 Dimmable, Light Emitting Diode (LED) surface-mount wraparound.
- .2 Lumen Output: 3000 L.
- .3 Color Temperature: 3500 K. CRI › 80.
- .4 LED Light Source shielded from direct view.
- .5 1219 mm long.
- .6 Baked white enamel finished.
- .7 Wrap-around (Front/Top/Bottom), white opal lens.
- .8 Surface mounted on ceiling.
- .9 CSA Approved.
- .10 Life expectancy: 50,000 hours.

.2 LED Driver:
- .1 Electronic.
- .2 0 – 10 V Dimming Driver, 10% minimum light output.
- .3 Input Wattage: Less than 30W.
- .4 Voltage: 120 V.

.3 Acceptable Products :

.1 Lithonia – STL4 30L EZ1 LP835
.2 Metalumen – SCE 2L35 1X4 SD W L4 1 S1 1
.3 LSI Industries Ltd. – DW LED SS CW UE EM

3 Execution

3.1 INSTALLATION

.1 Install Luminaires as indicated.

.2 Provide seismic restraints for all luminaires in accordance with Section 26 05 25 – Seismic Restraints.

.3 Connect to lighting circuits and switches as indicated.

.4 Protect all luminaires from construction dust and debris.

.5 Clean all lighting reflectors, lenses and other lighting surfaces at time of final cleaning.

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

.1 Unit equipment for emergency lighting in accordance with CSA C22.2 No.141-15 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.

.2 Output voltage: 12 V dc.

.3 Minimum Output wattage: self powered unit equipment c/w dual light heads mounted on an adjustable swivel, 2 high intensity tungsten, 12V, 9W.

.4 Operating time: 60 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, high intensity tungsten type, glare free lamps, 9 watts.

.11 Cabinet: wall mounted 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.

2.2 REMOTE HEADS

.1 N/A.

3 Execution

3.1 INSTALLATION GENERAL

.1 Install unit equipment c/w lamp heads as indicated.

.2 Direct heads as indicated.

.3 Test Battery Pack to ensure 60 minutes operating time on Battery. Submit test report to Departmental Representative indicating time 120V disconnected and time that Battery discharged and remote heads de-energized.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 26 05 00 – Common Work Results – Electrical.

.2 Section 26 05 28 – Grounding Secondary.

.3 Section 26 05 31 – Junction and Pull Boxes.

.4 Section 26 05 32 – Outlet Boxes and Conduit Boxes.

.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-C series standards – Commercial Building Telecommunications Standards.
.2 J-STD, 607-B – Commercial Building Ground and Bonding Requirements for Telecommunications.
.3 NECA/BICSI 568- 2006 – Standard for Installing Commercial Building Telecommunications Cabling.
.4 Canadian Electrical Code including all BC amendments and bulletins.
.5 National Building Code.

1.3 CONTRACTOR QUALIFICATIONS

.1 The cabling contractor shall be a certified systems vendor of Category 6 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 6 UTP cabling and components.

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 ETHERNET ROUTING SWITCH AND FIBER OPTIC TRANSCIEVER MODULE

.1 Ethernet Routing Switch - AL4900E04-E6:
ERS 4950gts-pwr+ 48 10/100/1000 802.3at & 2 sfp+ ports includes base software license, 1 1025w power supply, .5m ~~stack cable~~ na power cord

.2 Fiber Optic Transceiver Module - AA1419074-E6:
1-port 100Base-FX Small Form Factor Pluggable (mini-GBIC, connector type: LC) Please refer to product documentation to determine compatibility (RoHS compliant).

.3 SC to LC Fiber Optic Patch Cable (2m.).

2.2 VIDEO-CONFERENCE SYSTEM (VC)

.1 Display:
55” wall mount 1080p LED HD TV complete with support for external speakers on the sides.

.2 Speakers:
External side mount – Dual concentric driver, featuring a 100mm multi-fibre cone bass and a centrally mounted titanium dome wideband tweeter. Gloss Balack. Frequency respone 85Hz – 54kHZ.

.3 Speaker mounts:
Side channel speaker adaptor for mounting speaker at either side of the TV. Adjustable to fit speakers flush with side of TV. Expandable for TV’s up to 70” diagonal.

.4 Wall mount:
Fixed wall display mount. Suitable for TV size with support for height adjustment and lateral shift after installation. Built-in cable stand. Cable management with end caps. Enhanced security.

.5 Video Conference (VC) shelf:
Small shelf to hold VC camera. 200mm wide shelf to be placed above or below TV display to hold AV components. Lip on end ofshelf to prevent components from sliding off. Height extension range from 325mm – 485mm from center of TV to shelf. Height adjustable for 37 to 70” displays. TAA compliant.

.6 Component Shelf:
Medium size shelf to hold VC codec. For installation of AV equipment below the flat panel TV. Horizontal and vertical adjustments. Must be from the same manufacturer of VC shelf for compatibility. TAA compliant.

.7 PC shelf:
Medium size shelf to hold PC. To be installed at the bottom of the shelf stack to hold PC and other components from the same manufacturer. TAA compliant.

.8 The VC system camera, microphone and computer shall be provided and installed by Department Representative.

2.2 CATEGORY 6 UTP HORIZONTAL CABLE

.1 Four (4) pair, unshielded, twisted, solid copper core, 100 ohm, 24 AWG, Category 6, FT4 rated.

.2 Category 6 cable for both data and voice horizontal cabling. White color for voice cables and blue for data cables. Use Cat. 6 green cable for all security system cable runs unless otherwise indicated. Confirm color of the security cables with Department Representative.

.3 Transmission requirements shall conform to or exceed all applicable sections of the TIA/EIA 568-C current specifications and addendums for Category 6 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.

2.3 CATEGORY 6 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 6 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.

2.4 IDC CONNECTORS

.1 Rail mounted, Insulation Displacement Type (IDC) termination connector strips.

.2 Category 6 for all horizontal cabling to set run, wall outlets.

.3 6 x 4-pair connection strips for all horizontal cables.

.4 Connection strips to suit existing mounting rails in existing CER Room.

2.5 DATA PATCH PANELS

.1 Existing “AMP” NORDX patch panel suitable for individual snap-type modular jacks.

2.6 MODULAR VOICE AND DATA JACKS

.1 For installation on face plates.

.2 Non-keyed, 4 pair, 8P/8W modular jacks, Category 6, 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.

2.7 CATEGORY 6 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 Voice horizontal cable runs shall use 8P/8W female RJ45 components at the faceplate end and direct IDC termination in the Telephone Cabinet.
- .2 Data horizontal cable runs shall use 8P/8W female RJ45 components at both ends.

.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 6 Cabling”.
- .3 Insulation Displacement Type (IDC), modular, non-keyed.

.5 Connectors at outlet end; install in coverplate.

2.8 HORIZONTAL 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.

2.9 INDOOR MULTI-PAIR TELEPHONE CABLE

.1 Pairs as indicated, twisted, solid copper core, 100 ohm, 24 AWG, Category 3, FT4 rated.

.2 Transmission requirements shall conform to or exceed all applicable section of the TIA/EIA 568 current specifications and addendums.

3 Execution

3.1 CATEGORY 6 UTP HORIZONTAL CABLE INSTALLATION

.1 Install each cable in one continuous run from the IDC Connector to the jack on the faceplate. Breaks or spliced not allowed.

.2 No single cable run shall exceed 90 metres in length, measure from the terminations on the 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 Cabinet.

.7 Install all UTP cables according to the standards for a Category 6 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 and patch panel.

.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 6 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 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:

.6 No marginal passes or conditional passes will be accepted.
.7 Provide paper copy of all test results for incorporation into Maintenance Manuals specified in Section 01 01 50 – General Instructions.

3.6 CATEGORY 6 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 26 05 00 – Common Work Results – Electrical.

1.2 STANDARDS AND CODES

.1 Comply with latest issues and all addendums of the following standards:
  .1 TIA/EIA, 568-C series standards – Commercial Building Telecommunications Standards.
  .2 NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling.
  .3 Canadian Electrical Code including all BC amendments and bulletins.
  .4 National Building Code.

1.3 CONTRACTOR QUALIFICATIONS

.1 The Fibre Optic Infrastructure shall be certified by the cable manufacturer. The cabling shall be installed by a contractor designated and trained by the manufacturer of being capable to do so and shall provide written confirmation of this fact.

.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 the Fibre Optic cabling and related components installed in this contract.

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 FIBRE OPTIC CABLE

.1 Multi Mode;

  .1 62.5 micron core, 125 micron cladding, number of fibres strands as indicated. Tight-buffered 900 micron, or loose-tube construction, fan-out kit as required.

.2 Indoor / Outdoor type, (OS1/OS2).

.3 Water-blocked construction.

.4 All dielectric cable construction.

.5 Compliance: TIA/EIA 568-B.3.

2.2 FIBER OPTIC PATCH CABLES

.1 Fibre Core and Cladding: identical to installed indoor/outdoor cable.

.2 Transmission Properties: match installed indoor/outdoor cable's and electrical specifications.

.3 Configuration:
.1 Dual fibre, single jacket, with breakout assemblies with separate bayonet connectors at each end.
.2 Male LC type male connectors compatible with Patch Panel ports.
.3 Provide 24 x 610mm long Patch Cables. Confirm length with Departmental Representative prior to ordering.

2.3 FIBRE OPTIC PATCH PANELS

.1 Suitable for a minimum of 2 x 6 ports as required for Indoor/Outdoor Fibre strands to be terminated.

.2 Modular with 2 x 6 port adaptor plates and blanks as required.

.3 LC type connectors complete with dust covers.

.4 Wall mounted steel enclosure.

.5 Two section Patch Panel with separate hinged doors for Splice Tray Holder for Outside Plant Cable and Patch Cable Sections.

.6 Lockable doors complete with 2 keys.

.7 Nominal Dimensions: 305 x 258 x 60 mm.

2.4 INDOOR / OUTDOOR CABLE LABELS

.1 Size 7, lamicoid nameplate in accordance with Section 26 05 00.

.2 Tie-wrap nameplate to cable using two uv resistant tie-wraps.

.3 All indoor/outdoor cable nameplates to have a unique identification indicating;
.1 Type of Cable: 12 Strand Fibre Single (or Multi) Mode
.2 Use of Cable: CCTV System
.3 Building Origin Location: Room #1 (Example)
.4 Building Termination Location: Room #2 (Example)

.4 Wording on all nameplates to be approved by Departmental Representative prior to manufacture.

1 Execution

3.1 INDOOR / OUTDOOR FIBER OPTIC CABLE INSTALLATION

.1 Install indoor/outdoor cable in new conduits within or outside of the building as indicated.

.2 Install lamicoid nameplate cable label tie-wrapped to each Fiber Optic Cable at each end.

3.2 FIBRE OPTIC PATCH PANEL INSTALLATION

.1 Install Fiber Optic Patch Panel as indicated.

.2 Label each fiber port identifying the room that the fiber terminated originates from.

.3 Labels to be bold face laser quality printed labels, black print on white background.

3.3 FIBRE OPTIC CABLE TESTING

.1 Perform both insertion loss tests and Optical Cable Delay Reflectometer (OTDR) tests on all fibers to verify performance of cable.

.2 Perform testing as clarified and referenced in TIA TSA-140 “Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems”.

.3 Provide launch fibers at both ends of cable under test.

.4 Ensure each component/event loss does not exceed values in TIA/EIA 568-B Standards.

.5 Certify link for polarity, insertion loss, optic return loss, and length.

.6 Provide trace of OTDR testing.

.7 Provide paper copy of all test results for incorporation into Maintenance Manuals.

3.4 FIBRE OPTIC CABLE DOCUMENTATION AND CERTIFICATION

.1 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 In the event that the Contractor is no longer in business, the full certification remains valid and will be cover by the manufacturer.

.5 The installed fiber optic 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.

END OF SECTION

1 General

1.1 EXISTING IP CCTV SYSTEM

.1 The existing IP CCTV System consists of the following:
- .1 "Genetec" Version 4.8 operating System.
- .2 Virtual server/storage; "Pivot3 vSTAC" storage appliances located in CER.
- .3 Various Network User Stations (NVUS) located throughout Institution.
- .4 "Planet Layer 3" Network Switches.
- .5 "Planet" POE Injectors.
- .6 In excess of 230 Cameras. Majority of the cameras are "Sony" Models; SNC-DH120T and SNC-DH160T.

1.2 SCOPE OF WORK

.1 Work under this contract includes but is not limited to;

- .1 Provide a modular pre-engineered sit/stand monitoring console in room # 112,
- .2 Provide a modular pre-engineered office monitoring console in room # 108,
- .3 Provide a modular video monitor wall in room # 112,
- .4 Provide Two Industrial wall mount CCTV display LED monitors (60") c/w tilt able wall support in room # 108,
- .5 Provide Two Industrial CCTV display LED monitors (42") on video monitor wall in room # 112,
- .6 Provide Four Industrial CCTV display LED monitors (24") – mounted on the consoles,
- .7 Provide Four Network Video User Stations (NVUS), and install in the existing CER room and remote all the monitors. I/O devices shall be via a fiber system.
- .8 Provide Keyboard-Video-Mouse (KVM) over IP solution c/w video outputs (DVI-D or HDMI); video cables and Cat 6 cables/adapters; and software packages for remote operation of four NVUS stations at the control consoles. Each NVUS shall be monitored on two display monitors with one keyboard/mouse (two keyboards/mouse on each console).
- .9 Provide Fiber Optic Network Switches (total of 2) c/w patch panels / ports and Fiber Optic Interface Modules in wall mounted cabinet in room # 112 and in the IT cabinet in CER room, Building M2a.
- .10 Provide universal wall mount fiber optic cabinet for Fiber optic patch panel and network switch in room # 112. Exact location to be confirmed on site.
- .11 Provide CCTV monitor outlets c/w conduits and video cables to the KVM switch over IP, as indicated on the drawings.
- .12 Provide 12 Strand Indoor/Outdoor Fiber Optic cable c/w conduits from CER room to Room # 112 terminated in the new Fiber Optic Patch panel.
- .13 Submit Maintenance Handover Report and all test reports for all new Monitors, Cat 6 UTP cabling.
- .14 Provide minimum 4 hrs training for operator and one day training for the electronic maintenance teams complete with handouts and sign-in sheets.

1.3 CONTRACTOR QUALIFICATIONS

.1 The contractor and all personnel performing any work related to this Section shall have successfully completed all training and received necessary certification from “Genetec-Omnicast”.

.2 The contractor and all personnel performing any work related to this Section shall have successfully completed all training and received necessary certification for “Pivot3, Vstac” Network Video Recorder equipment.

.3 Upon request by Departmental Representative, provide certified documentation of qualifications described above. Failure to meet or provide such documentation will be the basis for rejection of sub-contractor proposed for work under this section.

1.4 STANDARDS AND CODES

.1 TIA/EIA, 568-C series standards – Commercial Building Telecommunications Standards.

.2 NECA/BICSI 568-2006 – Standards for Installing Commercial Building Telecommunications Cabling.

.3 Canadian Electrical Code including all BC amendments and bulletins.

1.5 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Section 01 01 50 – General Instructions.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 01 50 – General Instructions.

1.7 ENVIRONMENTAL PROTECTION

.1 Refer to Section 01 01 50 – General Instructions.

2 Products

2.1 CONSOLES

.1 Sit / Stand Console: (Single Operator sit/stand console with three monitor mounts – (724mm – 1030mm H x 2083mm W x 1032mm D). A system capable of supporting specified electronics;

.1 The system shall be comprised of end frames with integrated Linak DL6 electric-lift legs (double column – min. 260kg capacity no substitutes), horizontal stringers and decorative end panels to create the base structure.

.2 The console shall be supplied with electric actuators and cable followers to allow the console to move up and down with the touch of a button. The electric lifts legs shall be operating from a 120V power source complete with min. three programmable height settings and provide quick & easy work surface adjustment from 730mm – 1130mm high.

.3 The system shall also feature two linear wire trays for separating high and low voltage cables that are accessible by a hinged cover just below the work surface in the base of the console.

.4 Offer a black anodized aluminum track system on the worksurface capable of supporting a wide variety LED monitor arrays (for three monitors), possible lighting options and phone mounting options, while also providing easy adjustment along the length of the console. The monitor supports shall be 723mm high and shall be mounted to aluminum track with 4 spring drop-in T-nuts.

.5 The aluminum track shall be located on the worksurface 762mm from the front edge of the work surface.

.6 The system shall have a minimum 29mm thick MDF core with laminate work surface. The work surface shall be not less than 990mm deep overall and shall include a 44mm deep beveled edge covering the work surface's entire front width (1830mm chase with frames – no corners). The front beveled edge shall be clad with a black urethane. It shall not be removable in any way and mechanically bonded to the substrate material for durability. (no attachment by using an aluminum substructure)

.7 The console shall be provided with minimum of four grommets, one multi-outlet power strip with minimum six power outlets, six data outlets and one telephone outlet. Colour of the console shall be dark Gray.

.8 The assembly of the console shall be accomplished without the need for either welding or carpentry work.

.9 The console shall house minimum two bottom shelves to help store products inside the console. It will have minimum four doors to have the ability to store CPU shelves or folder bins. The doors shall not require the use of a castor system to support the weight of the door. The doors shall be made of corrugated metal for durability.

.10 The console doors shall use a spring and pin hinge system for easy quick release removal from the console during equipment maintenance.

.11 The console shall comply with Electronic Industry Association (EIA) specifications for rack mounting ANSI/EIA standard RS-310

.2 Control Console: (Single Operator console with three monitor mounts – (724mm H x 1372mm W x 1111mm D). A system capable of supporting specified electronics;

.1 The system shall be comprised of end frames with horizontal stringers and decorative end panels to create the base structure.

.2 The system shall also feature two linear wire trays for separating high and low voltage cables that are accessible by a hinged cover at the worksurface level.

.3 Offer a black anodized aluminum track system at the rear of the console capable of supporting a wide variety LED monitor arrays (for three monitors), possible lighting options and phone mounting options, while also providing easy

adjustment along the length of the console. The monitor supports shall be 723mm high and shall be mounted to aluminum track with 4 spring drop-in T-nuts.

.4 The aluminum track system shall be 100mm lower than the level of the work surface to provide optimal viewing around the environment of the room and beyond.

.5 The system shall have a minimum 29mm thick MDF core with laminate work surface. The work surface shall be not less than 508mm deep overall and shall include a 44mm deep beveled edge covering the work surface's entire front width. The front beveled edge shall be clad with a black urethane. It shall not be removable in any way and mechanically bonded to the substrate material for durability. (no attachment by using an aluminum substructure)

.6 The console shall be provided with multi-outlet power strip with minimum six power outlets, six data outlets and one telephone outlet. Colour of the console shall be dark Gray.

.7 The assembly of the console shall be accomplished without the need for either welding or carpentry work.

.8 The console shall house minimum two bottom shelves to help store products inside the console. It will have minimum four doors to have the ability to store CPU shelves or folder bins. . The doors shall not require the use of a castor system to support the weight of the door.

.9 The doors shall be made of corrugated metal for durability. The console doors shall use a spring and pin hinge system for easy quick release removal from the console during equipment maintenance.

.10 The console shall comply with Electronic Industry Association (EIA) specifications for rack mounting ANSI/EIA standard RS-310.

2.2 VIDEO MONITOR WALL

.1 A modular video monitor wall capable of supporting the specified monitors;

.1 The system shall be comprised of exterior frames and interior supports fabricated from lightweight, high-strength extruded "T-slotted" aluminum with smooth black anodized finish. Minimum dimensions of the monitor wall frame shall be: (2300mm H x 2100mm W).

.2 The system shall feature the necessary pivot and tilt mounts required to support and adjust the specified monitors (2 x 42").

.3 The video monitor wall shall include two large LED monitor mounts, multi-outlet power strip and cable management.

.4 Self-supporting skeleton framework shall consist of exterior frames (380mm x 762mm) and interior supports (380mm x 380mm) constructed of black anodized 6105-T5 extruded aluminum.

.5 All components within the system shall be of a pre-engineered modular construction,(i.e; constructed from a series of independent sectional compartments).

.6 All hardware needed for monitor wall assembly and monitor mounts shall be provided.

.7 Video Monitor wall shall have quick release adjustable brackets to allow moving the adjustable uprights where needed. It shall come with multiple raceway channels for wire management.

2.3 INDUSTRIAL DISPLAY MONITORS

.1 42", HD 1080p (1920x1080) CCTV Industrial LED Display monitors (total of two) and mounting brackets suitable for installation on the Video Wall.

.2 60", HD 1080p (1920x1080) CCTV Industrial LED Display monitors (total of two) c/w vertically tilt able wall mounts.

.3 24", HD 1080p (1920x1080) CCTV Industrial LED Display monitors (total of four) suitable for installation on the console.

.4 Power consumption of monitors shall be less than 200W.

2.4 NETWORK VIDEO USER STATION (NVUS)

.1 Provide four new NVUS's for the existing Genetec Omnicast System version 4.8 c/w Genetec Licenses. The new NVUS's must meet the following specifications;

1. 4th Generation Intel® Core™ i7-4770 or better
2. 16 GB of RAM or better
3. 64 bit operating system
4. 240 GB Solid State Drive for OS and Security Center applications
5. GbE network interface card
6. 2 x NVIDIA® GeForce® GTX 960 4 GB video card
7. Dual power supply
8. Minimum 5 year warranty
9. Rack mounted with rails

2.5 KEYBOARD-VIDEO-MOUSE (KVM) SWITCH OVER IP (Performance specification)

.1 Provide KVM Switches over IP for remote operation of four Network Video User Stations (NVUS) located in CER room # 136 and video outputs for total of eight CCTV monitors located in rooms # 108 and #112 as indicated on the drawings.

.2 KVM switches over IP shall have extensions for USB ports (for Keyboard, mouse and spare thumb drive), video outputs (DVI-D or HDMI) to monitors and ports required for Cat 6 and Fiber Optic connections from KVM switch to the NVUS.

.3 KVM over IP solution shall have software to provide capability of changing the CPU by moving the mouse (cursor) from one screen to the other.

.4 Simultaneous support for minimum two users and uninterrupted remote access. Two KVM switches for each console and each KVM switch shall control maximum two monitors.

.5 Provide necessary software package for enabling one user to control two NVUS units at the office console and sit/stand monitoring console.

.6 Minimum Video resolution shall be 1920 x 1080 @ 60Hz.

.7 Rack or shelf mounted.

2.6 WALL MOUNT CABINET FOR FIBER OPTIC PATCH PANEL & NETWORK SWITCH

.1 Wall-mount cabinet to secure and organize 10U rack height of 48cm rack equipment up to 52cm. deep,
.2 Maximum load capacity of 90kg,
.3 Swing away from wall on hinge for easy back-door access,
.4 Lockable front door with shatter-resistant clear acrylic window,
.5 Locking steel cabinet vented at sides, top and bottom,
.6 Ports with removable covers,
.7 Easily adjustable vertical mounting rails,
.8 Grounding lugs for front and back door frames,
.9 Approvals: UL/CSA 60950-1; EIA-310-D, RoHS

2.7 CATEGORY 6 UTP CABLE (For all CCTV connections)

.1 Four pair, unshielded twisted, solid copper core, 100 ohm, 24 AWG, Category 6, FT4 rated for new CCTV industrial grade display monitors.
.2 Green color outer jacket.
.3 Transmission requirements shall conform to or exceed all applicable section of the TIA/EIA 5668-B current specifications and addendums for Category 6 cable and components.

2.6 CATEGORY 6 UTP CABLE CONNECTORS

.1 8P/8W, Male / Female, RJ45, Category 6 jack at monitor with HDMI adaptor.
.2 Suitable for 24 AWG, solid copper wire.
.3 Meet or exceed technical criteria outlined in TIA/EIA 568, “Transmission Performance Specifications for 4-Pair, 100 ohm, Category 6 Cabling.
.4 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 cable.

2.7 CATEGORY 6 UTP PATCH CORDS

.1 Four (4) pair, unshielded twisted, stranded copper core, 100 ohm, 24 AWG, Category 6.
.2 Green color outer jacket. Length as required.
.3 Transmission requirements shall conform to or exceed all applicable section of the TIA/EIA 568-B current specifications and addendums for Category 6 cable and components.

2.8 CABLE LABELS

.1 Bold face laser quality printed labels, black print on white background. No hand written labels will be accepted.
.2 Self adhesive, one piece label and clear cover wrapped around cable.
.3 Wording on labels to be approved by Departmental Representative prior to manufacture.

3 Execution

3.1 INSTALLATION OF CONSOLES, CABINET AND CCTV MONITORS

.1 Install control console in room#108 and sit/stand console in room#112 in Building M2a, as indicated in the plans.
.2 Install video monitor wall c/w 2 x 42" industrial display monitors per manufacturer's instructions.
.3 Install 2 x 60" display monitors on the wall in room # 108 complete with vertical tilt able mounts per manufacturer's instructions.
.4 Install 4 x 24" CCTV display monitors and other electronic equipment on the consoles as indicated (two on each console).
.5 Install Cat 6 UTP cables / patch cords c/w RJ45 jacks and HDMI adaptors for CCTV monitors and control equipment on the console from the relevant outlets and Fiber Optic Patch panel in room # 112 as indicated in the plans.
.6 Install fiber optic cabinet on the wall c/w fiber optic patch panel, fiber module and network switch in room # 112.
.7 Locations of the new monitors are considered to be approximate. Contractor shall arrange a site visit with Departmental Representative prior to rough-in of associated conduits to determine exact mounting locations. Allow minimum of 2 hours for determining locations of the monitors.
.8 Change locations of monitors at no extra cost or credit, providing distance does not exceed 3 m, and information is given prior to rough-in of associated conduits.
.9 All monitors shall be adjusted on site to provide acceptable view as directed by Departmental Representative.

3.2 INSTALLATION OF CATEGORY 6 UTP CABLING

.1 Provide new Category 6, UTP cable to new monitors in conduit as indicated.
.2 Terminate all new Category 6, UTP cables on new Fiber Optic Patch Panel as indicated.
.3 Label both ends of all Category 6, UTP Cables indicating Monitor I.D. and location. Wording on labels to be approved by Departmental Representative prior to manufacture.
.4 Provide 3 m of slack cable at Patch Panel end of cable. Neatly coil slack cable to side of existing CCTV Cabinet.

3.3 INSTALLATION OF CATEGORY 6 UTP PATCH CORDS

.1 Provide one new Category 6 UTP Patch Cord for each monitor on the Fiber Optic network switch.

3.4 CATEGORY 6 UTP CABLE TESTING

.1 Test all cables with a Cat 6 certification analyzer that comply with all TIA/ISO standards.
.2 No marginal passes or conditional passes will be accepted on these cables.

.3 Replace entire length of cable for any cables that do not pass tests outlined in the specification.
.4 Provide electronic and paper copy of all test results for incorporation into Maintenance Manuals specified in Section 01 01 50 – General Instructions.

3.5 PROGRAMMING MONITORS INTO THE EXISTING CCTV SYSTEM

.1 Contractor shall program monitors into the existing “Genetec” operating system as required to incorporate new monitors into the system as directed by Departmental Representative.
.2 Contractor shall program the existing “Genetec” operating system for viewing on new Network Video User Stations as directed by Departmental Representative.
.3 All programming to the existing system shall be carried out by personnel who have successfully completed all training and received necessary certification from “Genetec”.

3.6 MAINTENANCE HANDOVER REPORT

.1 Submit a Maintenance Handover Report as per Appendix `A’ of these Specifications.
.2 Maintenance Handover Report to be completed in its entirety. Complete project information, Warranty Details, Distribution Details and Training Details.
.3 Include a list of all equipment itemizing the locations, quantity, model number, serial number and latest revision level of all installed equipment.
.4 Insert copy of Maintenance Handover Report in each copy of Maintenance Manuals.
.6 Provide Electronic Copy of Maintenance Handover Report in Word format.

END OF SECTION

APPENDIX `A'

CORRECTIONAL SERVICE OF CANADA
TECHNICAL SERVICES BRANCH
ELECTRONICS SYSTEMS
MAINTENANCE HANDOVER REPORT

INSTITUTION: **DATE:**

SYSTEM/EQUIPMENT:

APPLICABLE CONTRACT NO:
PWGSC PROJECT NO:
SPECIFICATIONS:

EQUIPMENT SUPPLIER (NAME AND ADDRESS):

SUPPLIER CONTACT (NAME AND TELEPHONE):

WARRANTY DETAILS:

Expiry date on materials/parts:
Expiry date on installation:
Expiry date on factory labour:

Travel & living expenses during the warranty period:

chargeable to CSC ☐

not chargeable to CSC ☐

Equipment transportation costs are paid by CSC for:

sending to the supplier ☐

returning from the supplier ☐

Negotiated rates for emergency repairs at site due to misuse/abuse during warranty period are as follows:

Not applicable.

Negotiated rates for labour at site after warranty period are as follows:

Not applicable.

APPENDIX `A'

DEFICIENCIES:

None remain ☐

List attached ☐

DOCUMENTATION:

Maintenance manual:

Supplied ☐

Due by ;

As-built drawings, cabling and wiring diagrams:

Supplied ☐

Due by ;

Acceptance test results:

Supplied ☐
Due by ;

DISTRIBUTION OF DOCUMENTATION:

1 copy to CESM sent on:
1 copy to RATIS/RTEO sent on:
2 copies to institution sent on:

SPARES:

All delivered ☐
Delivery to be completed by ;

EQUIPMENT LIST:

See attached list. ☐

MAINTENANCE TRAINING:

Completed ☐
Scheduled for ;

SIGNATURE: Project Manager

DISTRIBUTION: CESM, NHQ
RATIS/RTEO, RHQ

APPENDIX B

ARCADIS Design & Consultancy for natural and built assets

Public Works and Government Services Canada

Hazardous Materials Assessment for the Matsqui Institution Building M2A Security Intelligence Office (SIO)/Administrative Office

33344 King Road,
Abottsford, British Columbia

December 8, 2016

702358-022

Kelly Smith, B.Sc.

Senior Project Manager

Wayne J. Cormack, M.Eng., CIH

Senior Consultant

HAZARDOUS MATERIALS ASSESSMENT FOR THE MATSQUI INSTITUTION BUILDING M2A SECURITY INTELLIGENCE OFFICE (SIO)/ADMINISTRATIVE OFFICE, 33344 KING ROAD, ABOTTSFORD, BRITISH COLUMBIA

Prepared for:

Ms. Sherry Steele

Public Works and Government Services Canada

Environmental Services

401 – 1230 Government Street

Victoria, British Columbia

V8W 3X4

Prepared by:

Arcadis Canada Inc.

121 Granton Drive, Suite 12

Richmond Hill, Ontario L4B 3N4

Tel 905 882 5984

Fax 905 882 8962

Our Ref.:

702358-022

Date:

December 8, 2016

CONTENTS

1 INTRODUCTION 1-1

1.1 Scope of Work 1-1

2 BACKGROUND INFORMATION ON HAZARDOUS MATERIALS 2-1

2.1 Asbestos 2-1

2.2 Lead 2-2

2.3 Mercury 2-3

2.4 Silica 2-4

2.5 PCBs 2-4

2.6 Ozone-Depleting Substances and Halocarbons 2-5

2.7 Rodent Droppings 2-6

2.8 Mould 2-6

3 METHODOLOGY 3-1

3.1 Asbestos 3-1

3.2 Lead 3-1

3.3 Mercury 3-1

3.4 Silica 3-1

3.5 PCBs 3-1

3.6 Ozone-Depleting Substances and Halocarbons 3-1

3.7 Rodent Droppings 3-2

3.8 Mould 3-2

4 RESULTS AND DISCUSSION 4-1

4.1 Asbestos 4-1

4.2 Lead 4-3

4.3 Mercury 4-4

4.4 Silica 4-5

4.5 PCBs 4-5

4.6 Ozone-Depleting Substances and Halocarbons 4-5

4.7 Rodent Droppings 4-5

4.8 Mould 4-5

5 RECOMMENDATIONS 5-1

6 USE AND LIMITATIONS OF HAZARDOUS MATERIALS SURVEY REPORT 6-1

TABLES

Table 4.1. Summary of Results of Analyses of Bulk Samples for Asbestos Content 4-1

Table 4.2. Summary of Asbestos-Containing Materials and Approximate Quantities 4-3

Table 4.3 Summary of Results of Analyses of Paint Samples for Lead Content 4-4

APPENDICES

A Floor Plans

B Laboratory Reports

C Photographs

1 INTRODUCTION

Arcadis Canada Inc. (Arcadis) was retained by Public Works and Government Services Canada (PWGSC) Pacific Region, on behalf of Correctional Service Canada (CSC), to conduct a hazardous materials assessment in designated areas of the Matsqui Medium Institution, Building M2A Security Intelligence Office (SIO)/Administrative Office, located at 33344 King Road, Abbottsford, British Columbia.

It is our understanding that the project includes renovation of the west portion of the main floor to accommodate office renovations.

Floor plans of the Building M2A Security Intelligence Office (SIO)/Administrative Office are provided in Appendix A. It should be noted that Room 101 was not accessible at the time of our site inspection. It is our understanding that the room is utilized exclusively by the dog handler, and the escort was unable to obtain a key for entry.

The survey was undertaken to report on the presence or suspected presence of readily observable hazardous materials.

1.1 Scope of Work

The scope of work for our investigation included:

- review of existing information provided by PWGSC;
- conducting a hazardous building materials assessment of the Building M2A study area (including but not limited to assessment of asbestos-containing materials, lead, silica, mercury, PCB-containing equipment, halocarbon-containing equipment, rodent droppings and mould);
- obtaining representative bulk samples of materials which could contain asbestos, and paint chip samples;
- laboratory analyses of bulk samples for asbestos content and analysis of paint chip samples for lead content; and
- preparation of a report outlining the findings of the investigation.

Mr. Kenny Luong visited the site on November 9 and 10, 2016 to conduct the hazardous materials survey.

2 BACKGROUND INFORMATION ON HAZARDOUS MATERIALS

Canada Labour Code

Requirements related to disclosing the presence of hazardous substances (including designated substances) in federal government buildings are specified in Part II of the Canada Labour Code, sections 124(1)y and 125(1)Z.14, which state that employers shall:

- "ensure that the activities of every person granted access to the work place do not endanger the health and safety of employees [Section y]; and
- take all reasonable care to ensure that all of the persons granted access to the workplace, other than the employer's employees, are informed of every known or foreseeable health or safety hazard to which they are likely to be exposed in the workplace. [Section Z.14]".

When construction or redevelopment work is undertaken by a company whose primary activity is construction or redevelopment work at the site of a federally-regulated employer, the provincial health and safety laws apply. The British Columbia Workers Compensation Act and Occupational Health and Safety Regulations (B.C. Reg. 296/97) would therefore apply to any construction work undertaken at the subject site.

2.1 Asbestos

Asbestos has been widely used in buildings, both in friable applications (materials which can be crumbled, pulverized or powdered by hand pressure, when dry) such as pipe and tank insulation, sprayed-on fireproofing and acoustic texture material and in non-friable manufactured products such as floor tile, gaskets, cement board and so on. The use of asbestos in friable applications was curtailed around the mid-1970s. The use of asbestos in certain non-friable materials continued beyond the mid-1970s.

Control of exposure to asbestos is governed in British Columbia by B.C. Reg. 296/97 – Occupational Health and Safety Regulations. The WorkSafe BC publication *Safe Work Practices for Handling Asbestos* provides additional guidance.

B.C. Reg. 296/97 states that "asbestos-containing material" means the following:

(a) a manufactured article or other material, other than vermiculite insulation, that would be determined to contain at least 0.5% asbestos if tested in accordance with one of the prescribed methods.

(b) vermiculite insulation that would be determined to contain any asbestos if tested in accordance with the prescribed EPA method.

B.C. Reg. 296/97 prescribes certain requirements for asbestos management in buildings.

For on-going asbestos management in buildings, employers are required to:

- develop and implement an exposure control plan if a worker is or may be exposed to potentially harmful levels of asbestos;
- prepare an inventory (i.e., asbestos survey report) of all asbestos-containing materials in the workplace; keep the inventory at the workplace and keep the inventory current;
- ensure that a risk assessment is conducted by qualified person on asbestos-containing material identified in the inventory, with due regard for the condition of the material, its' friability, accessibility and likelihood of damage, and the potential for fibre release and exposure of workers;
- ensure that before a work activity that involves working with or in proximity to asbestos-containing material begins, the work activity is assessed by a qualified person and classified as a low, moderate or high risk activity;
- ensure that all friable asbestos-containing materials in the workplace are controlled by removal, enclosure or encapsulation so as to prevent the release of airborne asbestos fibre;
- prohibit any work that would disturb asbestos-containing material unless necessary precautions have been taken to protect workers;
- ensure that procedures for handling or using asbestos-containing material prevent or minimize the release of airborne asbestos fibres;
- ensure that the procedures for control, handling or use of asbestos are in accordance with procedures acceptable to the board;
- provide training for staff who are at risk of exposure to asbestos;

"Waste asbestos" is classified as a "hazardous waste" and is defined in the British Columbia Hazardous Waste Regulation (B.C. Reg. 63/88) as "a waste containing friable asbestos fibres or asbestos dust in a concentration greater than 1% by weight". Section 40, Part 6 of the regulation provides requirements for management of asbestos waste.

2.2 Lead

Lead is a heavy metal that can be found in construction materials such as paints, coatings, mortar, concrete, pipes, solder, packings, sheet metal, caulking, glazed ceramic products and cable splices. Lead has been used historically in exterior and interior paints.

B.C. Reg. 296/97 prescribes specific requirements for control of workplace exposure to lead. Employers are responsible for developing and implementing an exposure control plan if workers are or may be exposed to lead. The WorkSafe BC publication "Lead-Containing Paints and Coatings, Preventing Exposure in the Construction Industry" provides guidance in the measures and procedures that should be followed when handling lead-containing paints and coatings during construction projects and states the following:

- "Information from the U.S. Occupational Safety and Health Administration (OSHA) suggests that the improper removal of lead paint containing 600 mg/kg lead results in airborne lead concentrations that exceed half of the exposure limit. This would trigger the requirement for an Exposure Control Plan (ECP) and safe work procedures.
- Lead concentrations as low as 90 mg/kg may present a risk to pregnant women and children. Any risk assessment should include for the presence of high risk individuals within the workplace."

The *Surface Coating Materials Regulations* made under the *Hazardous Products Act* (SOR/2005-109) sets a maximum concentration of total lead of 90 mg/kg (0.009 percent or 90 parts per million) for surface coating materials, including paints, effective 21 October 2010. This criterion level applies to the sale and importation of new surface coating materials.

In addition, under the *Hazardous Waste Regulation* (B.C. Reg. 63/88, including amendments up to B.C. Reg. 63/2009, April 1, 2009), identified lead-based paints (LBPs) must also undergo Toxicity Characteristic Leachate Properties (TCLP) testing to determine disposal procedures. The acceptable TCLP limit for disposal of LBPs is less than 5 milligrams per litre (mg/L). If an identified LBP exhibits a TCLP result of less than 5 mg/L, the paint is not considered a hazardous material and may be disposed as construction waste.

The National Plumbing Code allowed lead as an acceptable material for pipes until 1975 and in solder until 1986.

2.3 Mercury

Mercury has been used in electrical equipment such as alkaline batteries, fluorescent light bulbs (lamps), high intensity discharge (HID) lights (mercury vapour, high pressure sodium and metal halide), "silent switches" and in instruments such as thermometers, manometers and barometers, pressure gauges, float and level switches and flow meters. Mercury-containing lamps, the bulk of which are 1.22 m (four foot) fluorescent lamps contain between 7 and 40 mg of mercury each. Mercury compounds have also been used historically as additives in latex paint to protect the paint from mildew and bacteria during production and storage.

The intentional addition of mercury to Canadian-produced consumer paints for interior use was prohibited in 1991. Mercury may have remained in paints after 1991, however, as a result of impurities in the paint ingredients or cross-contamination due to other manufacturing processes. The *Surface Coating Materials Regulations* made under the Hazardous Products Act set a maximum total mercury concentration of 10 mg/kg (0.001 percent) for surface coating materials (including paint). This criterion level applies to the sale and importation of new surface coating materials.

Mercury-containing thermostats and silent light switches are mercury tilt switches which are small tubes with electrical contacts at one end of the tube. A mercury tilt switch is usually present when no switch is visible. Mercury switches often have the word "TOP" stamped on the upper end of the switch, which is visible after removing the cover plate. If mercury switches are to be removed, the entire switch should be removed and placed into a suitable container for storage and disposal.

Waste light tubes generated during renovations or building demolition and waste mercury from equipment must either be recycled or disposed of in accordance with the requirements of B.C. Reg. 63/88 – *Hazardous Waste Regulation*.

Waste mercury is classified as "leachable toxic waste" if the extraction criterion value prescribed in Table 1 of Schedule 4 of the regulation is exceeded. Waste mercury from mercury switches or gauges should be properly collected and shipped to a recycling facility or disposed of as a hazardous waste. Removal of mercury-containing equipment (e.g., switches, gauges, controls, etc.) should be carried out in a manner which prevents spillage and exposure to workers.

2.4 Silica

Silica exists in several forms of which crystalline silica is of most concern with respect to potential worker exposures. Quartz is the most abundant type of crystalline silica. Some commonly used construction materials containing silica include brick, refractory brick, concrete, concrete block, cement, mortar, rock and stone, sand, fill dirt, topsoil and asphalt containing rock or stone.

Employers in British Columbia are required to develop an exposure control plan (ECP) when workers are or may be exposed to airborne silica dust in excess of 50 percent of the exposure limit. The WorkSafe BC guidance document "Developing a Silica Exposure Control Plan" provides information on each of the required elements of an ECP, including safe work procedures for controlling exposure to silica during construction activities.

2.5 PCBs

In most institutional and commercial facilities and in smaller industrial facilities, the primary source of equipment potentially containing PCBs is fluorescent and H.I.D. light ballasts. Small transformers may also be present. In larger industrial facilities, larger transformers and switch gear containing, or potentially containing, PCBs may also be present.

PCBs were also commonly added to industrial paints from the 1940s to the late 1970s. PCBs were added directly to the paint mixture to act as a fungicide, to increase durability and flexibility, to improve resistance to fires and to increase moisture resistance. The use of PCBs in new products was banned in Canada in the 1970s. PCB amended paints were used in speciality industrial/institutional applications prior to the 1970s including government buildings and equipment such as industrial plants, radar sites, ships as well as non-government rail cars, ships, grain bins, automobiles and appliances.

Removal of in-service equipment containing PCBs, such as fluorescent light ballasts, capacitors and transformers, is subject to the requirements of the federal *PCB Regulations*.

The PCB Regulations, which came into force on 5 September 2008, were made under the *Canadian Environmental Protection Act*, 1999 (CEPA 1999) with the objective of addressing the risks posed by the use, storage and release to the environment of PCBs, and to accelerate their destruction. The PCB Regulations set different end-of-use deadlines for equipment containing PCBs at various concentration levels.

The Regulations Amending the PCB Regulations and Repealing the Federal Mobile PCB Treatment and Destruction Regulations were published on 23 April 2014, in the Canada Gazette, Part II, and came into force on 1 January 2015. The most notable part of the amendments is the addition of an end-of-use deadline date of 31 December 2025 for specific electrical equipment located at electrical generation, transmission and distribution facilities.

"PCB wastes" are defined in B.C. Reg. 63/88 – Hazardous Waste Regulation as PCB liquid, PCB solid and PCB equipment that have been taken out of service for the purpose of treatment, recycling, reuse or disposal or for the purpose of storage prior to treatment, recycling, reuse or disposal. "PCB liquid" means any liquid containing more than 50 parts per million by weight of chlorobiphenyls. "PCB solid" means any material or substance other than PCB liquid that contains or is contaminated with chlorobiphenyls at a concentration greater than 50 parts per million by weight of chlorobiphenyls. "PCB equipment" means a manufactured item that contains or is contaminated with PCB liquids or PCB solids and includes transformers, capacitors and containers.

2.6 Ozone-Depleting Substances and Halocarbons

In Canada, the federal, provincial and territorial governments have legislation in place for the protection of the ozone layer and management of ozone-depleting substances and their halocarbon alternatives. The use and handling of these substances are regulated by the provinces and territories in their respective jurisdictions, and through the *Federal Halocarbon Regulations, 2003* (FHR 2003) for refrigeration, air-conditioning, fire-extinguishing and solvent systems under federal jurisdiction.

The FHR 2003 were published in August 2003 and amended in July 2009 under the authority of the *Canadian Environmental Protection Act, 1999*. The purpose of the FHR 2003 is to reduce and prevent emissions of ozone-depleting substances and of their halocarbon alternatives to the environment from air-conditioning units, refrigeration, fire-extinguishing and solvent systems that are:

- located on federal or aboriginal lands; or
- owned by federal departments, board agencies, Crown corporations, or federal works and undertakings.

The FHR 2003 replaced the former *Federal Halocarbon Regulations* and incorporated new provisions to achieve an orderly transition from CFCs and Halons to alternative substances and technologies, reflecting *Canada's Strategy to Accelerate the Phase-Out of CFC and Halon Uses and to Dispose of the Surplus Stocks.*

Under the FHR 2003, a person who installs, services, leak tests, or charges a refrigeration system or an air conditioning system or does any other work on the system that may result in the release of a halocarbon must do so in accordance with the *Environmental Code of Practice for the Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems*.

Some of the requirements of FHR 2003 include:

- certification is required for all persons testing, repairing, filling or emptying equipment containing ozone-depleting substances and their halocarbon alternatives;

- no person shall store, transport or purchase a halocarbon unless it is in a container designed and manufactured to be refilled and to contain that specific type of halocarbon;
- before dismantling, decommissioning or destruction of any system, a person shall recover all halocarbons contained in the system into a container designed and manufactured to be refilled and to contain that specific type of halocarbon;
- before dismantling, decommissioning or destruction or destroying a system, a person shall affix a notice to the system containing information as required in Column 3, Item 1 of Schedule 2. This information includes the name and address of the owner of the system; name of the operator of the system, specific location of the system before its dismantling, decommissioning or destruction; description of the system; name of service technician who recovered the halocarbons; certificate number of the service technician (if applicable); name of employer of service technician (if applicable); type and quantity of halocarbon and date recovered; type and charging capacity of the system; and final destination of the system; and
- in the case of dismantling, decommissioning or destruction of any system, the owner shall keep a record of the information contained in the notice as described above.

2.7 Rodent Droppings

According to the Health Canada (in collaboration with the Public Health Agency of Canada) article "*It's Your Health – Hantaviruses"*, dated August 2009, Hantaviruses are found in the droppings, urine, and saliva of infected rodents and humans can contact the virus from breathing in airborne particles or from being bitten. In Canada, a hantavirus capable of causing disease in humans – named Sin Nimbre virus – has been identified in deer mice. Although the risk in Canada is low, when it happens, the disease can be very severe.

Exposure to hantaviruses can cause a rare, but often fatal, disease called Hantavirus pulmonary syndrome (HPS). The earliest documented case of HPS in Canada was contracted in Alberta in 1989. Since then, there have been over 70 confirmed cases. Most of the cases occurred in western Canada (Manitoba, Saskatchewan, Alberta and British Columbia), except for one case in Quebec.

Hantavirus is typically transmitted by breathing particles in air from the droppings, urine and saliva of infected rodents. However, there have been a small number of reported cases of HPS believed to have been contracted through rodent bites.

2.8 Mould

Moulds are forms of fungi that are found everywhere both indoors and outdoors all year round. Outdoors, moulds live in the soil, on plants and on dead and decaying matter. More than 1000 different kinds of indoor moulds have been found in buildings. Moulds spread and reproduce by making spores, which are all small and light-weight, able to travel through air, capable of resisting dry, adverse environmental conditions, and hence capable of surviving a long time. Moulds need moisture and nutrients to grow and their growth is stimulated by warm, damp and humid conditions.

Recommended work practices are outlined in the following document:

- *Mould Guidelines for the Canadian Construction Industry*. Standard Construction Document CCA 82 2004. Canadian Construction Association.

3 METHODOLOGY

3.1 Asbestos

Bulk sampling and analysis was performed in general accordance with the requirements specified in B.C. Reg. 296/97 and in the WorkSafe BC publication *Safe Work Practices for Handling Asbestos*.

Determination of the locations of asbestos-containing materials was made based on the results of bulk sample analyses, visual observations and physical characteristics of the applications as well as our knowledge of the uses of asbestos in building materials.

Analysis of bulk samples was performed following EPA Method 600/R-93/116 in conformity with the requirements specified in B.C. Reg. 296/97.

3.2 Lead

Samples of select, representative paint applications were collected during the course of the site inspection.

3.3 Mercury

The presence of equipment which may contain mercury, such as fluorescent light tubes, thermometers, gauges, etc. observed during the course of our site inspection was recorded.

3.4 Silica

The presence of silica-containing materials observed during the course of our site inspection was documented. Silica is known to be a constituent of brick, concrete, cement, etc. Sampling and laboratory analysis are not required to make this determination.

3.5 PCBs

The presence or absence of fluorescent lights was documented during the course of our survey to determine whether there were any of the TI2 type which may therefore contain PCB ballasts.

3.6 Ozone-Depleting Substances and Halocarbons

Information on the presence of air-conditioning equipment, cooling equipment (refrigerators, etc.), etc. was recorded during the site inspections by Aracdis staff.

3.7 Rodent Droppings

The presence of rodent droppings in all accessible areas was recorded during the site inspections by Arcadis staff.

3.8 Mould

The presence of any “suspect” mould observed during the course of our site inspection was documented. “Suspect” mould is typically a coloured, textured substance or discolouration or staining on a building material surface which, based on our experience, may be mould growth. The adjective “suspect” is used where the presence of mould has not been confirmed by laboratory analysis.

4 RESULTS AND DISCUSSION

4.1 Asbestos

During the course of our hazardous materials assessment, representative bulk samples of materials were collected by Arcadis staff. The samples were forwarded to EMSL Canada Inc. for asbestos analyses. EMSL holds a current Certificate of Accreditation for Bulk Asbestos Fibre Analysis under the Voluntary Accreditation Program (NVLAP). The results of the bulk sample analyses for asbestos content are provided in Table 4.1, and the laboratory report is provided in Appendix B. A summary of the asbestos-containing materials and quantities is provided in Table 4.2.

Table 4.1. Summary of Results of Analyses of Bulk Samples for Asbestos Content

Sample Number	Sample Location	Sample Description	Asbestos Content
C1A	118 East Wall	Drywall Joint Compound	None detected
C1B	136 West Wall	Drywall Joint Compound	None detected
C1C	108 West Wall	Drywall Joint Compound	None detected
C2A-1	108	Brown/Beige Ceiling Tile Glue 1	None detected
C2A-2	108	Brown/Beige Ceiling Tile Glue 2	None detected
C2B-1	108	Brown/Beige Ceiling Tile Glue 1	None detected
C2B-2	108	Brown/Beige Ceiling Tile Glue 2	None detected
C2C-1	108	Brown/Beige Ceiling Tile Glue 1	None detected
C2C-2	108	Brown/Beige Ceiling Tile Glue 2	None detected
C3A	135 Throughout	12" Ceiling Tile Deep Fissures	None detected
C3B	135 Throughout	12" Ceiling Tile Deep Fissures	None detected
C4A	134A West Exterior Wall	Drywall Joint Compound	None detected
C4B	134A North Demising Wall	Drywall Joint Compound	None detected
C4C	131 Washroom Ceiling	Drywall Joint Compound	None detected
C4D	116 Washroom Ceiling	Drywall Joint Compound	None detected
C5A	115 Janitor Closet	Aqua 12" Vinyl Floor Tile/Mastic	**2% chrysotile**
C6A	136	Brown Ceiling Tile Glue	None detected

C6B	136	Brown Ceiling Tile Glue	None detected
C6C	136	Brown Ceiling Tile Glue	None detected
C7A	136 North	Block Mortar	None detected
C7B	127 East	Block Mortar	None detected
C7C	101A East	Block Mortar	None detected
C7D	135 East Exit	Block Mortar	None detected
C7E	118 Northwest	Block Mortar	None detected
C8A	131	Floor Tile Grout	None detected
C8B	128	Floor Tile Grout	None detected
C8C	116	Floor Tile Grout	None detected
C9A	104	Storm Pipe Insulation Wrap	**2% chrysotile**
C10A-1	136 South Wall	Brown Wall Mastic	None detected
C10A-2	136 South Wall	Brown Wall Mastic/Mortar	None detected
C10B	136 South Wall	Brown Wall Mastic	None detected
C10C	136 South Wall	Brown Wall Mastic	None detected

NOTES:

chrysotile = chrysotile asbestos

Based on visual observations and results of laboratory analyses of samples collected by Arcadis, the following asbestos-containing materials were found to be present in Building M2A Security Intelligence Office (SIO)/Administrative Office:

- Asbestos-containing thermal insulation wrap applied to storm drain pipe in Room 104; and
- Vinyl floor tiles and underlying mastic (Aqua 12” x 12”) in Room 115/Janitors Closet.

The locations of the asbestos-containing materials are provided on the floor plan in Appendix A.

Table 4.2. Summary of Asbestos-Containing Materials and Approximate Quantities

Description	Approximate Quantity	Location
Thermal insulation wrap applied to storm drain pipe	4 lm	Room 104
Aqua 12" Vinyl Floor Tile/Mastic	20 m^2	Room 115/Janitors Closet

NOTES:

m^2 = square metre
lm = lineal meter

Vinyl floor tiles may also be present under the vinyl sheet flooring present in the Corridor 135.

Photographs are provided in Appendix C.

Thermal insulation is a friable material. Removal of this asbestos-containing material can be performed as a moderate risk work activity as specified in B.C. Reg. 296/97 if the work is done using glove bags. If the work is completed without the use of glove bags, it is considered a high risk work activity.

Vinyl floor tiles and mastic are non-friable materials. Removal of these asbestos-containing materials can be performed as a moderate risk work activity as specified in B.C. Reg. 296/97 if the work is done only using non-powered, hand-held tools or if the removal work is done using power tools that are attached to dust-collecting devices equipped with HEPA filters.

Asbestos may also be present in materials which were not sampled during the course of the asbestos survey carried out by Arcadis, including, but not limited to, components of electrical equipment (e.g. electric wiring insulation, non-metallic sheathed cable, electrical panel partitions, arc chutes, high-grade electrical paper, etc.) and/or in locations that are presently inaccessible (e.g., in pipe chases, behind walls and beneath vinyl and wood flooring). Asbestos may also be present in the form of vermiculite insulation in cavities in concrete or cement block walls (used as in-fill insulation). Confirmatory testing of any such materials could be undertaken as the need arises (i.e., at the time of renovations) or the materials can be assumed to contain asbestos based on findings in adjacent areas.

If any materials which may contain asbestos and which were not tested during the course of the hazardous materials survey are discovered during any renovation activities, or if any of the materials listed above are encountered, or may be affected by the renovation activities, the work shall not proceed until such time as the required notifications have been made and an appropriate course of action is determined.

4.2 Lead

Three samples of the predominant paints were collected by Arcadis during the course of the investigation. The samples were submitted to EMSL Canada Inc. for analysis of lead content. The results of the analyses are presented in Table 4.3, and the laboratory report is provided in Appendix B.

Lead was detected at a level above the WorkSafe BC guideline value of 600 mg/kg in one of the three samples, and above the *Surface Coating Materials Regulations* maximum concentration of 90 mg/kg in two of the samples. One sample of paint did not contain lead (i.e. less than the laboratory limit of detection). Where one colour of paint is indicated in the sample descriptions in Table 4.3, only one layer of paint was observed.

The paint applications were noted to be generally in good condition at the time of the survey by Arcadis. Prior to any renovation work, affected lead-containing paint should be handled following the measures and procedures outlined in the WorkSafe BC publication *Lead-Containing Paints and Coatings, Preventing Exposure in the Construction Industry*.

Table 4.3. Summary of Results of Analyses of Bulk Samples for Lead Content

Sample Number	Sample Location	Sample Description	Condition	Lead Content (mg/kg)
CL1	Room 101B	Light Brown Walls	Good	<90 mg/kg
CL2	Corridor 135	Dark Brown Trim	Good	150 mg/kg
CL3	Corridor 135	Peach Concrete Walls	Good	**970 mg/kg**

NOTES:

mg/kg = milligrams lead per kilogram paint.

< = less than.

1 mg/kg = 1 part per million (ppm).

4.3 Mercury

No mercury-containing thermostats were observed during the course of our site inspection. Fluorescent light tubes were observed throughout the study area. Mercury should be assumed to be present as a gas in all fluorescent light tubes. If any fluorescent light tubes are removed, the light tubes should be recycled for mercury.

Proper procedures for removing and handling mercury-containing fluorescent light tubes typically involve:

- ensuring that electrical power to light fixtures has been disconnected and locked out;
- taking all necessary precautions to ensure that fluorescent lamp tubes are removed in a manner that prevents breakage; and
- transporting fluorescent lamp tubes to a licensed processing location for separation and recovery of mercury.

4.4 Silica

Materials observed in the study area which could contain silica included ceiling tiles, drywall joint compound, gypsum board, concrete, concrete block and mortar.

The WorkSafe BC guidance document Developing a Silica Exposure Control Plan, provides guidance in controlling exposure to silica dust during construction/renovation activities.

4.5 PCBs

Fluorescent lights were observed throughout the study area during the course of our site inspection. Light ballasts, such as those associated with the type of fluorescent lights (T8s) observed in the study area, are usually an electronic-type which do not contain PCBs, however, this should be confirmed by an electrician at the time of dismantling of the lights.

4.6 Ozone-Depleting Substances and Halocarbons

Suspect ODS- or halocarbon-containing equipment observed during the course of the inspection was limited to two styles of window mounted air-conditioning units located throughout the office areas.

If any ODS-containing equipment is to be removed then they must be handled in the following manner:

- any equipment designated for disposal as scrap must be drained of its contents by a licensed technician and equipped with a label indicating that the equipment no longer contains any refrigerant. The specific requirements for information on the label, as specified in the regulation, must be adhered to; and
- all refrigerants must be stored in approved containers that are designed and manufactured for the specific refrigerant.

4.7 Rodent Droppings

Rodent droppings were not observed in the study area during the course of our site inspection.

4.8 Mould

No suspect mould was observed in the study area during the course of our site inspection.

During renovation activities, any mould-impacted materials that may be uncovered/discovered should be remediated following the measures and procedures outlined in the Canadian Construction Association Standard Construction Document CCA-82 2004 - Mould guidelines for the Canadian Construction Industry.

5 RECOMMENDATIONS

We recommend the following on the basis of the findings of the hazardous material assessment outlined in this report:

1. Develop an asbestos exposure control plan and ensure that all asbestos-containing materials identified in the study area (vinyl floor tiles and underlying mastic, and thermal insulation wrap) are removed, if they are affected by the renovation work, in accordance with work practices and procedures specified in B.C. Reg. 296/97 and outlined in WorkSafe BC publication “Safe Work practices for Handling Asbestos”.
2. Ensure that a risk assessment is performed and an exposure control plan is developed for lead-containing paint prior to renovations.
3. Prior to undertaking renovation activities:
    - ensure that a licensed electrician inspects ballasts to determine whether or not any light ballasts may contain PCBs, if they are affected by the proposed project. Guidance in identification of PCB ballasts is provided in the Environment Canada publication titled “Identification of Lamp Ballasts Containing PCBs. Report EPS 2/CC/2 (revised)”, August 1991;
    - if any ODS equipment is to be removed then they must be handled in accordance with the requirements of the Federal Halocarbon Regulations;
    - develop a silica exposure control plan; and
    - remove all fluorescent light tubes, if they are affected by the proposed project, and transport to a licensed processing location for separation and recovery of mercury.

6 USE AND LIMITATIONS OF HAZARDOUS MATERIALS SURVEY REPORT

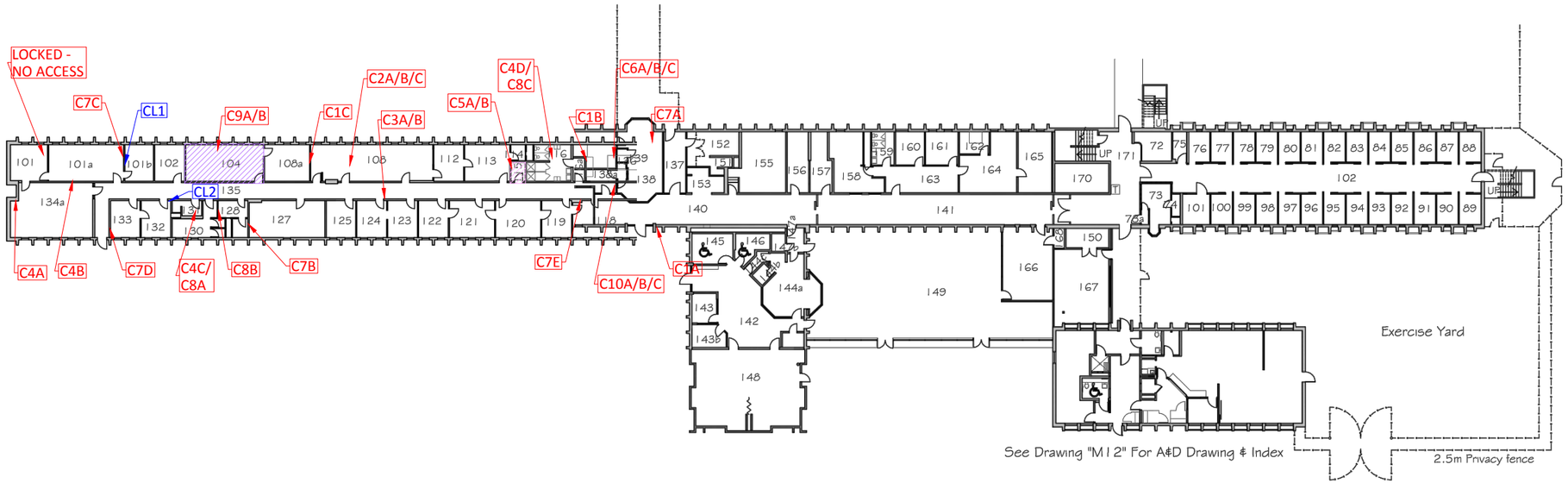
This report, prepared for Public Works and Government Services Canada, on behalf of Correctional Service Canada, does not provide certification or warranty, expressed or implied, that the investigation conducted by Arcadis identified all hazardous materials in the study area of Building M2A Security Intelligence Office (SIO)/Administrative Office. The work undertaken by Arcadis was directed to provide information on the presence of hazardous materials in the study area in building construction materials based on visual inspection of readily accessible areas of the building, and on the results of laboratory analysis of a limited number of bulk samples of material for asbestos content and laboratory analysis of a limited number of paint samples for lead content.

The material in this report reflects Arcadis' best judgment in light of the information available at the time of the investigation, which was performed on November 9 and 10, 2016.

This report was prepared by Arcadis for Public Works and Government Services Canada, on behalf of Correctional Service Canada. Any use which any other party makes of the report, or reliance on, or decisions to be based on it, is the responsibility of such parties.

APPENDIX A

Floor Plans



FIRST FLOOR PLAN

SCALE 1:475

LEGEND

88	Room numbers
	Asbestos-containing vinyl floor tiles and underlying mastic
	Asbestos-containing thermal insulation wrap applied to storm drain pipe
C7A	Sample Number (Asbestos)
CL1	Sample Number (Paint)

Building M2a

Administrative Offices - First Floor

Rm. #	Name	Area m²
101	Office	18.05
101a	Office	33.32
101b	Office	13.14
102	Office	13.56
104	H/R	34.56
108	Finance	54.04
108a	H/R Chief	20.26
112	Finance	13.51
113	Finance	20.26
114	Stationary Storage	3.68
115	Janitor	3.09
116	Showers/Washroom	20.25
116a	Vestibule	3.18
118	Corr. Manager	37.46
119	Photocopy Room	13.62
120	Office	20.43
121	Office	20.43
122	Office	13.62
123	Office	13.62
124	Office	13.62
125	Office	13.62
127	Mechanical Room	34.06
128	Women's Washroom	10.84
130	Women's Washroom	17.74
131	Men's Washroom	5.48
132	Office	13.62
133	Office	13.62
134a	Office	51.81
135	Corridor	110.94
136	MCCP Computer Room	43.87
137	Corridor	15.68
138	Central Control	32.18
138a	Secure Vestibule	1.77
139	Washroom	1.50
140	Entry	71.53

Building M2b

Visiting & Correspondence - First Floor

Rm. #	Name	Area m²
41	Hallway	94.63
42	Visitors Waiting	55.08
43	Interview	9.57
43b	Interview	9.28
44a	V&C Control	30.80
44b	Staff Toilet	2.92
44c	Janitor	3.25
45	B.F. W. Visitor Washroom	17.64
46	B.F. M. Visitor Washroom	11.53
47a	Vestibule	6.23
47b	Inmate Washroom	4.05
48	Boardrooms	96.22
49	Visitor Lounge	232.92
50	Mechanical	10.54
51	Washroom	4.63
152	Inmate Waiting Room	19.43
153	Staff Canteen	8.92
155	Mechanical	34.95
156	Visitor/Screened	15.68
157	Inmate/Screnned	14.31
158	Computer Lab	29.79
159	Female Staff Washroom	9.67
160	Office	12.19
161	Office	13.64
162	Server Room	9.23
163	Office	21.65
164	I.T.	30.63
165	I.T.	23.94
166	Classroom	37.49
167	JC Multipurpose Room	43.82
168	Closet	2.78
170	Mechanical Room	17.44
171	Corridor	48.10

Building M2c

J/C Unit - First Floor

Rm. #	Name	Area m²
72	Kitchenette	11.89
73	Control Post	13.06
73a	Vestibule	1.55
74	Staff washroom	3.64
75	Laundry	5.93
76-100	Cells	215.65
101	Shower	11.10
102	Corridor	100.08

Title: **MASTQUI INSTITUTION**
BUILDING M2A SIO/ADMINISTRATION OFFICE

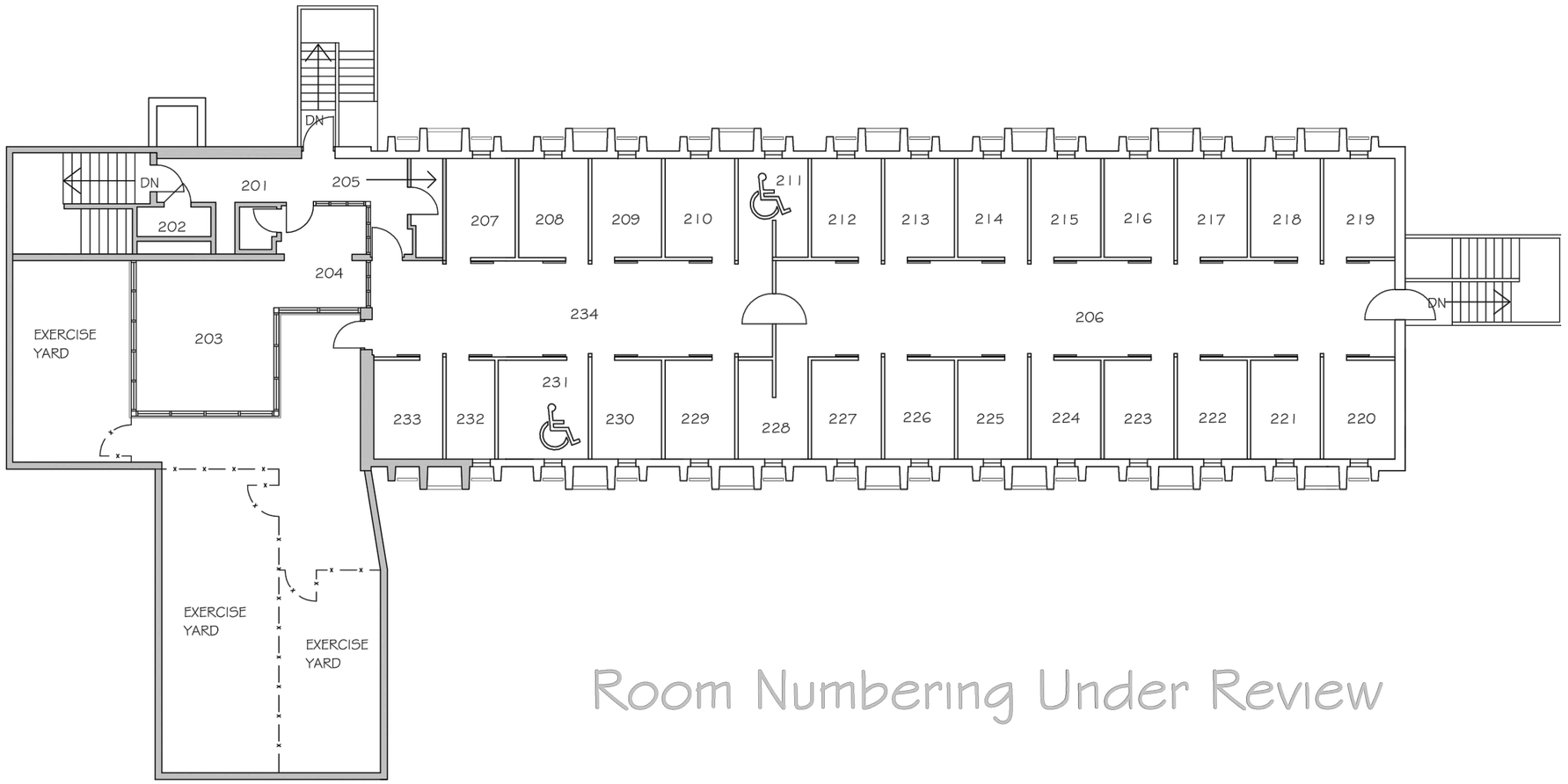
Project: HAZARDOUS MATERIALS ASSESSMENT

Client: PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project	Drawn By: JB	Plot Size: 11X17"	DECEMBER 2016

ARCADIS

FIGURE 1



Room Numbering Under Review

Building M2d		
Dissociation - Second Floor		
Rm. #	Name	Area m²
201	Vestibule	#####
202	Storage	####
203	Control Post	#####
204	Staff Washroom	#####
205	Janitor closet	####
206	Corridor	####
207-10	Cells	####
211	B.F. Shower	####
212-27	Cells	#####
228	Shower	#####
229-30	Cells	

LEGEND

Title:
MASTQUI INSTITUTION
BUILDING M2A SIO/ADMINISTRATION OFFICE

Project:
HAZARDOUS MATERIALS ASSESSMENT

Client:
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

Project	Drawn By:	Plot Size:	
	JB	11X17"	DECEMBER 2016

ARCADIS

FIGURE 3

APPENDIX B

Laboratory Reports

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691601487
Customer ID: 55DCSL97
Customer PO: 702358
Project ID:

Attn: Kelly Smith
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

Proj: 702358

Phone: (905) 882-5984
Fax: (905) 882-8962
Collected:
Received: 11/10/2016
Analyzed: 11/17/2016

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: C1A **Lab Sample ID:** 691601487-0037
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

Client Sample ID: C1B **Lab Sample ID:** 691601487-0038
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

Client Sample ID: C1C **Lab Sample ID:** 691601487-0039
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

Client Sample ID: C2A-Ceiling Tile Glue 1 **Lab Sample ID:** 691601487-0040
Sample Description: BUILDING M2A/BROWN/BEIGE CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	0%	100%	None Detected	

Client Sample ID: C2A-Ceiling Tile Glue 2 **Lab Sample ID:** 691601487-0040A
Sample Description: BUILDING M2A/BROWN/BEIGE CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Beige	0%	100%	None Detected	

Client Sample ID: C2B-Ceiling Tile Glue 1 **Lab Sample ID:** 691601487-0041
Sample Description: BUILDING M2A/BROWN/BEIGE CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	0%	100%	None Detected	

Client Sample ID: C2B-Ceiling Tile Glue 2 **Lab Sample ID:** 691601487-0041A
Sample Description: BUILDING M2A/BROWN/BEIGE CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Beige	0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691601487
Customer ID: 55DCSL97
Customer PO: 702358
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: C2C-Ceiling Tile Glue 1 ***Lab Sample ID:*** **691601487-0042**
Sample Description: BUILDING M2A/BROWN/BEIGE CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Black	0%	100%	None Detected	

Client Sample ID: C2C-Ceiling Tile Glue 2 ***Lab Sample ID:*** **691601487-0042A**
Sample Description: BUILDING M2A/BROWN/BEIGE CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Beige	0%	100%	None Detected	

Client Sample ID: C3A ***Lab Sample ID:*** **691601487-0043**
Sample Description: BUILDING M2A/12" CEILING TILE DEEP FISSURES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	65%	35%	None Detected	

Client Sample ID: C3B ***Lab Sample ID:*** **691601487-0044**
Sample Description: BUILDING M2A/12" CEILING TILE DEEP FISSURES

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	65%	35%	None Detected	

Client Sample ID: C4A ***Lab Sample ID:*** **691601487-0045**
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

Client Sample ID: C4B ***Lab Sample ID:*** **691601487-0046**
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

Client Sample ID: C4C ***Lab Sample ID:*** **691601487-0047**
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

Client Sample ID: C4D ***Lab Sample ID:*** **691601487-0048**
Sample Description: BUILDING M2A/DWJC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	White	0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691601487
Customer ID: 55DCSL97
Customer PO: 702358
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: C5A ***Lab Sample ID:*** **691601487-0049**

Sample Description: BUILDING M2A/AQUA 12" VINYL FLOOR TILE/MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	98%	**2% Chrysotile**	

Client Sample ID: C5B ***Lab Sample ID:*** **691601487-0050**

Sample Description: BUILDING M2A/AQUA 12" VINYL FLOOR TILE/MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016				Positive Stop (Not Analyzed)	

Client Sample ID: C6A ***Lab Sample ID:*** **691601487-0051**

Sample Description: BUILDING M2A/BROWN CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	5%	95%	None Detected	

Client Sample ID: C6B ***Lab Sample ID:*** **691601487-0052**

Sample Description: BUILDING M2A/BROWN CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	5%	95%	None Detected	

Client Sample ID: C6C ***Lab Sample ID:*** **691601487-0053**

Sample Description: BUILDING M2A/BROWN CEILING TILE GLUE

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	0%	100%	None Detected	

Client Sample ID: C7A ***Lab Sample ID:*** **691601487-0054**

Sample Description: BUILDING M2A/BLOCK MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C7B ***Lab Sample ID:*** **691601487-0055**

Sample Description: BUILDING M2A/BLOCK MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C7C ***Lab Sample ID:*** **691601487-0056**

Sample Description: BUILDING M2A/BLOCK MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691601487
Customer ID: 55DCSL97
Customer PO: 702358
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: C7D **Lab Sample ID:** **691601487-0057**
Sample Description: BUILDING M2A/BLOCK MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C7E **Lab Sample ID:** **691601487-0058**
Sample Description: BUILDING M2A/BLOCK MORTAR

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C8A **Lab Sample ID:** **691601487-0059**
Sample Description: BUILDING M2A/FLOOR TILE GROUT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C8B **Lab Sample ID:** **691601487-0060**
Sample Description: BUILDING M2A/FLOOR TILE GROUT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C8C **Lab Sample ID:** **691601487-0061**
Sample Description: BUILDING M2A/FLOOR TILE GROUT

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C9A **Lab Sample ID:** **691601487-0062**
Sample Description: BUILDING M2A/STORM PIPE INSULATION WRAP

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Black	10%	88%	**2% Chrysotile**	

Client Sample ID: C9B **Lab Sample ID:** **691601487-0063**
Sample Description: BUILDING M2A/STORM PIPE INSULATION WRAP

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016				Positive Stop (Not Analyzed)	

Client Sample ID: C10A-Mastic **Lab Sample ID:** **691601487-0064**
Sample Description: BUILDING M2A/WALL MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	0%	100%	None Detected	

EMSL Canada Inc.

4506 Dawson Street Burnaby, BC V5C 4C1
Phone/Fax: 604-757-3158 / (604) 757-4731
http://www.EMSL.com / vancouverlab@EMSL.com

EMSL Canada Order 691601487
Customer ID: 55DCSL97
Customer PO: 702358
Project ID:

Test Report: Asbestos Analysis in Bulk Material for Occupational Health and Safety British Columbia Regulation 188/2011 via EPA 600/R-93/116 Method

Client Sample ID: C10A-Mortar ***Lab Sample ID:*** **691601487-0064A**

Sample Description: BUILDING M2A/WALL MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Gray	0%	100%	None Detected	

Client Sample ID: C10B ***Lab Sample ID:*** **691601487-0065**

Sample Description: BUILDING M2A/WALL MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	0%	100%	None Detected	

Client Sample ID: C10C ***Lab Sample ID:*** **691601487-0066**

Sample Description: BUILDING M2A/WALL MASTIC

TEST	Analyzed Date	Color	Non-Asbestos Fibrous	Non-Asbestos Non-Fibrous	Asbestos	Comment
PLM	11/17/2016	Brown	0%	100%	None Detected	

Analyst(s):

Kathleen Cruz PLM (23)
Nicole Yeo PLM (9)

Reviewed and approved by:

Nicole Yeo, Laboratory Manager
or Other Approved Signatory

None Detected = <0.1%. EMSL maintains liability limited to cost of analysis. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. Interpretation and use of test results are the responsibility of the client. Samples received in good condition unless otherwise noted. This report must not be used to claim product endorsement by NVLAP of any agency of the U.S. Government.

Samples analyzed by EMSL Canada Inc. Burnaby, BC

Report amended: 11/29/201616:52:58 Replaces initial report from: 11/17/201614:54:37 Reason Code: Client-Other (see report comment)

EMSL Canada Inc.
2756 Slough Street, Mississauga, ON L9T 5N4
Phone/Fax: 289-997-4602 / (289) 997-4607
http://www.EMSL.com torontolab@emsl.com

EMSL Canada Or	551612349
CustomerID:	55DCSL97
CustomerPO:	702358
ProjectID:	

Attn: **Kelly Smith**
ARCADIS Canada Inc.
121 Granton Drive
Unit 12
Richmond Hill, ON L4B 3N4

Phone:	(905) 882-5984
Fax:	(905) 882-8962
Received:	11/15/16 10:13 AM
Collected:	

Project: **702358**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
CL1	*551612349-0007*		11/18/2016	<90 mg/Kg
	Site: LIGHT BROWN WALLS			
CL2	*551612349-0008*		11/18/2016	150 mg/Kg
	Site: DARK BROWN TRIM			
CL3	*551612349-0009*		11/18/2016	970 mg/Kg
	Site: PEACH CONCRETE WALLS			

Rowena Fanto, Lead Supervisor
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.010 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Canada Inc. Mississauga, ON A2LA Accredited Environmental Testing Cert #2845.08

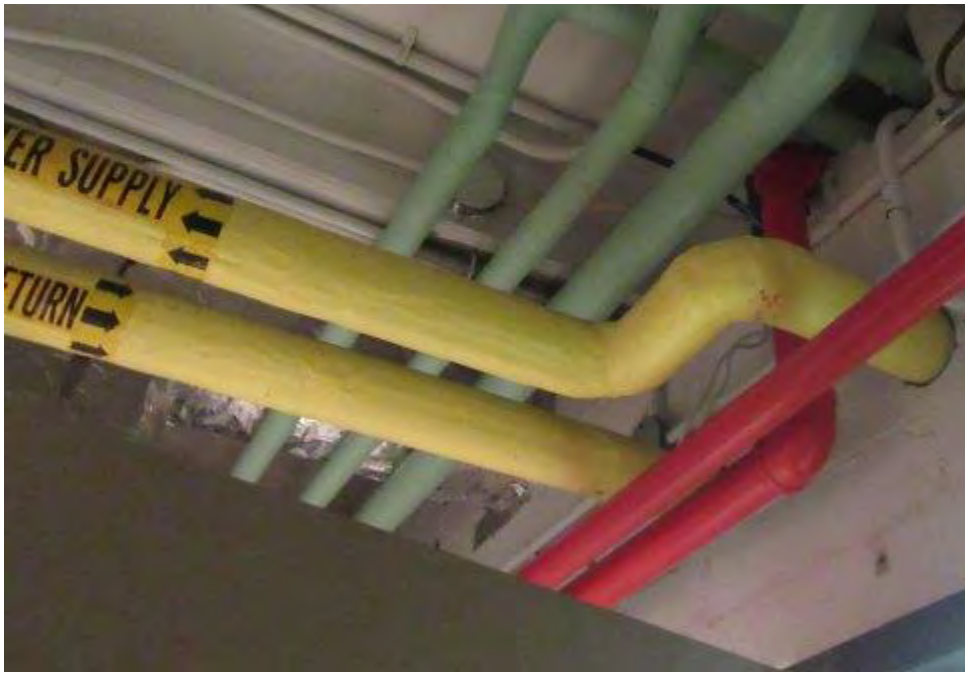
Initial report from 11/22/2016 08:16:20

APPENDIX C

Photographs

Photograph 1: Mechanical Room 127

Fiberglass insulation applied to piping including lagging and fittings. New ducting throughout, no mastic on ducts. Block mortar collected from east wall (sample 7B)



Photograph 2: Mechanical Room 127

Fiberglass insulation applied to all piping including lagging and fittings.

Photograph 3: 115 Janitor Closet

Asbestos-containing 12" Aqua vinyl floor tiles and underlying mastic (sample C5A). White vinyl sheet flooring (<10 years old) present throughout Hallway 135. No paper backing observed.

Photograph 4: Typical window mounted air-conditioning unit present in all offices (approximately 10). Units contain halocarbons.

Photograph 5: Typical dark brown trim (sample CL2), light brown walls (sample CL1).

Photograph 6: Typical 12" fiberglass ceiling tiles present in most offices.

Photograph 7: Hallway 135

Mixed cellulose 12" ceiling tiles throughout hallway (sample C3A). Tiles are nailed to the substrate, no glue observed.

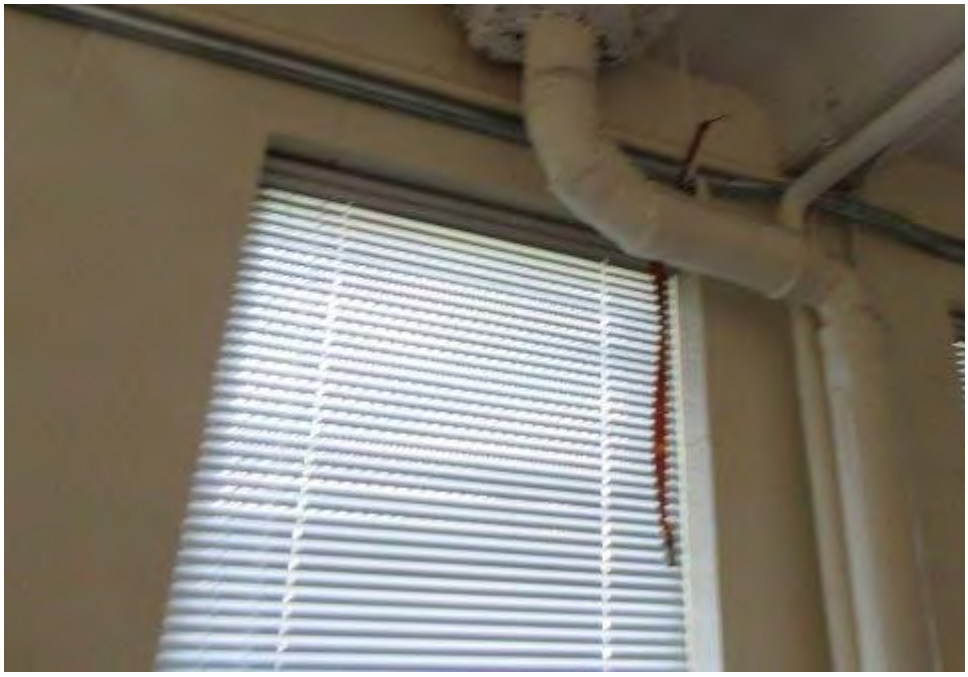
Photograph 8: Room 108
Brown/beige ceiling tile glue (sample C2A) present under tiles in office.

Photograph 9: Room 136

Brown mastic on south wall (sample C10A).

Photograph 10: 135 Hallway

Fiberglass insulation applied to all piping in ceiling plenum.



Photograph 11: Room 104

Asbestos-containing thermal insulation wrap applied to fiberglass storm drain pipe (samples C9A/B). Insulation in good condition.

Photograph 12: Typical alternate style window mounted air-conditioning unit present in offices. Unit contains halocarbons.

Arcadis Canada Inc.

121 Granton Drive, Suite 12, Richmond Hill, Ontario L4B 3N4

Tel 905 882 5984

Fax 905 882 8962