Federal Building

PROJECT MANUAL

FOR

Interior Renovations
105 – 10th Avenue North
Swan River, Manitoba

Issued for Tender
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Part 1 General

1.1 WORK COVERED BY CONTRACT DOCUMENTS

.1 Work of this Contract comprises demolition and renovation of the cell area in the detachment located at Swan River, Manitoba. Renovation includes:

- .1 Demolition of existing cells.
- .2 Removal of existing mechanical and electrical services.
- .3 Reconfiguration of cells.
- .4 Construction of new support spaces within cell area.
- .5 Interior and exterior structural, mechanical, and electrical alterations.
- .6 Demolition in garage storage, modification to existing walls, ceilings. Mechanical, and electrical to suit.
- .7 Coordinate temporary placement and removal of seacan into Room 131 according to construction phasing.

1.2 CONTRACT METHOD

.1 Construct Work under single stipulated price contract.

1.3 SUPPLEMENTARY INFORMATION FOR PROGRESS PAYMENTS

.1 Successful Contractor will be required to submit a detailed breakdown of costs for each elemental section into three funding accountabilities within 5 business days of Contract Award and with every change to the project. The funding accountability will be detailed as directed, and on a form provided by the Departmental Representative, for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of application for payments. After review by Departmental Representative, cost breakdown will be used as basis for progress payment.

1.4 WORK BY OTHERS

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

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

1.5 WORK SEQUENCE

.1 Construct Work in stages to accommodate Departmental Representative continued use of premises during construction.

- .1 Cell area will be vacated during construction, while detachment will remain operational throughout construction.
- .2 Complete Work of Phase 1 prior to commencing demolition of Phase 2.

.3 Place Client-supplied seacan in Room 131 prior to commencing demolition of Phase 2.

.4 Coordinate removal of seacan following completion of Phase 2.

.5 Allow for TAB reports at completion of each Phase.

.6 Allow for fire alarm testing at completion of each Phase.

.2 Co-ordinate Progress Schedule and co-ordinate with occupancy during construction.

.3 Construct Work in stages to provide for continuous public usage. Do not close off public usage of facilities until use of one stage of Work will provide alternate usage.

.4 Maintain fire access/control.

1.6 CONTRACTOR USE OF PREMISES

.1 Limit use of premises for Work, for storage, and for access, to allow:

.1 Partial occupancy.

.2 Public usage.

.2 Co-ordinate use of premises under direction of Departmental Representative.

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

.4 Remove or alter existing work to prevent injury or damage to portions of existing work that remain.

.5 Repair or replace portions of existing work that have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.6 At completion of operations condition of existing work: equal to or better than that which existed before new work started.

1.7 DEPARTMENTAL REPRESENTATIVE-SUPPLIED ITEMS

.1 Departmental Representative Responsibilities:

.1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.

.2 Deliver supplier's bill of materials to Contractor.

.3 Arrange and pay for delivery to site in accordance with Progress Schedule.

.4 Inspect deliveries jointly with Contractor.

.5 Submit claims for transportation damage.

.6 Arrange for replacement of damaged, defective or missing items.

.7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.

.2 Contractor Responsibilities:

.1 Designate submittals and delivery date for each product in progress schedule.

.2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.

.3 Receive and unload products at site.

.4 Inspect deliveries jointly with Departmental Representative; record shortages, and damaged or defective items.

.5 Handle products at site, including uncrating and storage.

.6 Protect products from damage, and from exposure to elements.

.7 Assemble, install, connect, adjust, and finish products.

.8 Provide installation inspections required by public authorities.

.9 Repair or replace items damaged by Contractor or subcontractor on site (under their control).

.3 Schedule of Departmental Representative-furnished items:

.1 Gun storage cabinet.

1.8 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.9 EXISTING SERVICES

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

.2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours' notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to pedestrian, vehicular traffic, tenant operations.

.3 Provide alternative routes for personnel, pedestrian, and vehicular traffic.

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

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

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

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

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

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

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

.11 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.10 DOCUMENTS REQUIRED

.1 Successful bidding Contractor is to obtain required sets of Contract Documents for construction purposes, which includes two (2) sets for "as-built" and record purposes.

.1 Contractor is responsible for costs of printing, handling, and shipping of Contract Documents.

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

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Reviewed Shop Drawings.
.5 List of Outstanding Shop Drawings.
.6 Change Orders.
.7 Other Modifications to Contract.
.8 Field Test Reports.
.9 Copy of Approved Work Schedule.
.10 Health and Safety Plan and Other Safety Related Documents.
.11 Other documents as specified.

END OF SECTION

Part 1 General

1.1 ACCESS AND EGRESS

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

1.2 USE OF SITE AND FACILITIES

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

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

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

.4 Closures: Protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

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

1.4 EXISTING SERVICES

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

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

.3 Provide for personnel, pedestrian, and vehicular traffic.

.4 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.5 SPECIAL REQUIREMENTS

.1 Submit schedule in accordance with Section 01 32 16 - Construction Progress Schedule - Bar (GANTT) Chart.

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

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

1.6 SECURITY

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

.2 Security clearances:

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

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

.3 Work performed after hours:

.1 Requires security escort, regardless of reliability status.

.4 Engage and pay for security for escort for personnel without reliability status, and for personnel performing work after hours.

.1 Right of first refusal for security provision is to be given to the Canadian Corps of Commissionaires.

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

1.7 BUILDING SMOKING ENVIRONMENT

.1 Comply with smoking restrictions.

.2 Smoking is not permitted inside building.

.3 Confirm, with building management, outdoor locations where personnel may smoke.

END OF SECTION

Part 1 General

1.1 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

.2 Cash allowances, unless otherwise specified, cover net cost to Contractor of services, products, construction machinery and equipment, freight, handling, unloading, storage, installation, and other authorized expenses incurred in performing Work.

.3 Contract Price, and not cash allowance, includes Contractor's overhead and profit in connection with such cash allowance.

.4 Contract Price will be adjusted by written order to provide for excess or deficit to each cash allowance.

.5 Where costs under a cash allowance exceed amount of allowance, Contractor will be compensated for excess incurred and substantiated plus allowance for overhead and profit as set out in Contract Documents.

.6 Include progress payments on accounts of work authorized under cash allowances in Consultant's monthly certificate for payment.

.7 Prepare schedule jointly with Departmental Representative and Contractor to show when items called for under cash allowances must be authorized by Departmental Representative for ordering purposes so that progress of Work will not be delayed.

.8 Amount of each allowance is as follows:

.1 Include allowance of $1000 for purchase of signage to standards provided by Departmental Representative after contract award.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Departmental Representative.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

.6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.

.7 Reproduce and distribute copies of minutes within three days after meetings; transmit to Departmental Representative, meeting participants, and affected parties not in attendance.

.8 Representatives of Contractor, Subcontractor, and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

.1 Within 15 days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.

.2 Departmental Representative, Contractor, major Subcontractors, field inspectors, and supervisors will be in attendance.

.3 Establish time and location of meeting and notify parties concerned minimum five days before meeting.

.4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.

.5 Agenda to include:

.1 Appointment of official representative of participants in the Work.

.2 Schedule of Work: in accordance with Section 01 32 16 - Construction Progress Schedules - Bar (GANTT) Chart.

.3 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00 - Submittal Procedures.

.4 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 52 00 - Construction Facilities.

.5 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

.6 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.

.7 Departmental Representative-provided products.

.8 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.

.9 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.

.10 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.

.11 Monthly progress claims, administrative procedures, photographs, hold backs.

.12 Appointment of inspection and testing agencies or firms.

.13 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

.1 During course of Work and two weeks prior to project completion, schedule progress meetings bi-weekly.

.2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.

.3 Notify parties minimum three days prior to meetings.

.4 Record minutes of meetings; circulate to attending parties and affected parties not in attendance within three days after meeting.

.5 Agenda to include the following:

.1 Review, approval of minutes of previous meeting.

.2 Review of Work progress since previous meeting.

.3 Field observations, problems, conflicts.

.4 Problems that impede construction schedule.

.5 Review of off-site fabrication delivery schedules.

.6 Corrective measures and procedures to regain projected schedule.

.7 Revision to construction schedule.

.8 Progress schedule, during succeeding work period.

.9 Review submittal schedules and expedite as required.

.10 Maintenance of quality standards.

.11 Review proposed changes for effect on construction schedule and on completion date.

.12 Other business.

END OF SECTION

Part 1 General

1.1 DEFINITIONS

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

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

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

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

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

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

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

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

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

1.2 REQUIREMENTS

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

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

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

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

1.3 SUBMITTALS

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

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

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

1.4 MASTER PLAN

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

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

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

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

1.5 PROJECT SCHEDULE

.1 Develop detailed Project Schedule derived from Master Plan.

.2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:

- .1 Award.
- .2 Shop Drawings, Samples.
- .3 Permits.
- .4 Mobilization.
- .5 Structural Steel.
- .6 Interior Architecture (Walls, Floors and Ceiling).
- .7 Plumbing.
- .8 Lighting.
- .9 Electrical.
- .10 Piping.
- .11 Controls.
- .12 Heating, Ventilating, and Air Conditioning.
- .13 Millwork.
- .14 Fire Systems.
- .15 Testing and Commissioning.
- .16 Completion, demobilization, and clean-up.

1.6 PROJECT SCHEDULE REPORTING

.1 Update Project Schedule on weekly 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.

1.7 PROJECT MEETINGS

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

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

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

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

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

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

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

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

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

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

.7 Accompany submissions with transmittal letter, containing:

- .1 Date.
- .2 Project title and number.
- .3 Contractor's name and address.
- .4 Identification and quantity of each shop drawing, product data and sample.
- .5 Other pertinent data.

.8 Submissions include:

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

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

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

.11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental

Representative where shop drawings will not be prepared due to standardized manufacture of product.

.12 Submit electronic copies of test reports for requirements requested in specification Sections, and as requested by Departmental Representative.

.1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product, or system to be provided has been tested in accord with specified requirements.

.2 Testing must have been within 3 years of date of contract award for project.

.13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.

.2 Certificates must be dated after award of project contract complete with project name.

.14 Submit electronic copies of manufacturers' instructions for requirements requested in specification Sections and as requested by Departmental Representative.

.1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.

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

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

.16 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.

.17 Delete information not applicable to project.

.18 Supplement standard information to provide details applicable to project.

.19 If upon review by Departmental Representative, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of Work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed.

.1 The review of shop drawings by Departmental Representative is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 SAMPLES

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

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

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

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

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

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

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic copy of colour digital photography in jpg format, standard resolution, as directed by Departmental Representative.

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

.3 Viewpoints and location: As determined by Departmental Representative.

.4 Frequency of photographic documentation: as directed by Departmental Representative.

.1 Upon completion of: framing and services before concealment, and as directed by Departmental Representative.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

.2 Province of Manitoba

.1 The Workplace Safety and Health Act RSM 1987, including latest updates and amendments.

1.2 SAFETY PLAN

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

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

1.3 RESPONSIBILITY

.1 The "Prime Contractor" according applicable local jurisdiction, is responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.

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

.3 Should any unforeseen or peculiar safety-related factor, hazard, or condition become evident during performance of Work, and follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction. Advise Departmental Representative verbally and in writing.

1.4 SUBMITTALS

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

.2 Submit site-specific Health and Safety Plan within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:

.1 Results of site-specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation.

.3 Submit electronic copies of Contractor's authorized representative's work site health and safety inspection reports weekly to Departmental Representative.

.4 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section [02 81 01 - Hazardous Materials].

.7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 10 working days after receipt of plan. Revise plan as appropriate and resubmit plan to Departmental Representative within 5 working days after receipt of comments from Departmental Representative.

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

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

.10 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.

1.5 FILING OF NOTICE

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

.2 Install proper site separation and identification to maintain time and space at all times throughout life of project.

1.6 SAFETY ASSESSMENT

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

1.7 MEETINGS

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

1.8 REGULATORY REQUIREMENTS

.1 Perform Work in accordance with Section [01 41 00 - Regulatory Requirements].

1.9 COMPLIANCE REQUIREMENTS

.1 Comply with The Workplace Safety and Act, Workplace Safety and Health Regulation, Manitoba Reg. 217.

.2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.10 UNFORESEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, advise Health and Safety co-ordinator, follow procedures in accordance with Acts and Regulations of Province having jurisdiction, and advise Departmental Representative verbally and in writing.

1.11 HEALTH AND SAFETY CO-ORDINATOR

.1 Employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator. Health and Safety Co-ordinator must:

.1 Have site-related working experience.

.2 Have working knowledge of occupational safety and health regulations.

.3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.

.4 Be responsible for implementing, enforcing daily and monitoring site-specific Contractor's Health and Safety Plan.

.5 Be on site during execution of Work and report directly to and be under direction of site supervisor.

1.12 POSTING OF DOCUMENTS

.1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Province having jurisdiction, and in consultation with Departmental Representative.

1.13 WHMIS

.1 Ensure that products used in project comply with Workplace Hazardous Materials Information System (WHMIS) Regulations and Chemical Substances of the OH&S Act and Regulations regarding use, handling, labelling, storage, and disposal of hazardous materials.

.2 Deliver copies of relevant Material Safety Data Sheets (MSDS) to job site and Departmental Representative. MSDS to be acceptable to Labour Canada and Health and Welfare Canada for controlled products that will be used in performance of this work. Locate MSDS in accessible locations for workers and visitors throughout the site, bound and organized in binders.

.3 Train workers required to use or to work in close proximity to controlled products in accordance with OH&S Act and Regulations.

.4 Label controlled products at jobsite in accordance with OH&S and Regulations and WHMIS.

.5 Provide appropriate emergency facilities as specified in the MSDS where workers might be exposed to contact with chemicals, including eye-wash facilities, emergency shower.

.1 Workers are to be trained in use of such emergency equipment.

.6 Provide appropriate personal protective equipment as specified in the MSDS where workers are required to use controlled products.

.1 Properly fit workers for personal protective equipment

.2 Train workers in care, use, and maintenance of personal protective equipment.

.7 No controlled products are to be brought on-site without prior approved MSDS.

.8 MSDS are to remain on site at all times.

1.14 CORRECTION OF NON-COMPLIANCE

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

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

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

1.15 POWDER ACTUATED DEVICES

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

1.16 WORK STOPPAGE

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

1.17 FIRE PROTECTION

.1 Comply with requirements of the local Fire Commissioner's Office.

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

.3 Burning rubbish and construction waste materials is not permitted on site.

.4 Maintain placed or installed fire resistive construction and firestopping to protect the portions of the Work during construction.

END OF SECTION

Part 1 General

1.1 REFERENCES AND CODES

.1 Perform Work in accordance with 2015 National Building Code of Canada (NBC) including amendments up to tender closing date, and other codes of provincial or local application; in case of conflict or discrepancy, more stringent requirements apply. The following governing standards are also to apply.

.1 Canadian Electrical Code, 2015.

.2 National Plumbing Code of Canada, 2015.

.3 National Fire Code of Canada, 2015.

.2 Meet or exceed requirements of:

.1 Contract documents.

.2 Specified standards, codes and referenced documents.

1.2 HAZARDOUS MATERIAL DISCOVERY

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

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

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

1.3 BUILDING SMOKING ENVIRONMENT

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

END OF SECTION

Part 1 General

1.1 INSPECTION

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

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

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

.4 Departmental Representative will order part of Work to be examined 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 Work and pay cost of examination and correction. If Work is found in accordance with Contract Documents, cost of examination and replacement will be borne by Departmental Representative.

1.2 INDEPENDENT INSPECTION AGENCIES

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

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

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

.4 If defects are revealed during inspection and testing, appointed agency will request additional inspection and testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative at no cost to Departmental Representative. Pay costs for retesting and re-inspection.

1.3 ACCESS TO WORK

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

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

1.4 PROCEDURES

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

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

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

1.5 REJECTED WORK

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

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

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

1.6 REPORTS

.1 Submit three hard copies and one electronic copy of inspection and test reports to Departmental Representative.

.2 Provide copies to subcontractor of work being inspected or tested and manufacturer or fabricator of material being inspected or tested.

1.7 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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

1.8 MOCK-UPS

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

.2 Construct in locations acceptable to Departmental Representative.

.3 Prepare mock-ups for Departmental Representative’s review with reasonable promptness and in orderly sequence, to not cause delays in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time, and no claim for extension by reason of such default will be allowed.

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

.6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.9 MILL TESTS

.1 Submit mill test certificates as requested.

1.10 EQUIPMENT AND SYSTEMS

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

.2 Refer to Section 01 91 31 – Commissioning Plan for definitive requirements.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA S269.2-M87 (R2003), Access Scaffolding for Construction Purposes.

.2 CAN/CSA Z321-96 (R2006), Signs and Symbols for the Workplace.

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities to execute work expeditiously.

.4 Remove from site all such work after use.

1.4 SCAFFOLDING

.1 Scaffolding in accordance with CSA S269.2.

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

1.5 HOISTING

.1 Provide, operate and maintain hoists [cranes] required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists to be operated by qualified operator.

1.6 SITE STORAGE/LOADING

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

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

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

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

1.8 SECURITY

.1 Provide and pay for responsible security personnel to guard site and contents of site after working hours and during holidays.

1.9 OFFICES

.1 Provide office heated to 22°C, lighted 750 lx, ventilated, and of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.10 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.11 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.12 CLEAN-UP

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

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

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

.4 Stack stored new or salvaged material not in construction facilities.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

.1 Provide temporary controls to execute Work expeditiously.

.2 Remove from site all such work after use.

1.2 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open stair wells, open edges of floors and roofs.

.2 Provide as required by governing authorities.

1.3 WEATHER ENCLOSURES

.1 Provide weather tight closures to unfinished door and window openings, tops of shafts and other openings in floors and roofs until they are permanently enclosed.

.2 Erect enclosures to allow access for the installation of materials and to allow for work inside enclosure.

.3 Close off floor areas where walls are not finished; seal off other openings; enclose building interior work for temporary heat.

.4 Design enclosures to withstand wind pressure and snow loading.

.5 Ensure that upon final construction, and during construction, the work is executed to prevent the entry of water, snow and air infiltration into the interior of the building, and to accept responsibility to correct any deficient work. Bring to the attention of the Departmental Representative prior to construction any detail that may compromise weather tightness.

.6 Provide weather enclosures or other means as necessary to protect foundation excavations to maintain soil bearing capacity.

1.4 DUST TIGHT SCREENS

.1 Provide dust tight screens or partitions to localize dust-generating activities, and for protection of workers, finished areas of Work and public.

.2 Maintain and relocate protection until such work is complete.

.3 Coordinate location and security measures with Departmental Representative on Site.

1.5 ACCESS TO SITE

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

1.6 PUBLIC TRAFFIC FLOW

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

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

.1 Protect surrounding private and public property from damage during performance of Work.

.2 Be responsible for damage incurred.

1.9 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

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

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

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Within text of each specifications section, reference may be made to reference standards. Conform to these reference standards, in whole or in part as specifically requested in specifications.

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

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

1.2 QUALITY OF PRODUCTS

.1 Products, materials, equipment, and articles incorporated in Work are to be new, not damaged nor defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source, and quality of products provided.

.2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.

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

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

.5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.

.6 Permanent labels, trademarks, and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

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

1.4 STORAGE, HANDLING, AND PROTECTION

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

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

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

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

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

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

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

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

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

1.5 TRANSPORTATION

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

.2 Transportation cost of products supplied by Owner will be paid by Departmental Representative. Unload, handle, and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.7 QUALITY OF WORK

.1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify

Departmental Representative if required Work is such as to make it impractical to produce required results.

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

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

1.8 CO-ORDINATION

.1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.

.2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 CONCEALMENT

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

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

1.10 REMEDIAL WORK

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

.2 For remedial work, employ specialists familiar with materials affected.

1.11 LOCATION OF FIXTURES

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

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

1.12 FASTENINGS

.1 Provide metal fastenings and accessories in same texture, colour, and finish as adjacent materials, unless indicated otherwise.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.

.4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood or other organic material plugs are not acceptable.

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

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

1.13 FASTENINGS - EQUIPMENT

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

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

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

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

1.14 PROTECTION OF WORK IN PROGRESS

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

1.15 EXISTING UTILITIES

.1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and/or building occupants and pedestrian and vehicular traffic.

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

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Submit written request in advance of cutting or alteration which affects:

- .1 Structural integrity of elements of project.
- .2 Integrity of weather-exposed or moisture-resistant elements.
- .3 Efficiency, maintenance, or safety of operational elements.
- .4 Visual qualities of sight-exposed elements.
- .5 Work of Owner or separate contractor.

.3 Include in request:

- .1 Identification of project.
- .2 Location and description of affected Work.
- .3 Statement on necessity for cutting or alteration.
- .4 Description of proposed Work, and products to be used.
- .5 Alternatives to cutting and patching.
- .6 Effect on Work of Owner or separate contractor.
- .7 Written permission of affected separate contractor.
- .8 Date and time work will be executed.

1.2 MATERIALS

.1 As required for original installation.

.2 Change in Materials: Submit request for substitution in accordance with Section 01 33 00 - Submittal Procedures.

1.3 PREPARATION

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

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

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

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

.5 Provide protection from elements for areas that are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

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

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

.3 Uncover Work to install ill-timed Work.

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

.5 Remove samples of installed Work for testing.

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

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

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

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

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

.11 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material in accordance with Section 07 84 00 – Firestopping, full thickness of the construction element.

.12 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.

.13 Conceal pipes, ducts, and wiring in floor, wall, and ceiling construction of finished areas except where indicated otherwise.

END OF SECTION

Part 1 General

1.1 PROJECT CLEANLINESS

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

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

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

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

.5 Provide on-site containers for collection of waste materials and debris. Equip containers with covers to prevent spread of waste by wind, and entry into container by unauthorized persons.

.6 Provide and use marked separate bins for recycling. Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.7 Dispose of waste materials and debris off site.

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

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

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

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

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

1.2 FINAL CLEANING

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

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

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

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

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

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

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

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

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

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

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

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

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

.14 Remove dirt and other disfiguration from exterior surfaces.

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

.16 Sweep and wash clean paved areas.

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

.18 Clean roofs, downspouts, and drainage systems.

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

.20 Remove snow and ice from access to building.

END OF SECTION

Part 1 General

1.1 STORAGE, HANDLING AND PROTECTION

.1 Store materials to be re-used in locations as directed by Departmental Representative.

.2 Unless specified otherwise, materials for removal become Contractor's property.

.3 Protect structural components not removed for demolition from movement or damage.

.4 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.

.5 Protect drainage, mechanical, and electrical systems from damage and blockage.

1.2 DISPOSAL OF WASTES

.1 Remove waste materials as deconstruction/disassembly and construction work progresses.

.2 Do not dispose of waste, volatile materials, mineral spirits, oil, nor paint thinner into waterways, storm, or sanitary sewers.

Part 2 Products

Not used.

Part 3 Execution

3.1 APPLICATION

.1 Handle waste materials in accordance with appropriate regulations and codes.

3.2 CLEANING

.1 Remove tools and waste materials on completion of Work and leave work area in clean and orderly condition.

.2 Clean-up work area as work progresses.

3.3 DIVERSION OF MATERIALS

.1 On-site sale of salvaged, recovered, reusable, and recyclable material is not permitted.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Procedures for Acceptance of Work:

.1 Contractor's Inspection:

.1 Contractor: Conduct inspection of Work, 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; submit verification that corrections have been made.

.3 Request Departmental Representative inspection.

.2 Departmental Representative Inspection:

.1 Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.

.2 Contractor to correct Work as directed.

.3 Completion Tasks: Submit written certificates, in English, indicating that tasks have been performed as follows:

.1 Work: Completed and inspected for compliance with Contract Documents.

.2 Defects: Corrected and deficiencies completed.

.3 Equipment and systems: Tested, adjusted, balanced, and fully operational.

.4 Certificates required by Fire Commissioner and Utility companies: Submitted.

.5 Operation of systems: Demonstrated to designated personnel.

.6 Commissioning of mechanical systems: completed in accordance with 01 91 13 - General Commissioning (Cx) Requirements, and final Commissioning Report submitted to Departmental Representative.

.7 Work: Complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks have been completed, request final inspection of Work by Departmental Representative and Contractor.

.2 When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

1.2 FINAL CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Pre-warranty Meeting:

.1 Convene meeting one week prior to contract completion with Contractor's Representative and Departmental Representative, in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify Project requirements.

.2 Review warranty requirements.

.2 Departmental Representative to establish communication procedures for:

.1 Notifying construction warranty defects.

.2 Determine priorities for type of defects.

.3 Determine reasonable response time.

.3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.

.4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, three print and three electronic final copies of operating and maintenance manuals in English. Confirm quantities of O&M manuals required with Departmental Representative.

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

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

1.3 MECHANICAL AND ELECTRICAL SUBMITTALS

.1 For submittals related to Mechanical work, refer to Section 22 05 00.

.2 For submittals related to Electrical work, refer to Section 26 05 00.

1.4 FORMAT

.1 Organize data as instructional manual.

.2 Binders: Vinyl, hard covered, 3 'D' ring, with spine and face pockets.

.1 When multiple binders are used, correlate data into related consistent groupings.

.3 Text: Manufacturer's printed data, or typewritten data.

1.5 CONTENTS – O&M MANUALS

.1 Binder Cover and Binder Edge

- .1 Include: Building Name, address, project name, project number, completed date.

.2 Title Page

- .1 O&M Manual for... Building name, address, date, general contractor information: name address, phone number.
- .2 Consultant name address, phone number.
- .3 Table of contents indicates each binder's contents.

.3 Index and tabs

- .1 Dividers with permanently marked tabs separate each section and sub section.
- .2 Tab labels typed, not hand written.
- .3 Main tab for each specification section.

.4 Tab A: Signed Letter of Warranty, to include:

- .1 Date.
- .2 Project name.
- .3 Project number.
- .4 Building Location.
- .5 Warranty start date and end, to be from date of substantial, declared by Consultant.
- .6 Organization, names and phone numbers of persons to call for warranty services.
- .7 All warranties to be included from all contractors in this section and extended warranties.

.5 Tab B: Contact Information for all Subcontractors and Suppliers, including:

- .1 Name, address, telephone number of manufacturer, installing contractor.
- .2 24-hour number for emergency service for all equipment in this section identified by equipment.

.6 Tab C: All Reports and Permits:

- .1 TAB reports.
- .2 Pre-functional tests.
- .3 Start up reports.
- .4 Completed performance verification forms (found in the Tender Documents).
- .5 Cabling verifications.
- .6 ESA certification.
- .7 TSSA certification.
- .8 Fire alarm certification.

.9 Seismic certification.

.10 All permits, including electrical, building, plumbing.

.7 Tab D: As-Built Drawings:

.1 Marked-up by contractor**,** changes marked in red to also be given to Consultant.

.8 Tab E: Operation and Shutdown:

.1 Sequence of Operation-outline how the systems installed were designed to work.

.2 Accurate Sequence of Operation, with detailed instruction in proper sequence, for each mode of operation.

.3 Emergency Operation: Functions of equipment that can be operated while other functions disabled. Included only for alternate abnormal operations that can follow when there is a partial failure, malfunctioning of components, or other unusual condition.

.4 Shutdown Procedure: Instructions for stopping and securing the equipment after operation. If a sequence is required, step-by-step instructions given in that order.

.9 Tab F: CMMS Data Sheets:

.1 All equipment that is to be deleted, removed, added, or replaced is to have a CMMS inventory sheet completed and included in the O&M Manual.

.10 Tab G: Shop Drawings:

.1 Copy of all reviewed “by the Consultant” shop drawings.

.11 Tab H: Maintenance

.1 Copy of specific service and maintenance manuals.

.2 Preventative and corrective maintenance, with service procedures and schedules.

.3 Schedule for preventive maintenance in a printed format and electronic format compatible with Owner’s system.

.4 Recommended frequency of performance for each preventive maintenance task, cleaning, inspection and scheduled overhauls or reconditioning.

.5 Cleaning: Instructions and schedules for all routine cleaning and inspection recommended, including recommended cleaners and lubricants.

.6 Inspection: Periodic inspection of equipment required for operation, cleaning or other reasons, with items to be inspected indicated and inspection criteria given for motors, controls, filters, and any other maintenance items.

.7 Instructions for minor repairs or adjustments required for preventive maintenance routines.

.8 Listing of any special tools required to service or maintain the equipment.

.12 Last Tab: Miscellaneous Items

.1 Health and Safety submittals including: site specific hazard assessment, safety manual TOC and company safety policy, MSDS sheets (if applicable) signed site orientations for worker, copy of first aid certificate, copy of emergency plan and muster location.

.2 Special requirements for equipment, not to be used for reports.

1.6 AS-BUILT DOCUMENTS AND SAMPLES

.1 Maintain, in addition to requirements in General Conditions, at site for Departmental Representative one record copy of:

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

.5 Reviewed shop drawings, product data, and samples.

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store as-built documents and samples in field office apart from documents used for construction.

.1 Provide files, racks, and secure storage.

.3 Label as-built documents and file in accordance with Section number listings in List of Contents of this Project Manual.

.1 Label each document "AS-BUILT DOCUMENTS" in neat, large, printed letters.

.4 Maintain as-built documents in clean, dry and legible condition.

.1 Do not use as-built documents for construction purposes.

.5 Keep as-built documents and samples available for inspection by Departmental Representative.

.6 Record as-built information on drawings and in designated copy of Project Manual provided by Departmental Representative.

.7 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.

.8 Maintain information during construction on project site drawings and accurately record deviations of newly installed or existing works from Contract documents.

.9 Use red felt tip marking pens for recording information.

.10 Mark on one set of prints and at completion of project and prior to final inspection; neatly transfer notations to second set.

.11 Ensure but do not limit recording of following information on as-built drawings:

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

.2 Changes made by Change Order.

.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.4 Field changes of dimension and detail.

.5 Details not on original Contract Drawings.

.6 References to related shop drawings and modifications.

.12 Incorporate as-built information into CAD drawings.

.13 Submit as-built drawings to Departmental Representative.

.1 Provide in electronic form as CAD .dwg format, on CD or DVD.

.14 Specifications: Mark each item to record actual construction, including:

.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.

.2 Changes made by Addenda and change orders.

1.7 RECORD DOCUMENTS

.1 Prior to Substantial Performance of the Work, provide on CD or DVD the marked-up information from the as-built documents to a master set of drawing files provided by the Departmental Representative:

.2 Mark revised documents as "RECORD DOCUMENTS". Include all revisions.

.3 Indicate changes on the electronic set of record drawings. Provide updated record drawings in .dwg format.

.4 Submit completed record documents to Departmental Representative on CD or DVD.

1.8 EQUIPMENT AND SYSTEMS

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

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

.2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Panel board circuit directories: Provide electrical service characteristics, controls, and communications.

.3 Include installed colour coded wiring diagrams.

.4 Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences.

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

.2 Include summer, winter, and any special operating instructions.

.5 Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

.6 Provide servicing and lubrication schedule, and list of lubricants required.

.7 Include manufacturer's printed operation and maintenance instructions.

.8 Include sequence of operation by controls manufacturer.

.9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

.10 Provide installed control diagrams by controls manufacturer.

.11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.

.12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

.13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

.14 Include test and balancing reports as specified in Section 01 91 13 - General Commissioning (Cx) Requirements.

.15 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

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

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

.3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

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

1.10 MAINTENANCE MATERIALS

.1 Spare Parts:

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

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

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.2 Extra Stock Materials:

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

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

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

.5 Obtain receipt for delivered products and submit prior to final payment.

.3 Special Tools:

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

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

.3 Deliver to site; place and store.

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.11 DELIVERY, STORAGE, AND HANDLING

.1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.

.2 Store in original and undamaged condition with manufacturer's seal and labels intact.

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

.4 Store paints and freezable materials in a heated and ventilated room.

.5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.12 WARRANTIES AND BONDS

.1 Develop warranty management plan to contain information relevant to Warranties.

.2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative approval.

.3 Warranty management plan to include required actions and documents to assure that Departmental Representative receives warranties to which it is entitled.

.4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.

.5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.

.6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:

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

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

.3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.

.4 Verify that documents are in proper form, contain full information, and are notarized.

.5 Co-execute submittals when required.

.6 Retain warranties and bonds until time specified for submittal.

.7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.

.8 Conduct joint 4 month and 9 month warranty inspection, measured from time of acceptance, by Departmental Representative.

.9 Include information contained in warranty management plan as follows:

.1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.

.2 Provide list for each warranted equipment, item, feature of construction or system indicating:

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

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

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

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

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

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

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

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

.3 Contractor's plans for attendance at 4 and 9 month post-construction warranty inspections.

.4 Procedure and status of tagging of equipment covered by extended warranties.

.5 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

.10 Respond in timely manner to oral or written notification of required construction warranty repair work.

.11 Written verification to follow oral instructions.

.1 Failure to respond will be cause for the Departmental Representative to proceed with action against Contractor.

1.13 WARRANTY TAGS

.1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by Departmental Representative.

.2 Attach tags with copper wire and spray with waterproof silicone coating.

.3 Leave date of acceptance until project is accepted for occupancy.

.4 Indicate following information on tag:

.1 Type of product/material.

.2 Model number.

.3 Serial number.

.4 Contract number.

.5 Warranty period.

.6 Inspector's signature.

.7 Construction Contractor.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE REQUIREMENTS

.1 Demonstrate operation and maintenance of equipment and systems to designated personnel two weeks prior to date of substantial performance.

.2 Departmental Representative: Provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.

.3 Preparation:

.1 Verify conditions for demonstration and instructions comply with requirements.

.2 Verify designated personnel are present.

.3 Ensure equipment has been inspected and put into operation in accordance with Section 01 91 13 – General Commissioning Requirements.

.4 Ensure testing, adjusting, and balancing have been performed in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements and equipment and systems are fully operational.

.4 Demonstration and Instructions:

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

.2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.

.3 Review contents of manual in detail to explain aspects of operation and maintenance.

.4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

.5 Time Allocated for Instructions: Ensure amount of time provided for instruction of each item of equipment or system is adequate for full orientation and training of designated personnel.

1.2 SUBMITTALS

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

.2 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Departmental Representative's approval.

.3 Submit reports within one week after completion of demonstration, that demonstration and instructions have been satisfactorily completed.

.4 Give time and date of each demonstration, with list of persons present.

.5 Provide copies of completed operation and maintenance manuals for use in demonstrations and instructions.

1.3 QUALITY ASSURANCE

.1 When specified in individual Sections requiring manufacturer to provide authorized representative to demonstrate operation of equipment and systems:

.1 Instruct designated personnel.

.2 Provide written report that demonstration and instructions have been completed.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

1.2 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Submit 20 days prior to start of demolition and removals Work.

.3 Where required, submissions to be signed and sealed by a Professional Engineer licensed in the Province of Manitoba.

.4 Shop Drawings

.1 Drawings, diagrams or details indicating sequence of disassembly Work, supporting structures, and underpinning.

.5 Hazardous Materials: provide description of Hazardous Materials and Notification of Filing with proper authorities prior to beginning of Work as required.

.6 Demolition plan:

.1 Show schedule of selective demolition.

.2 Number and location of dumpsters.

.3 Anticipated frequency of tippage.

.4 Show impacts, interruptions, and delays to building operations.

.7 Waste reduction: Submit progress reports and audits in accordance with Section 01 74 21 – Construction/Demolition Waste Management and Disposal.

1.3 QUALITY ASSURANCE

.1 Convene pre-installation meeting one week prior to beginning work of this section to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with building subtrades.

.2 Arrange for site visit with Departmental Representative to examine existing site conditions adjacent to demolition work, prior to start of Work.

.3 Hold project meetings every month.

.1 Ensure key personnel, site supervisor, project manager, subcontractor representatives attend.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect existing items designated to remain and items designated for salvage. In event of damage to such items, immediately replace or make repairs to approval of Departmental Representative and at no cost to Departmental Representative.

.2 Remove and store materials to be salvaged, in manner to prevent damage.

.3 Store and protect in accordance with requirements for maximum preservation of material.

1.5 SITE CONDITIONS

.1 Perform operations, machine and equipment movements, deliveries and removals at time or times that will permit uninterrupted operations in and around structures, including parking, deliveries, and Site access and egress.

.2 Take over structures to be demolished based on condition on date that Bids close.

.3 In all circumstances, ensure that demolition work does not adversely affect adjacent water courses groundwater and wildlife, nor contribute to excess air and noise pollution.

.4 Do not dispose, of waste or volatile materials such as mineral spirits, oil, petroleum based lubricants, or toxic cleaning solutions into watercourses, storm or sanitary sewers. Ensure proper disposal procedures are maintained throughout project.

.5 Do not pump water containing suspended materials into watercourses, storm or sanitary sewers, or onto adjacent properties.

.6 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authorities.

.7 Protect trees, plants and foliage on site and adjacent properties where indicated.

Part 2 Products

Not used.

Part 3 Execution

3.1 GENERAL

.1 Products requiring demolition become Contractor's property. Remove Products from Site daily, unless such Products are otherwise specified or indicated on Contract Drawings to be reused or handed over to Departmental Representative.

.2 Stockpiling of rubble, debris and surplus Products on Site will not be permitted.

.3 Clean up rubble and debris resulting from Work promptly and dispose at end of day or place in waste disposal bins. Empty bins on regular basis.

3.2 EXAMINATION

.1 Examine adjacent structures and other installations prior to commencement of demolition and removals Work.

3.3 PREPARATION

.1 Inspect site with Departmental Representative and verify extent and location of items designated for removal, disposal, alternative disposal, recycling, salvage, and items to remain.

.2 Locate and protect utilities. Preserve active utilities traversing site in operating condition.

.3 Notify and obtain approval of utility companies before starting demolition.

.4 Disconnect electrical and telephone service lines in areas to be demolished. Post warning signs on electrical lines and equipment that remain energized to serve other areas during period of demolition. Disconnect electrical and telephone service lines in demolition areas to requirements of local authority having jurisdiction.

.5 Disconnect and cap mechanical services in accordance with requirements of local authority having jurisdiction. Natural gas supply lines are to be removed by gas company or by qualified trade, in accordance with gas company instructions.

.6 Erect and maintain dustproof partitions, seal off ducts as required to prevent spread of dust and fumes to other parts of the building. On completion, remove partitions and make good surfaces to match adjacent surfaces.

3.4 EXISTING CONDITIONS

.1 Prior to start of demolition work, remove from site materials defined as contaminated or hazardous by authorities having jurisdiction, and dispose at designated disposal facilities.

3.5 PROTECTION

.1 Prevent movement of or damage to adjacent structures, services and parts of existing structure to remain. Supply and install bracing and shoring as required. Make good damage caused by demolition, to acceptance of Departmental Representative.

.2 Protect adjacent structures and property against damage that might occur from falling debris or other causes. Repair or replace damage caused from Work of this Section to acceptance of Departmental Representative.

.3 Do not interfere with use of adjacent structures and Work areas. Maintain free, safe passage to and from adjacent structures and Work areas.

.4 Take precautions to support affected structures. If safety of structure being demolished, adjacent structures or services are endangered, cease demolition operations and take necessary action to support endangered item. Immediately inform Departmental Representative. Do not resume demolition until reasons for endangering have been determined and corrected and action taken to prevent further endangering.

.5 If movement or settlement occurs, install additional bracing and shoring as necessary and make good damage to acceptance of Departmental Representative.

.6 Prevent debris from blocking surface drainage, mechanical, and electrical systems which are required to remain in operation.

.7 Pay particular attention to prevention of fire and elimination of fire hazards that would endanger Work or adjacent structures and premises.

.8 Close off access to areas where demolition is proceeding by barricades and post warning signs.

.9 Where required, supply, install and maintain barricades, guards, railings, lights, warning signs, security and other safety measures, and fully protect persons and property.

.10 Do not proceed with demolition work when weather conditions constitute a hazard to workers and site.

.11 Dust/Weather Protection:

.1 Prior to demolition Work proceeding in existing structures, temporarily enclose Work areas, access and supply and install dustproof partitions. Design partitions to prevent dust and dirt infiltration into adjoining areas.

.2 Prevent dust, dirt and material caused by demolition operations from entering operational areas.

.3 Adjust and relocate partitions as required for various operations of Work.

.4 Upon completion of Work, remove and dispose of partitions from Site.

3.6 DEMOLITION

.1 Carry out demolition in accordance with the requirements of CSA S350.

.2 Perform demolition with extreme care. Confine effects of demolition to those parts that are to be demolished.

.3 Perform Work and prevent inconvenience to persons outside the demolition area.

.4 Demolish parts of structure to permit construction of addition as indicated.

.5 Perform Work to minimize dust.

.6 Do not sell or burn materials on Site.

.7 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.

.8 Lower waste materials in a controlled manner; do not drop or throw materials from heights.

.9 At end of day's Work, leave Work in safe condition with no part in danger of toppling or falling.

.10 Drainage and Sewer System Protection:

.1 Ensure that no dust, debris, nor slurry enters drainage and sewer system on Site.

.2 Remove and dispose of debris and slurry promptly from Site.

3.7 REMOVAL OPERATIONS

.1 Except where otherwise specified, all materials indicated or specified to be permanently removed from the Place of the Work shall become Contractor's property. Maximize salvage and recycling of such materials, consistent with proper economy and expeditious performance of the Work.

.2 Remove items as indicated.

.3 Do not disturb items designated to remain in place.

.4 Removal from site: Interim removal of stockpiled material will be required by Departmental Representative, if material is deemed to interfere with operations.

3.8 RESTORATION

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

3.9 CLEAN UP

.1 Upon completion of work, remove debris, trim surfaces, and leave work site clean.

.2 Use cleaning solutions and procedures which are not harmful to health, are not injurious to plants, and do not endanger wildlife, adjacent water courses or ground water.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C270-14a, Mortar for Unit Masonry.

.2 ASTM C1714/C1714M-13a, Preblended Dry Mortar Mix for Unit Masonry.

.3 ASTM C920-05, Standard Specification for Elastomeric Joint Sealants.

.4 ASTM C1184-14, Standard Specification for Structural Silicone Sealants.

.5 ASTM C1714/C1714M-10, Standard Specification for Preblended Dry Mortar Mix for Unit Masonry.

.2 Canadian Standards Association (CSA)

.1 CAN/CSA G30.18-09, Carbon Steel Bars for Concrete Reinforcement.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications, and data sheets.

.1 Provide two copies of Workplace Hazardous Materials Information System (WHMIS) - Material Safety Data Sheets (MSDS) in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Manufacturer's installation instructions: submit manufacturer's installation instructions to requirements of Section 01 61 00 - Common Product Requirements.

.4 Samples: Provide glass block unit samples in accordance with Section 01 33 00 - Submittal Procedures, supplemented as follows:

.1 Provide duplicate glass units, full size, illustrating design and face pattern.

.2 Provide representative samples of expansion strips and sealant.

1.3 QUALITY ASSURANCE

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

.2 Pre-installation meeting: conduct pre-installation meeting to verify project requirements manufacturer’s instructions and manufacturer’s warranty requirements.

1.4 MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct glass block assembly, in cell designated by Departmental Representative, illustrating materials installation and interface.

.3 Locate where directed.

.4 Allow one week for inspection of mock-up by Departmental Representative before proceeding with glass block work.

.5 Reviewed and accepted mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, store and handle glass unit masonry in accordance with Section 01 61 00 – Common Product Requirements.

1.6 WASTE MANAGEMENT

.1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 SITE CONDITIONS

.1 Ambient Conditions: assemble and erect components when temperature is above 4°C.

.2 Field Measurements: Make field measurements necessary to ensure proper fit of all members.

Part 2 Products

2.1 MANUFACTURED UNITS

.1 Glass block: Solid, with joint key for mortar bond.

.1 Pattern and design: Transparent.

.2 Outer surfaces: Smooth.

.3 Inner surfaces: Sand-blasted.

.4 Colour: Clear.

.5 Edge coating colour: Manufacturer's standard translucent polyvinyl-butyral based edge coating.

.6 Nominal sizes:

.1 Square units: 203 mm square x 76 mm thick.

.7 Impact strength: 16.9 N-m (> 150 inch-lbs).

.8 Sound Transmission Class: 53 STC.

2.2 ACCESSORIES

.1 Mortar: ASTM C270 and ASTM C1714, Type S, pre-mixed blend of white Portland cement, white sand, lime and chemical additives, intended for glass unit masonry construction.

.1 Compressive strength: 12.4 MPa (1800 psi).

.2 Expansion strips: 100 mm wide x 10 mm thick, continuous semi-rigid glass fibre or white flexible plastic foam, in accordance with recommendations of glass unit manufacturer.

.3 Sealant: To ASTM C1184 and ASTM C920, Class 50, neutral, one-part, non-staining, waterproof, structural silicone sealant.

.1 Apply sealant 24 hours after glass unit masonry installation.

.4 Sealant backing: Polyethylene foam, neoprene, or equal as approved by sealant manufacturer.

.5 Spacers: Plastic, concealed type, allowing pointing mortar and placing reinforcing and panel anchors without obstruction, of size to provide horizontal and vertical joint width indicated, capable of supporting glass units until mortar set, incorporated into structural design of glass unit masonry.

.6 Security bars: Steel to CAN/CSA G30.18.

2.3 SOURCE QUALITY CONTROL

.1 Ensure glass block, components and materials are from single manufacturer.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

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

.2 Examine openings to receive glass unit masonry. Verify correct size, location, squared and plumb and readiness to receive work of this Section.

.1 Inform Departmental Representative of unacceptable conditions.

.2 Proceed with installation only after unacceptable conditions have been remedied.

.3 Verify that substrate conditions are acceptable for product installation in accordance with manufacturer's instructions.

3.3 PREPARATION

.1 Ensure structure or substrate is adequate to support glass block.

.2 Surface Preparation: Prepare surface in accordance with manufacturer's written recommendations.

.3 Clean glass units of foreign substances.

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

.5 Protect elements surrounding work of this Section from damage and disfiguration.

3.4 INSTALLATION

.1 Erect glass units and accessories in accordance with manufacturer's instructions.

.2 Install perimeter metal channels, anchors.

.3 Coat surface under units with asphalt emulsion as a bond breaker; allow to dry before placing mortar.

.4 Install glass unit spacers to manufacturer's recommendations.

.5 Set glass units with full bond mortar joints. Furrowing not permitted. Remove excess mortar.

.6 Do not install glass unit when ambient temperature is below 4°C. Maintain ambient temperature above 4°C for 48 hours after installation.

.7 Place units to maintain uniform joint width of 6 mm.

.8 Install unit masonry to avoid contact of glass units with metal accessories or frames.

.9 Isolate glass block from adjacent construction on sides and top with expansion strips concealed within perimeter trim. Keep expansion joint voids clear of mortar.

.10 Shore assembly until mortar will maintain panel in position without movement.

.11 Joint reinforcement:

.1 Install reinforcement in accordance with NBC.

3.5 CONSTRUCTION

.1 Jointing:

.1 Tool joints to concave profile, exposing shoulders of glass units.

.2 Rake out mortar joints to depth equal to joint width and not less than 13 mm, to receive pointing mortar.

.3 Rake out mortar joints to half of joint width but not less than 5 mm depth, to receive joint sealant.

.2 Application of pointing mortar.

.1 Neatly tool surface to a concave profile. Expose shoulders of glass units.

.2 Remove excess mortar while it is still plastic using a clean, wet sponge or a scrub brush with stiff bristles.

.3 Vacuum clean mortar joints.

.3 Application of Sealant:

.1 Apply sealant 24 hours after glass unit masonry installation.

.2 Form surfaces of sealant smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Tool surface to a slight concave profile. Edges of joints to expose shoulders of glass units.

.3 Remove excess sealant.

3.6 TOLERANCES

.1 Tolerance for glass block unit construction:

.1 Variation from specified joint width: plus 2 mm and minus 0 mm.

.2 Maximum variation from flat plane: 3 mm in 3 m, non-cumulative.

3.7 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning, supplemented as follows.

.1 Remove mortar particles using a clean, wet sponge or cloth. Rinse sponge or cloth frequently in clean water to remove abrasive particles that could scratch glass surfaces. Allow any remaining film on the block to dry to a powder.

.2 Remove excess caulking materials with commercial solvents such as xylene, mineral spirits, or naphtha and follow with normal wash and rinse. Do not damage caulking by over-application of strong solvents. Comply with solvent manufacturers' printed data for toxicity and flammability warnings.

.2 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.8 PROTECTION

.1 Brace and protect glass block unit construction.

.2 Make good damage to adjacent materials caused by glass block installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A123/A123M-13, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.

.3 ASTM E84-14, Standard Test Method for Surface Burning Characteristics of Building Materials.

.2 Canadian Standards Association (CSA)

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.2 CSA O112.9-10 (R2014), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).

.3 CSA O121-08 (R2013), Douglas Fir Plywood.

.4 CSA O141-05 (R2014), Softwood Lumber.

.5 CSA O151-09 (R2014), Canadian Softwood Plywood.

.6 CSA O325-07 (R2012), Construction Sheathing.

.3 National Lumber Grades Authority (NLGA)

.1 NLGA Standard Grading Rules for Canadian Lumber (2014 edition).

.4 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories. Include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

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

.2 Plywood, particleboard, OSB, and wood based composite panels in accordance with CSA and ANSI standards.

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

.1 Lumber: Softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:

.1 Use S2S or S4S materials.

.2 Board sizes: "Standard" or better grade.

.3 Dimension sizes: "Standard" light framing or better grade.

.4 Post and timbers sizes: "Standard" or better grade.

.3 Plywood, OSB and wood based composite panels: CSA O325.

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

.5 Canadian softwood plywood (CSP): CSA O151, standard construction.

.6 Treated wood products: To CSA O80 Series.

.7 Fire retardant treated plywood: To CAN/ULC S102 or ASTM E84:

.1 Flame spread: Maximum 25.

.2 Smoke developed: Maximum 25.

2.2 ACCESSORIES

.1 Insulating sill gasket: Rubberized, moisture resistant 3 mm thick foam strip, 12 mm wide, with self-sticking adhesive on one face, lengths as required.

.2 Air seal: Closed cell polyurethane or polyethylene.

.3 Sealants: In accordance with Section 07 92 00 - Joint Sealants.

.1 Sealants: Provide pick-proof sealants.

.4 General purpose adhesive: CSA O112.9.

.5 Nails, spikes and staples: CSA B111.

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

.7 Proprietary fasteners: Toggle bolts, expansion shields and lag bolts, screws and lead or inorganic fibre plugs, recommended for purpose by manufacturer.

.8 Joist hangers: Minimum 1 mm thick sheet steel, galvanized ZF001 coating designation.

.9 Fasteners: Hot dipped galvanized steel to ASTM A123/A123M or ASTM A653/A653M for high humidity and treated wood locations, unfinished steel elsewhere.

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 FURRING AND BLOCKING

.1 Install furring and blocking as required to space-out and support casework, cabinets, storage shelving, wall-mounted seat, wall and ceiling finishes, audio-visual equipment mounting, electrical equipment mounting boards, architectural hardware, hose reel, firearm lockers, bathroom accessories, fire extinguisher cabinets and brackets, and other work as required.

.2 Install rough bucks, nailers, and linings to rough openings as required to provide backing for frames and other work.

3.3 EQUIPMENT/ELECTRICAL MOUNTING BOARDS

.1 Equipment/Electrical mounting boards:

.1 Douglas Fir plywood, good one side.

.2 Size: 1220 x 2440 mm x 19 mm (48 x 96 x ¾ inch).

.3 Finish: Intumescent paint finish, refer to Section 09 91 00 – Painting; white or to match wall colour unless otherwise specified; finish on all six surfaces prior to installation to ensure proper sealing.

.4 Fastening: Exposed stainless steel fasteners, at 400 mm (16 inches) o.c. unless otherwise specified.

3.4 CLEANING

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

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

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by rough carpentry installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI)

.1 ANSI A208.1-09, Particleboard.

.2 ANSI A208.2-09, Medium Density Fiberboard (MDF) for Interior Applications.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)

.1 Architectural Woodwork Standards, 2nd Edition, 2014.

.3 ASTM International

.1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.

.4 Builders Hardware Manufacturers Association (BHMA)

.1 ANSI/BHMA A156.9-2015, Cabinet Hardware.

.2 ANSI/BHMA A156.11-2014, Cabinet Locks.

.5 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 71.20-M88, Adhesive, Contact, Brushable.

.6 Canadian Standards Association (CSA)

.1 CSA B111-74 (R2003), Wire Nails, Spikes and Staples.

.2 CSA O112.10-08 (R2013), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).

.3 CSA O141-05 (R2014), Softwood Lumber.

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

.1 Material Safety Data Sheets (MSDS).

.8 National Electrical Manufacturers Association (NEMA)

.1 ANSI/NEMA LD3-2005, High-Pressure Decorative Laminates (HPDL).

.9 National Hardwood Lumber Association (NHLA)

.1 Rules for the Measurement and Inspection of Hardwood and Cypress, 2011.

.10 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber, 2014.

1.2 SUBMITTALS

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

.2 Product Data:

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

.2 Submit WHMIS MSDS for products used in the project.

.3 Shop Drawings:

.1 Indicate details of construction, profiles, jointing, fastening and other related details.

.1 Scales: profiles full size, details half full size.

.2 Indicate materials, thicknesses, finishes and hardware.

.3 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

.4 Samples:

.1 Submit duplicate manufacturer’s samples of high-pressure decorative laminate for pattern and colour selection.

.5 Certifications: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 QUALITY ASSURANCE

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

.2 Plywood, particleboard, OSB, and wood based composite panels to CSA and NPA standards.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.1 Protect millwork against dampness and damage during and after delivery.

.2 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

.3 Storage and Handling Requirements:

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

.2 Store and protect architectural woodwork from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Softwood lumber: Unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:

- .1 CSA O141.
- .2 NLGA Standard Grading Rules for Canadian Lumber.
- .3 AWMAC Custom grade, moisture content as specified.

.2 Machine stress-rated lumber is acceptable for all purposes.

.3 Particleboard core: To NPA A208.1, Grade M2 or better.

- .1 Thickness swelling: Maximum 5.5%.
- .2 Modulus of rupture: Minimum 13.0 N/mm^2 (1885 psi).

.4 Moisture-resistant MDF: To ANSI/NPA A208.2, Grade 155 MR50.

.5 High pressure decorative laminate (HPDL) for horizontal surfaces: To NEMA LD3, Horizontal Grade Standard (HGS), 1.2 ± 0.12 mm thick; colours and patterns as selected by Departmental Representative.

.6 HPDL for vertical surfaces: To NEMA LD3, Vertical Grade Standard (VGS), 0.7 mm ± 0.10 mm thick, colours and patterns as selected by Departmental Representative.

.7 Laminate backing sheet: Grade BKL, minimum 0.5 mm thickness.

.8 Laminate adhesive: Contact adhesive to CAN/CGSB 71.20.

.9 Nails and staples: To CSA B111.

.10 Wood screws: Stainless steel, type and size to suit application.

.11 Splines: Metal.

.12 Sealant: In accordance with Section 07 92 00 - Joint Sealants.

2.2 HARDWARE

.1 General:

- .1 Hardware: ANSI/BHMA A156.9.
- .2 Finish: Brushed nickel or stainless steel, unless otherwise specified.

.2 Hinges: European style hinges, minimum 110º opening.

.3 Pulls: Metal, contemporary bar pulls.

- .1 Mounting: 128 mm center-to-center screw attachment.
- .2 Overall dimension: 170 mm long; 40 mm projection from mounting surface.
- .3 Ends: Rounded, closed.
- .4 Confirm proposed product with Departmental Representative.

.4 Catches: Type I – magnetic catch.

.5 Adjustable shelf standards and supports: Slotted shelf standard, steel, mortise mounted, slots on 12.7 mm (1/2 inch) centers; complete with clips.

.6 Drawer slides: Full extension, side-mounted drawer slides with ball bearings, zinc coated steel, 30 kg (66 lb) load capacity, soft closing.

.7 Cabinet Locks: ANSI/BHMA A156.11, Grade 1; keyed cylinder, two keys per lock, master keyed, steel with satin finish; complete with strike.

.1 Body: Die cast zinc.

.2 Cylinder: Solid brass, pin tumbler.

.3 Coordinate keying with Departmental Representative.

2.3 MANUFACTURED UNITS

.1 All work to AWMAC Custom grade.

.2 Core: Particleboard or MDF.

.3 All work to AWMAC Custom grade.

.4 Casework:

.1 Construction type: Frameless.

.2 Cabinet and door interface: Flush overlay.

.3 Core: Particleboard.

.4 Doors/drawers:

.1 Fronts: HPDL.

.2 Semi-exposed surfaces: HPDL.

.3 Concealed surfaces: Laminate backing sheet.

.4 Edgeband: 3 mm PVC, colour coordinated to HPDL.

.5 HPDL shelves:

.1 Top and bottom surfaces: HPDL.

.2 Edges: 3 mm PVC, all four sides, colour coordinated to HPDL.

.6 Ladder base: Canadian softwood plywood, 19 mm thick.

.1 Kitchenette: Mount 6 mm moisture-resistant MDF to front face of ladder base; finish with HPDL.

.7 Toe kicks and bases: HPDL.

.5 Valences:

.1 Front surface: HPDL.

.2 Back surface: Laminate backing sheet, white.

.3 Edges: 3 mm PVC, colour coordinated to HPDL.

.6 Countertops:

.1 Core: Particleboard.

.2 Surfaces: Stainless steel to ASTM A240 Type 304, 1.98 mm thickness, #4 finish. Provide sprayed-on latex sound deadening between core and finish surface.

.3 Corners: Rounded, 100 mm radius.

.4 Front edges: Square.

.7 Secure bench:

.1 Wood: Birch, eased edges and corners, 38 x 89 mm.

.1 Finish: Refer to Section 09 91 00 – Painting.

.2 Bench support brackets: To ASTM A36, steel, with black powder-coat paint finish; 100 mm wide x 6 mm thick.

.3 Attachment: Countersunk stainless steel carriage bolts, 10 mm.

2.4 FABRICATION

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

.2 Shop install cabinet hardware for doors, shelves, and drawers. Recess shelf standards unless noted otherwise.

.3 Shelving to cabinetwork to be adjustable unless otherwise noted.

.4 Provide cut-outs for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

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

.6 Obtain governing dimensions before fabricating items that are to accommodate or abut appliances, equipment and other materials.

.7 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.8 Veneer laminate to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm.

.9 Apply laminate backing sheet to reverse side of core of laminate work.

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Perform architectural woodwork to Quality Standards of AWMAC.

.2 Install prefinished millwork at locations shown on drawings.

.1 Position accurately, level, plumb, and straight.

.3 Fasten and anchor millwork securely.

.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

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

.5 At junction of counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00 - Joint Sealants.

.6 Apply water resistant building paper over wood framing members in contact with masonry or cementitious construction.

.7 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

3.3 CLEANING

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

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

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Clean millwork outside surfaces, and inside cupboards and drawers.

.2 Remove excess glue from surfaces.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.4 PROTECTION

.1 Protect millwork from damage until final inspection.

.2 Protect installed products and components from damage during construction.

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C303-10 (2016), Standard Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation.

.2 ASTM C423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.3 ASTM C518-10, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

.4 ASTM D1621-10, Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC S114-05, Test for Determination of Non-Combustibility in Building Materials.

.3 CAN/ULC S129-06, Standard Method of Test for Smoulder Resistance of Insulation (Basket Method).

.4 CAN/ULC S701-11, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.

.5 CAN/ULC S702-09, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and data sheets.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

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

1.3 DELIVERY, STORAGE, AND HANDLING

.1 Deliver materials in manufacturer's original containers clearly labeled with manufacturer's name, product identification, safety information, net weight of contents and expiration date.

.2 Store material in a safe manner and where the temperatures are within range specified by manufacturer.

.3 Remove empty containers from site on a daily basis.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 PROJECT CONDITIONS

.1 Maintain environmental conditions of temperature, humidity, and ventilation within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

.2 Protect workers as recommended by standards and manufacturer's recommendations.

Part 2 Products

2.1 BATT INSULATION

.1 Batt insulation: To CAN/ULC S702, Type 1; mineral fibre thermal insulation.

.1 Thickness: As indicated.

.2 Non-combustibility (CAN/ULC S114): Pass.

.3 Surface burning characteristics (CAN/ULC S102):

.1 Flame spread: 0.

.2 Smoke developed: 0.

.4 Density (ASTM C303): Minimum 40 kg/m^3.

.5 Smoulder resistance (CAN/ULC S129): 0.09%.

.6 Acoustic performance (ASTM C423): NRC 1.05 at 76 mm (3 inches) thickness.

2.2 RIGID INSULATION

.1 Extruded polystyrene (XPS): To CAN/ULC S701, Type 4, closed cell rigid board.

.1 Compressive strength (ASTM D1621): Minimum 210 kPa.

.2 Thermal resistance (ASTM C518): RSI 0.88/25 mm.

.3 Thickness: As indicated on Drawings.

.4 Size: 1220 x 2440 mm.

.5 Edges: square.

2.3 ADHESIVE

.1 Adhesive (for polystyrene): Single-component, moisture-cured polyurethane foam adhesive, acceptable to XPS manufacturer.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 Examine substrates and inform Departmental Representative of defects.

.2 Verify substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

.3 Verify acoustic and firestop sealants required at stud framing concrete masonry unit wall junctions with adjacent building components or at mechanical and electrical conduit and duct penetrations are installed.

.4 Confirm mechanical, electrical and telecommunications service lines in walls to be insulated have been inspected.

3.3 BATT INSULATION INSTALLATION

.1 Install insulation after building substrate materials are dry.

.2 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.3 Cut and trim insulation neatly to fit spaces. Butt joints tightly, offset vertical joints. Use only insulation boards free from chipped or broken edges. Use largest possible dimensions to reduce number of joints.

.4 Offset both vertical and horizontal joints in multiple layer applications.

.5 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.6 Install acoustic insulation where indicated to maintain sound attenuation of separation in building elements and spaces.

.7 Place acoustic batts between studs ensuring friction fit, free of sags, folds, voids, or open joints that may let sound pass through.

.8 Do not compress insulation excessively to fit voids.

.9 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.4 BOARD INSULATION INSTALLATION

.1 Apply recommended adhesive to substrate in accordance with manufacturer's recommendations.

.2 Embed insulation boards into adhesive, applied as specified, prior to skinning of adhesive.

3.5 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C1177/C1177M-08, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 37-GP-56M-1985, Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.

.3 Canadian Roofing Contractors Association (CRCA)

.1 CRCA Roofing Specifications Manual – current edition.

.4 Canadian Standards Association (CSA)

.1 CSA A123.21-14, Standard Test Method for the Dynamic Wind Uplift Resistance of Membrane-Roofing Systems.

.5 Factory Mutual (FM Global)

.1 FM Approvals - Roofing Products.

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

.1 Material Safety Data Sheets (MSDS).

.7 Underwriters Laboratories' of Canada (ULC)

.1 CAN/ULC S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, and indicate VOC content for:

.1 Primers.

.2 Asphalt.

.3 Sealers.

.3 Shop drawings:

.1 Indicate flashings, insulation, roof drains, and all required roofing materials.

1.3 FIRE PROTECTION

.1 Fire Extinguishers:

.1 Maintain one cartridge operated type or stored pressure rechargeable type with hose and shut-off nozzle,

.2 ULC labelled for A, B, and C class protection.

.3 Size: 4.5 kg, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Refer to Section 01 61 00 - Common Product Requirements for storage and handling requirements.

.2 Store materials off-ground in weatherproof storage.

.3 Store materials in upright position. Store membrane rolls with selvage edge up, store as per manufacturer’s requirements to meet warranty.

.4 Remove only in quantities required for same day use.

.5 Place plywood runways over work to protect work and enable work flow.

.6 Store sealants at +5°C minimum.

.7 Store insulation protected from daylight, weather and deleterious materials.

1.5 SITE CONDITIONS

.1 Do not install roofing when temperature remains below -18°C for torch application, or to manufacturers' recommendations for mop application.

.2 Minimum temperature for solvent-based adhesive is -5°C.

.3 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.6 PROTECTION

.1 Fire Extinguishers: maintain one stored pressure rechargeable type with hose and shut-off nozzle, ULC labeled for A, B and C class protection. Size 9 kg on roof per torch applicator, within 10 m of torch applicator.

.2 Provide safety person on site at all times during the roofing process and remain on site two (2) hours after work has ceased and torching has stopped.

.3 Scan perimeter and roof penetration details with hand-held infrared gun.

.4 Verify existing under-deck mounted electrical conduits prior to installing mechanically fastened roof assembly.

Part 2 Products

2.1 PERFORMANCE CRITERIA

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

.2 Roofing System: To CSA A123.21 for wind uplift resistance.

2.2 DECK COVERING

.1 Glass Mat, Gypsum Board: To ASTM C1177, thickness as indicated on Drawings.

2.3 AIR/VAPOUR BARRIER

.1 Air/Vapour Barrier: Self adhering peel and stick air/vapour barrier composed of Styrene-Butadiene-Styrene (SBS) modified bitumen reinforced with high density polyethylene film, anti-slip surface, minimum thickness 1.0 mm.

2.4 MEMBRANE

.1 Base Sheet: Base sheet: to CGSB-37.56-M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, non woven, polyester reinforcement, weighing 180 g/m ^{2}.

- .1 Fully adhered.
- .2 Plain surfaced.
- .3 Top and bottom surfaces:
  - .1 Polyethylene/polyethylene.
- .4 Base sheet membrane properties:
  - .1 Strain energy (longitudinal/transversal): 9.0/7.0 kN/m.
  - .2 Breaking strength (longitudinal/transversal): 17.0/12.5 N/5 cm.
  - .3 Ultimate elongation (longitudinal/transversal): 60/65 %.
  - .4 Tear resistance: 60 N.
  - .5 Cold bending at -30°C: no cracking.
  - .6 Static puncture resistance: > 400.
  - .7 Dimensional Stability: -0.3 / 0.3 %.

.2 Cap sheet: to CGSB-37.56-M, Styrene-Butadiene-Styrene (SBS) elastomeric polymer, prefabricated sheet, glass, polyester reinforcement, weighing 250 g/m^2.

- .1 Fully adhered.
- .2 Granule surfaced.
- .3 Bottom surface polyethylene.
- .4 Colour: To match existing.
- .5 Cap sheet membrane properties:
  - .1 Strain energy (longitudinal/transversal): 10.0/10.0 kN/m.
  - .2 Breaking strength (longitudinal/transversal): 18.0/10.0 kN/m.

.3 Ultimate elongation (longitudinal/transversal): 60/65 %.

.4 Tear resistance: 75 N.

.5 Cold bending at -30°C: no cracking.

.6 Static puncture resistance: > 420.

.7 Dimensional Stability: -0.8 / -0.2 %.

.3 Cap sheet and base sheet to be from same manufacturer.

2.5 MEMBRANE FLASHING

.1 Base Sheet Flashing: To CGSB-37.56-M, non-woven polyester reinforced 180g/m^2, self-adhesive membrane with polyethylene top face and release film under face.

.2 Cap Sheet Flashing: Reinforced modified bitumen.

.1 Application: Thermofused.

.2 Top surface: Granules, colour to match existing.

.3 Bottom surface: Thermofusible plastic film.

2.6 PROTECTION BOARD

.1 Protection board: Semi-rigid asphalt roofing substrate composed of mineral core between glass fibre mats, minimum thickness 3.0 mm.

2.7 POLYISOCYANURATE INSULATION

.1 To CAN/ULC-S704, glass reinforced felt facers, square edged and containing no CFC.

2.8 SEALERS

.1 Mastic made of synthetic rubbers, plasticized with bitumen and solvents with aluminum pigments to provide greater resistance to U.V.

2.9 CANT STRIPS

.1 Cut from rigid mineral wool fibre material.

Part 3 Execution

3.1 QUALITY OF WORK

.1 Perform examination, preparation and roofing Work in accordance with CRCA Roofing Specification Manual.

.2 Perform priming in accordance with manufacturer’s written recommendations.

.3 Make assembly, component, and material connections with consideration to appropriate design loads.

3.2 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions:

.1 Inspect deck conditions with Departmental Representative including parapets, construction joints, roof drains, plumbing vents, and ventilation outlets to determine readiness to proceed.

.2 Evaluation and Assessment: Prior to beginning of work ensure:

.1 Decks are firm, straight, smooth, dry, and free of snow, ice, frost, sharp edges and fins. Do not use calcium or salt for ice or snow removal.

.2 Substrate is cleaned of debris and foreign matter.

.3 Curbs have been built.

.4 Roof drains have been installed at proper elevations relative to finished roof surface.

.5 Cant strips, reglets, and nailer plates have been installed to deck, walls, and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.3 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rainwater off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking to be galvanized or treated with rust proofing.

3.4 CONVENTIONAL MEMBRANE ROOFING APPLICATION

.1 Insulation: Fully adhered, adhesive application:

.1 Place boards in parallel rows with ends staggered, and in moderate contact with one another.

.2 Cut end pieces to suit.

.3 Apply adhesive in continuous ribbons at 300 mm on centre.

.4 between layers 150 mm minimum.

.2 Overlay board, adhesive application:

.1 Adhere overlay board to insulation with vulcanized adhesive at the rate of 1 L/m^2.

.2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.

.3 Cut ends to suit and apply adhesive in continuous ribbons at 300 mm on centre.

.3 Base sheet application:

.1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.

.2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, at 230°C.

.3 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.

.4 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.

.5 Application to be free of blisters, wrinkles and fishmouths.

.4 Cap sheet application:

.1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.

.2 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/m^2, EVT at point of contact.

.3 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.

.4 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.

.5 Application to be free of blisters, fishmouths, and wrinkles.

.6 Do membrane application in accordance with manufacturer's recommendations.

.5 Flashings:

.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.

.2 Attach sheet onto substrate in 1 metre wide strips.

.3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.

.4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.

.5 Provide 75 mm minimum side lap and seal.

.6 Properly secure flashings to their support, without sags, blisters, fishmouths, or wrinkles.

.7 Perform work in accordance with manufacturer's recommendations.

.6 Roof penetrations:

.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.5 CANTS

.1 Install mineral wool fibre cants.

.2 Apply hot bitumen to receiving surface and embed cant firmly by hand.

.3 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90°.

3.6 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C612-10 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.2 ASTM E1966-07 (2011) - Standard Test Method for Fire-Resistive Joint Systems.

.3 ASTM E2174-14 – Standard Practice for On-Site Inspection of Installed Firestops.

.4 ASTM G21-15 - Determining Resistance of Synthetic Polymeric Materials to Fungi.

.2 Firestop Contractors International Association (FCIA)

.1 FCIA Firestop Industry Manual of Practice, 5th Edition.

.3 FM Global (FM)

.1 FM Approvals 4991 – Approval of Firestop Contractors.

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

.1 Material Safety Data Sheets (MSDS).

.5 National Fire Protection Association (NFPA)

.1 NFPA 101 – Life Safety Code, 2012 Edition.

.6 UL (formerly Underwriters Laboratories)

.1 UL 1479 – Standard for Fire Tests of Through-Penetration Firestops.

.2 UL 2079 – Standard for Tests for Fire Resistance of Building Joint Systems.

.7 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S101-14 – Standard Methods of Fire Endurance Tests of Building Construction and Materials.

.2 CAN/ULC S102-10 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.3 CAN/ULC S115-11 - Fire Tests of Firestop Systems.

1.2 DEFINITIONS

.1 Fire Stop Material: Device intended to close off opening or penetration during fire or materials that fill openings in wall or floor assembly where penetration is by cables, cable trays, conduits, ducts and pipes and poke-through termination devices, including electrical outlet boxes along with their means of support through wall or floor openings.

.2 Single Component Fire Stop System: Fire stop material that has Listed Systems Design and is used individually without use of high temperature insulation or other materials to create fire stop system.

.3 Multiple Component Fire Stop System: Exact group of fire stop materials that are identified within Listed Systems Design to create on site fire stop system.

.4 Tightly Fitted (ref: NBC Part 3.1.9.1.1 and 9.10.9.6.1): Penetrating items that are cast in place in buildings of noncombustible construction or have "0" annular space in buildings of combustible construction.

.1 Words "tightly fitted" should ensure that integrity of fire separation is such that it prevents passage of smoke and hot gases to unexposed side of fire separation.

1.3 PERFORMANCE REQUIREMENTS

.1 Materials, accessories, and application procedures: Listed by ULC, cUL, or tested in accordance with CAN/ULC S115 to comply with applicable building code requirements.

.2 Firestopping materials: To CAN/ULC S101, to achieve fire rating as noted on Drawings and ULC Design Number shown.

1.4 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications, and datasheets. Include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets.

.3 Shop Drawings:

.1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings, and method of installation.

.2 Ensure construction details accurately reflect actual job conditions.

.4 System Design Listings, including illustrations from a qualified testing and inspection agency as applicable for each firestop configuration.

.5 Quality Assurance Submittals: Submit following in accordance with Section 01 45 00 - Quality Control.

.1 Certificates: Signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: Including special handling criteria, installation sequence, and cleaning procedures.

.6 Project Record Documentation: Supply documentation for each single application addressed. Identify each penetration and joint location on entire project. Provide at completion of project.

.1 Include the following for through-penetrations:

.1 Sequential location number.
.2 Project name.
.3 Installation date.
.4 Detailed description of penetration location.
.5 Tested System or Engineered Judgment Number.
.6 Type of assembly penetrated.
.7 Detailed description of size and type of penetrating item.
.8 Size of opening.
.9 Number of sides of assemblies addressed.
.10 Hour rating achieved.
.11 Installer's name.

.2 Include the following for construction joints:
.1 Sequential location number.
.2 Project name.
.3 Installation date.
.4 Detailed description of construction joint location.
.5 Tested System or Engineered Judgment Number.
.6 Type of construction joint.
.7 Width of joint.
.8 Lineal footage of joint.
.9 Number of sides of assemblies addressed.
.10 Hour rating achieved.
.11 Installer's name.

1.5 QUALITY ASSURANCE

.1 Single Source Responsibility: Obtain firestop systems for each type of penetration and construction situation from a single primary firestop systems manufacturer.

.2 Regulatory Requirements:

.1 Conform to applicable code for fire resistance ratings and surface burning characteristics.

.2 Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

1.6 DELIVERY, STORAGE, AND HANDLING

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

.2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, and ULC or cUL labels.

.3 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.4 Replace defective or damaged materials with new.

.5 Waste Management and Disposal:

.1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.7 SITE CONDITIONS

.1 Apply materials within temperature range recommended by manufacturer.

.2 Maintain recommended temperature before, during, and for 72 hours after installation of materials.

1.8 SEQUENCING AND SCHEDULING

.1 Schedule installation of cast-in-place firestop devices after completion of floor formwork, metal form deck, or composite deck, but before placement of concrete.

.2 Schedule installation of drop-in firestop devices after placement of concrete but before installation of pipe penetration.

.3 Schedule installation of other firestopping materials after completion of penetrating item installation, but prior to covering or concealing of openings.

Part 2 Products

2.1 MATERIALS

.1 Fire stopping and smoke seal systems: In accordance with CAN/ULC S115.

.1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke, and gases in compliance with requirements of CAN/ULC S115 and not to exceed opening sizes for which they are intended.

.2 Ensure firestopping system components are fully compatible with each other, with substrates, and with items penetrating the firestopping.

.3 Mould and mildew resistance to ASTM G21: 0 (Zero).

.2 Service penetration assemblies: Systems tested to CAN/ULC S115.

.3 Service penetration fire stop components: Certified by test laboratory to CAN/ULC S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: Elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork, and other mechanical items requiring sound and vibration control: Elastomeric seal.

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

.8 Water (if applicable): Potable, clean, and free from injurious amounts of deleterious substances.

.9 Insulation: Mineral wool fibre semi-rigid insulation to ASTM C612 – Type IVA, UL 2079, and ASTM E1966; minimum density 64 kg/m^3 (4 lbs/ft^3).

.10 Damming and backup materials, supports, and anchoring devices: To manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.11 Sealants for vertical joints: Non-sagging.

.12 Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping are ready to receive the work of this Section.

.3 Proceed with installation only when unsatisfactory conditions have been corrected.

3.3 PREPARATION

.1 Ensure substrates and surfaces are clean, dry, and frost free.

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

.3 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.4 Maintain insulation around pipes and ducts penetrating fire separation, without interruption to vapour barrier.

.5 Mask and use drop cloths where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.4 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

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

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.5 LABELLING

.1 Provide and install identification labels for each individual penetration with firestopping.

.1 Install labels in readily visible location, on both sides of penetrated assembly, with permanently bonding adhesive.

.2 Label to include:

.1 Warning indicating that system is firestopping installation to be left undisturbed.

.2 Installing Contractor name and contact information.

.3 System designation of testing organization.

.4 Installation date.

.5 Manufacturer.

3.6 FIELD QUALITY CONTROL

.1 Section 01 45 00: Quality Control.

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

3.7 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Architectural Aluminum Manufacturers Association (AAMA)

.1 AAMA 812-04 (2012), Voluntary Practice for Assessment of Single Component Aerosol Expanding Polyurethane Foams for Sealing Rough Openings of Fenestration Installations.

.2 ASTM International

.1 ASTM C661-06 (2011), Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

.2 ASTM C719-14, Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement (Hockman Cycle).

.3 ASTM C834-05, Standard Specification for Latex Sealants.

.4 ASTM C881/C881M-10, Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

.5 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.

.6 ASTM C920-05, Standard Specification for Elastomeric Joint Sealants.

.7 ASTM C1016-14, Determination of Water Absorption of Sealant Backing (Joint Filler) Material.

.8 ASTM C1193-13, Standard Guide for Use of Sealants.

.9 ASTM C1311-02, Standard Specification for Solvent Release Sealants.

.10 ASTM C1330-02 (2013), Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

.11 ASTM D1623-09, Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.

.12 ASTM E814-13a, Standard Test Method for Fire Tests of Penetration Firestop Systems.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.

.2 CGSB 19-GP-14M-1984, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

.3 CAN/CGSB 19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.

.4 CAN/CGSB 19.21-M87, Sealing and Bedding Compound, Acoustical.

.5 CAN/CGSB 19.24-M90, Multi-component, Chemical Curing Sealing Compound.

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants. Include product characteristics, performance criteria, physical size, finish and limitations.

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Compatibility: Verify sealants used are compatible with their respective joint substrates.

.2 Provide sealants with appropriate expansion and contraction properties for the joints being sealed.

.3 Perform sealant application work to ASTM C1193.

.4 Perform acoustic sealant application work to ASTM C919.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

1.6 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4°C.

.2 Joint substrates are dry.

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

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are within range allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.

.2 Ventilate area of work as directed by Departmental Representative by use of approved portable supply and exhaust fans.

Part 2 Products

2.1 GENERAL

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 Where sealants are qualified with primers, use only these primers.

.3 Provide tamper-resistant “pick-proof” sealants in critical areas, including cells and shower area.

2.2 SEALANT MATERIALS

.1 Tamper-resistant “pick-proof” caulking: To ASTM C881 Type I and III, Grade 3; rigid, two-part, high-solids, high modulus epoxy resin.

.1 Shore D hardness (ASTM C661): Minimum 70.

.2 Typical uses: For sealing in critical security areas, including pin holes, burrs, sharp edges, and voids.

.2 Epoxy grout, two-part: To ANSI A118.3, two-part 100% solids epoxy, commercial grade, stain and chemical resistant.

.1 Typical use: Sealing around cell lights and toilets.

.3 Polyurethane Sealant: To CAN/CGSB 19.24, Type 2, Class B; and ASTM C920, Type M, Grade NS, Use NT, M, A and O; non-sag, multi component, chemical curing.

.1 Typical uses: Control joints in concrete floors (when no hard finish is specified), exterior joints, expansion joints, panel walls, perimeter windows.

.4 Elastomeric Polyurethane Sealant: To CAN/CGSB 19.13, Type 2; and ASTM C920, Type S, Grade NS, Use NT, M, A and O; non-sag, single component, moisture curing hybrid polyurethane.

.1 Typical uses: Expansion and control joints, perimeter caulking of windows and doors.

.5 Spray foam sealant: Spray applied polyurethane, closed cell, low pressure build foam, complying with AAMA 812.

.6 Latex Sealant: To CAN/CGSB 19.17; and ASTM C834; single component, acrylic latex or siliconized acrylic latex.

.1 Typical uses: General purpose, acoustic sealing, window frame perimeters.

.7 Acoustic Sealant: To CAN/CGSB 19.21 and ASTM C919, acoustic grade, single component, non-hardening, non-skinning.

.1 Typical uses: Acoustic sealing of gypsum wall board partitions, sealing of interior polyethylene air/vapour barrier.

.8 Acoustic and Smoke Sealant: To CAN/CGSB 19.21 and ASTM C919, acoustic grade, single component, non-hardening, non-skinning.

.1 Typical use: Acoustic and smoke sealing of gypsum wall board partitions.

.9 Fire-Resistive Sealant: To ASTM E814, one part fire-stopping sealant.

.1 Typical uses: Penetrations in fire-rated floor and wall assemblies.

.10 Silicone, one part: To CAN/CGSB 19.13; and ASTM C920, Type S, Grade NS; mildew resistant, single component, colour white unless otherwise specified.

.1 Typical uses: Around washroom fixtures, lavatories, janitor's sinks, and other wet areas.

.11 Butyl: To CGSB 19-GP-14M and ASTM C1311, single component, butyl rubber sealant.

.12 Preformed compressible and non-compressible back-up materials:

.1 Polyethylene foam: Extruded closed cell round foam backer rod, to ASTM C1330 Type C.

.1 Size: oversize 30 to 50%.

.2 Neoprene or butyl rubber:

.1 Round solid rod, Shore A hardness 70.

.3 High density foam:

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength

140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond breaker tape:

.1 Polyethylene bond breaker tape that will not bond to sealant.

.13 Primer: As recommended by sealant manufacturer, where required, for adhesion of sealant to substrate.

2.3 JOINT CLEANER

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

.2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates are acceptable for joint sealants installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 SURFACE PREPARATION

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

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

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

.4 Ensure joint surfaces are dry and frost free.

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

3.3 PRIMING

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

.2 Prime joint substrates as recommended by sealant manufacturer immediately prior to caulking.

3.4 BACKUP MATERIAL

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

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

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant:

.1 Mask edges of joint where irregular surface or sensitive joint border exists, to provide neat joint.

.2 Apply sealant in continuous beads.

.3 Apply sealant using gun with proper size nozzle.

.4 Use sufficient pressure to fill voids and joints solid.

.5 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.6 Tool exposed surfaces before skinning begins to give slightly concave shape.

.7 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

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

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

.2 Clean adjacent surfaces immediately.

.3 Remove excess and droppings, using recommended cleaners as work progresses.

.4 Remove masking tape after initial set of sealant.

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.8 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

DOOR						FRAME		STC	Fire Rating	Notes
NO.	Nominal Size	Type	Material	Finish	Glass	Material	Finish			
D24	EX	EX	EX	PT	-	EX	PT	-	1.5 HR	Extg card access to remain
D25A	914 x 2134	1	HM	PT	-	PS	PT	-	1HR	
D26	EX	EX	EX	PT	-	EX	PT	-	1.5 HR	
D27	914 x 2134	1	HM	PT	-	PS	PT	-	1HR	Card access
D28	914 x 2134	1	HM	PT	-	PS	PT	-	1HR	Card access
D30	EX	EX	EX	PT	-	EX	PT	-	-	
D31	914 x 2134	4	HM	PT	-	PS	PT	-	1HR	Door viewer x2
D32	914 x 2134	1	HM	PT	-	PS	PT	-	1HR	
D33	914 x 2134	1	HM	PT	-	PS	PT	-	-	
D34	914 x 2134	1	HM	PT	-	PS	PT	-	1HR	
D36	914 x 2134	4	HM	PT	-	PS	PT	-	1HR	Door Viewer x2
D35	914 x 2134	3	HM	PT	6mm	PS	PT	-	-	Viewport with shutter
D37	914 x 2134	2	HM	PT	6mm	PS	PT	-	-	
D38	914 x 2134	1	HM	PT	-	PS	PT	-	-	
D39	914 x 2134	2	HM	PT	6mm	PS	PT	-	-	
D40	914 x 2134	2	HM	PT	6mm	PS	PT	-	-	
D41	914 x 2134	1	HM	PT	-	PS	PT	-	-	

LEGEND

EX - Existing
HM - Hollow metal, welded
PT - Paint
PS - Pressed Steel

DOOR						FRAME		STC	Fire Rating	Notes
NO.	Nominal Size	Type	Material	Finish	Glass	Material	Finish			
D42	914 x 2134	2	HM	PT	6mm	PS	PT	-	-	
D43	914 x 2134	1	HM	PT	-	PS	PT	-	-	
D44	914 x 2134	2	HM	PT	6mm	PS	PT	-	-	
D45	914 x 2134	1	HM	PT	-	PS	PT	46	-	
D46	914 x 2134	3	HM	PT	6mm	PS	PT	-	-	Viewport with shutter
D47	914 x 2134	4	HM	PT	-	PS	PT	-	1 HR	Door viewer x2
D48	EX	EX	EX	PT	-	EX	PT	-	-	
D50	914 x 2134	1	HM	PT	-	PS	PT	-	-	
D51	914 x 2134	5	HM	PT	-	PS	PT	-	-	Viewport with shutter

LEGEND

EX - Existing
HM - Hollow metal, welded
SM - Solid Metal, welded
PT - Paint
PS - Pressed Steel

Door Types:

1 TYPICAL 45MM HOLLOW METAL
2 SLIDING CELL DOORS
3 45MM HOLLOW METAL WITH VERTICALVIEWPORT W/ SHUTTER
4 45MM HOLLOW METAL WITH VIEWER BOTH DIRECTIONS

Part 1 General

1.1 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A653/A653M-13, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM D2240-05 (2010), Standard Test Method for Rubber Property - Durometer Hardness.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.2 CAN/CGSB 12.1-M90, Tempered or Laminated Safety Glass.

.3 Canadian Standards Association (CSA)

.1 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)

.1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frame Products, 2006.

.2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Door and Frame Products, 2009.

.5 Glass Association of North American (GANA)

.1 GANA Glazing Manual – current edition.

.6 National Fire Protection Association (NFPA)

.1 NFPA 80-2007, Standard for Fire Doors and Other Opening Protectives.

.2 NFPA 252-12, Fire Tests of Door Assemblies.

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S104-10, Standard Method for Fire Tests of Door Assemblies.

.2 CAN/ULC S105-09, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN/ULC S104.

.3 CAN/ULC S704-11, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.2 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Provide fire labelled frames for openings requiring fire protection ratings.

.2 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC S104 or NFPA 252 for ratings specified or indicated.

1.3 SUBMITTALS

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

.2 Shop drawings:

.1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazing, arrangement of hardware, fire ratings, and finishes.

.2 Indicate each type of frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, fire rating, and finishes.

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

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver, handle, and store doors and frames at the job site in such manner as to prevent damage.

.3 Store doors and frames under cover with doors stored in a vertical position on blocking, clear of floor, and with blocking between doors to permit air circulation.

.4 Waste Management and Disposal: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: To ASTM A653/A653M, CS Type B.

.1 Galvanizing thickness: Z120 (G40).

2.2 DOOR CORE MATERIALS

.1 Honeycomb construction: Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m^3 minimum, sanded to required thickness.

.2 Polyurethane: To CAN/ULC S704, rigid, modified polyisocyanurate, closed cell board. Density 32 kg/m^3.

2.3 ADHESIVES

.1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

.2 Polyurethane cores: Heat resistant, epoxy resin based, low viscosity, contact cement.

.3 Lock-seam doors: Fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.4 PRIMER

.1 Touch-up primer to CAN/CGSB 1.181.

2.5 PAINT

.1 Field paint steel doors and frames in accordance with Section 09 91 00 – Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.6 GLAZING

.1 Glass: To CAN/CGSB 12.1, tempered, 6 mm thick.

.2 Glazing Stops: Formed galvanized steel channel, minimum 16 mm high, accurately fitted, butted at corners and fastened to frame sections with counter-sunk, tamper proof sheet metal screws.

.3 Setting blocks: Neoprene, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.

.4 Spacer shims: Neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.5 Glazing tape: Preformed butyl compound with integral resilient tube spacer, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; widths as required for application, black colour.

.6 Glazing splines: Resilient polyvinyl chloride or silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

2.7 ACCESSORIES

.1 Door Hardware and Weatherstripping: Specified in Section 08 71 00.

.2 Door silencers: Single stud rubber/neoprene type.

.3 Metallic paste filler: To manufacturer's standard.

.4 Fire labels: Metal riveted.

.5 Sealant: Refer to Section 07 92 00 – Joint Sealing.

.6 Finish painting: Refer to Section 09 91 00 – Painting.

2.8 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Interior frames: 1.6 mm welded type construction.

.4 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.5 Protect mortised cut-outs with steel guard boxes.

.6 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.7 Manufacturer's nameplates on frames and screens are not permitted.

.8 Conceal fastenings except where exposed fastenings are indicated.

.9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

2.9 FRAME ANCHORAGE

.1 Shim and anchor new doors in accordance with CAN/CSA A440.4.

.2 Provide appropriate anchorage to floor and wall construction.

.3 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.4 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

.5 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.10 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

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

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails, and sills.

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

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

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

2.11 DOOR FABRICATION GENERAL

.1 Doors: Swing type, flush, with provision for glass openings as indicated.

.2 Form face sheets for interior doors from 1.3 mm sheet steel with core laminated under pressure to face sheets.

.3 Fabricate doors with longitudinal edges lock-seamed, adhesive assisted.

.1 Seams: Visible.

.4 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.5 Fabricate doors with recessed bottom to accommodate mortised mounting of automatic door bottoms, where scheduled.

.6 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.7 Reinforce doors for surface mounted hardware. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.8 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.9 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN/ULC S104 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

.10 Manufacturer's nameplates on doors are not permitted.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION GENERAL

.1 Install labelled steel fire rated doors and frames to NFPA 80 except where specified otherwise.

.2 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

.1 Set frames plumb, square, level, and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

3.4 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.

.1 Hinge side: 1.0 mm.

.2 Latchside and head: 1.5 mm.

.3 Finished floor: 13 mm.

.3 Adjust operable parts for correct function.

3.5 GLASS INSTALLATION

.1 Perform work in accordance with GANA Glazing Manual and for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line. Butt-joint tape edges, seal joints with butyl sealant.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Set glass unit on setting blocks; apply pressure against fixed stop for full contact.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Apply pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.6 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A123/A123M-08 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.2 ASTM A653/A653M-08 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM D2240-05 (2010), Standard Test Method for Rubber Property - Durometer Hardness.

.4 ASTM F1450-05, Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention Facilities.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.181, Ready-Mixed Organic Zinc-Rich Coating.

.2 CAN/CGSB 12.1-M90, Tempered or Laminated Safety Glass.

.3 Glass Association of North American (GANA)

.1 GANA Glazing Manual – current edition.

.4 NAAMM/HMMA (National Association of Architectural Metal Manufacturers/Hollow Metal Manufacturers Association)

.1 NAAMM/HMMA 863-04, Guide Specifications for Detention Security Hollow Metal Doors and Frames.

1.2 SYSTEM DESCRIPTION

.1 Execute Work to assure a complete detention space that:

.1 Is vandal proof internally.

.2 Will resist escape attempts (without specialized tools).

.3 No components can be removed or disabled without special tools or equipment.

.4 Have no sharp edges, rough jagged items, or protruding materials exposed within the detention space.

1.3 PERFORMANCE REQUIREMENTS

.1 Construct doors to requirements of NAAMM/HMMA 863 and ASTM F1450, Grade 3.

.2 Static load: Tested by centrally applied load of 4000 kg at quarter points on door.

.1 Maximum deflection: 15 mm.

.2 Maximum permanent set: 2 mm.

.3 Rack test: Tested by concentrated load of 2645 kg on one unsupported corner of door.

.1 Door must not fail.

.2 Maximum deflection: 35 mm.

.4 Impact load test: Tested to ASTM F1450, with door mounted in frame as in normal cell setting. Door subjected to series of impact loads of 271 Joules following pattern of targets from pendulum ram, delivered from push side of door. Number of impacts:

.1 200 lock or strike impacts.

.2 75 hinge impacts.

.3 100 corner panel impacts.

1.4 SUBMITTALS

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data: Indicate door and frame configurations, location of cut-outs for hardware reinforcement.

.3 Shop Drawings: Indicate door and frame elevations, reinforcement, hardware placement, and finishes.

.4 Test Reports: Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data.

.5 Installation Data: Manufacturer's special installation requirements.

1.5 REGULATORY REQUIREMENTS

.1 Conform to applicable code for lawful confinement requirements.

1.6 MOCK-UP

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Install detention door, in cell designated by Departmental Representative, illustrating materials installation and interface.

.3 Locate where directed.

.4 Allow one week for inspection of mock-up by Departmental Representative before proceeding with door installations.

.5 Reviewed and accepted mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Protect pre-finished surfaces with wrapping or strippable coating.

Part 2 Products

2.1 MATERIALS

.1 Sliding Cell Doors and Frames:

.1 Frames: 2.3 mm thick, hot rolled steel, welded construction.

.2 Doors: Flush surface design,

.1 Faces: 2.8 mm thick sheet steel.

.2 Overall thickness: 50 mm.

.3 Frame Depth: Thickness of supporting wall (frame throat measurement), plus wrap around edges both sides.

.4 Frame and doors mortised to accept security devices.

.5 Prepare frame with anchors, compatible with wall construction.

.6 Metal Protection: ASTM A653/A653M hot dipped galvanized, Z275 (G90) coating designation.

.2 Detention Hardware: Acceptable products:

.1 Chubb 1030D-1.

.2 Folger Adam 32D.

.3 Southern Steel 1030-D1

.4 RR Brink – 7030D.

2.2 GLAZING

.1 Glass: Refer to Section 08 80 50 – Glazing.

2.3 ACCESSORIES

.1 Fasteners: Tamper-proof screws, bolts, nuts and lock washers compatible with material being secured to substrate material.

.2 Operable Viewport Shutter and Food Pass Flap:

.1 Steel perimeter frame, welded construction,

.2 Frame and throat dimensions to suit door construction.

.3 Refer to Drawings for dimensions.

2.4 HARDWARE

.1 Swing Door Lock Sets:

.1 Locksets: Tumbler paracentric, deadlock.

.2 Unlock with a half turn of key and lock with a full turn of the key.

.3 Locks include mounting plate, strike and single notch escutcheon.

.4 Fasteners: Tamper-proof, button head machine screws.

.2 Flush Door Pulls: Cast brass, flush mount, with tamper-proof screws.

2.5 FABRICATION

.1 Fabricate doors in accordance with NAAMM/HMMA 863.

.2 Fabricate components in a secure fashion consistent with security level of facility.

.3 Fabricate frames and doors with internal hardware reinforcement welded securely.

2.6 FINISHES

.1 Touch-Up Primer for Galvanized Steel Surfaces: CAN/CGSB 1.181.

.2 Concealed Steel Items: Galvanized in accordance with ASTM A123/A123M to 610 g/m^2 (2.0 oz/ft^2).

.3 Apply one (1) coat of bituminous paint to concealed metal surfaces in contact with cementitious or dissimilar materials.

.4 Finish of Exposed Surfaces: Two (2) coats of two-component enamel paint. Colour as selected by Consultant.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that opening sizes and tolerances are acceptable.

.3 Verify dimensions, tolerances, and method of attachment with other work.

3.2 INSTALLATION

.1 Install components to manufacturer instructions.

.2 Install frames, doors, and hardware by factory trained and authorized installers.

.3 Install components, plumb and level.

.4 Install frames within a positioning tolerance, plus or minus 1.5 mm (1/16 inch).

.5 Solidly brace frames both vertically and horizontally and secure to opening framing to fully resist specified impact load.

.6 Touch-up factory finished doors with matching material and colours.

3.3 GLASS INSTALLATION

.1 Perform work in accordance with Section 08 80 50 – Glazing.

3.4 ADJUSTING

.1 Adjust components for smooth and balanced movement.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)

.1 ANSI/BHMA A156.1-2013, Butts and Hinges.

.2 ANSI/BHMA A156.4-2013, Door Controls - Closers.

.3 ANSI/BHMA A156.6-2010, Architectural Door Trim.

.4 ANSI/BHMA A156.8-2010, Door Controls – Overhead Stops and Holders.

.5 ANSI/BHMA A156.13-2012, Mortise Locks.

.6 ANSI/BHMA A156.22-2012, Door Gasketing and Edge Seal Systems.

.7 ANSI/BHMA A156.26-2012, Continuous Hinges.

.8 ANSI/BHMA A156.31-2013, Electric Strikes and Frame Mounted Actuators.

.9 ANSI/BHMA A156.115W-2006 – Hardware Preparations in Wood Doors.

.2 ASTM International

.1 ASTM E90-09, Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

.2 ASTM E283-04 (2012), Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

.3 ASTM F1577-05 (2012), Standard Test Methods for Detention Locks for Swinging Doors.

.3 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)

.1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

.4 National Fire Protection Association (NFPA)

.1 NFPA (Fire) 80-2013, Standard for Fire Doors and Other Opening Protectives.

.2 NFPA 105-2013, Smoke Door Assemblies and Other Opening Protectives.

.5 Underwriter’s Laboratories of Canada (ULC)

.1 CAN/ULC S104-M80, Fire Tests of Door Assemblies.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware; include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Hardware List:

.1 Submit contract hardware list.

.2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

.4 Manufacturer's Instructions: Submit manufacturer's installation instructions.

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

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for door hardware for incorporation into manual.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.5 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.4 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, well-ventilated area.

.2 Store and protect door hardware from nicks, scratches, and blemishes.

.3 Protect prefinished surfaces with wrapping or strippable coating.

.4 Replace defective or damaged materials with new.

Part 2 Products

2.1 HARDWARE ITEMS

.1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

.1 Mortise locks and latches: To BHMA A156.13, series 1000 mortise lock, Grade 1 and Security Grade 1. Meets impact requirements of ASTM F1577.

- .1 Case: Wrought steel, zinc dichromate plated, 3 mm thick.
- .2 Latchbolt: Stainless steel, minimum 19 mm throw.
- .3 Provide electrically operated locks as scheduled.
- .4 Function: As scheduled.

.2 Deadbolts: To BHMA A156.13, Operational Grade 1 and Security Grade 1.

- .1 Case: Wrought steel, zinc dichromate plated, 3 mm thick.
- .2 Latchbolt: Stainless steel, minimum 19 mm throw.
- .3 Function: As scheduled.

.3 Electric strikes: To BHMA A156.31, Grade 1; heavy duty stainless steel.

- .1 Conforms to CAN4-S104 for fire doors.
- .2 Static strength: 660 kg (1500 lbs).
- .3 Dynamic strength: 95 N-m (70 ft-lbs).
- .4 UL 1034 – burglar resistant.

.4 Flush pull: To BHMA A156.6, heavy duty, cast brass, with security head fastener attachment.

.5 Butt hinges: To BHMA A156.1, five-knuckle.

- .1 Heavy weight: 0.180 gauge steel.
- .2 Provide hinges with non-removable pins where scheduled.

.6 Barrel continuous hinges: To BHMA A156.26, Grade 1, full-height piano-style hinge; 14 gauge stainless steel, with 4.75 mm diameter stainless steel pin, nylon bearings, symmetrical hole pattern.

.7 Door closers: To BHMA A156.4, Grade 1, rack and pinion operation, cast iron cylinder assembly, metal case, adjustable backcheck intensity.

- .1 Arms: Heavy duty forged steel; standard and parallel, as scheduled.
- .2 Tracks: Regular, and hold-open, as scheduled.

.8 Door bottom: To ANSI/BHMA A156.22, NFPA 105, and ASTM E90; 6063-T6 aluminum case with movable sponge neoprene drop bar seal. Seal actuated by plunger contacting jamb.

- .1 Air leakage (ASTM E283): Maximum 0.3 cfm/ft^2 at 1.57 psf.
- .2 Mounting: Fully recessed.

.9 Overhead stop: To BHMA A156.8, Grade 1 and 2; heavy duty, low-profile, concealed mounting; UL listed for fire doors.

.10 Wall stops: To BHMA A156.16; cast brass with convex rubber bumper, large size with flush back plate; 100 mm (4 inch) diameter, 19 mm (3/4 inch) diameter.

.11 Perimeter gasketing: To BHMA A156.22, extruded tempered aluminum retainer, alloy 6063-T6; with silicone seal, heavy duty type; stainless steel fasteners.

.12 Viewer: To BHMA A156.16, brass with bright chrome finish, UL 90 minute fire rating, heavy duty privacy cover, 190° viewing field.

.13 Architectural door trim: To BHMA A156.6.

.1 Door protection plates: Kick plate type 1.27 mm thick stainless steel, No. 4 finish.

2.3 FASTENINGS

.1 Use only fasteners provided by manufacturer. Failure to comply may void warranties and applicable licensed labels.

.2 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.3 Exposed fastening devices to match finish of hardware.

.4 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.5 Use fasteners compatible with material through which they pass.

2.4 KEYING

.1 Contact Departmental Representative for Keying Strategy.

.2 Provide keys in duplicate for every lock.

.3 Stamp keying code numbers on keys and cylinders.

Part 3 Execution

3.1 INSTALLATION

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

.2 Supply door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Supply manufacturers' instructions for proper installation of each hardware component.

.4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).

.5 Where doorstop contacts door pulls, mount stop to strike bottom of pull.

.6 Use only manufacturer's supplied fasteners.

.1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.7 Remove construction cores when directed by Departmental Representative.

.1 Install permanent cores and ensure locks operate correctly.

3.2 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

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

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

.2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.

.3 Remove protective material from hardware items where present.

.4 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by door hardware installation.

3.5 SCHEDULE

.1 Door D24:

.1 Intrusion Detection System (IDS). Zone separately from Room 125A.

.2 Existing card access to remain.

.2 Door D25A:

.1 HCM 45mm thick, 1HR FRR

.2 1.6mm steel door frame with strike bucket to accept 25mm throw dead bolt; wedge or grout in are of strike bucket to prevent spreading

.3 Reuse existing hardware

.4 IDS zoned separately from RM 124

.3 Door D27:

.1 HCM door 45mm thick, 1HR FRR

.2 1.6mm steel door frame with strike bucket to accept 25mm throw dead bolt; wedge or grout in are of strike bucket to prevent spreading

.3 Lockset: ANSI F15

.4 Heavy duty closer

.5 NRPS if reverse swing door

.6 IDS door contacts.

.7 Electronic Access Control

.4 Door D28:

.1 HCM door 45mm thick, 1HR FRR

.2 Lockset: ANSI F14K

.3 NRPS

.4 Heavy duty door closer

.5 Electronic Access Control

.6 Door viewer x 2 both directions, installed at same height side by side, centered, installed by manufacturer

.1 Approved models: Ives No. 698B3 and Loxem 190

.5 Door D31

.1 HCM 45mm thick, 1HR FRR

.2 1.6mm steel door frame with strike bucket to accept 25mm throw dead bolt; wedge or grout in are of strike bucket to prevent spreading

.3 Reuse existing hardware

.4 NRPS

.5 Threshold

.6 Weather-stripping

.7 Door sweep

.8 Door viewer x 2 both directions, installed at same height side by side, centered, installed by manufacturer

.1 Approved models: Ives No. 698B3 and Loxem 190

.6 Door D32:

.1 HCM 45mm thick, 1HR FRR

.2 Lockset: ANSI F07K

.3 Door Closer

.7 Door D33:

.1 HCM 45mm thick

.2 Lockset: ANSI F01K or F75K

.3 Door Closet

.8 Door D34:

.1 HCM 45mm thick, 1HR FRR

.2 Lockset: ANSI F07K

.3 Door Closer

.9 Door D35:

.1 HCM 45mm thick

.2 Vertical viewport with shutter

.3 6mm tempered glass

.4 Undercut door for exhaust air make-up

.5 Lockset: ANSI F18 with dummy trim knob or finger pull on outside, no trim inside

.10 Door D36:

.1 HCM 45mm thick, 1 HR FRR

.2 Lockset: ANSI F14K

.3 NRPS

.4 Heavy duty door closer

.5 Door viewer x 2 both directions, installed at same height side by side, centered, installed by manufacturer

.1 Approved models: Ives No. 698B3 and Loxem 190

.11 Door D37, D39, D40, D42, D44:

.1 Folger Adam 32D Lock

.2 Ensure floor track assembly is attached to both floor and wall

.3 Ensure receiver has Tack Weld Edge every 203mm on site

.12 Door D38, D41, D43

.1 HCM 45mm thick

.2 Lockset: ANSI F18 with finger pull or dummy knob

.13 Door D45

.1 Acoustical 45mm thick metal door, STC 46 with resilient threshold

.2 Lockset: ANSI F14K

.3 Heavy duty closer outside of room

.4 Acoustic door trim including: weather-stripping, door bottom seal, threshold

.14 Door 46

.1 HCM 45mm thick with 1.2mm CRS door skin

.2 Vertical viewport with shutter

.3 6mm tempered glass

.4 Lockset: ANSI F07K

.5 Heavy duty closer

.15 Door D47

.1 HCM 45mm thick, 1HR FRR

.2 1.6mm steel door frame with strike bucket to accept 25mm throw dead bolt; wedge or grout in are of strike bucket to prevent spreading

.3 Lockset: F14K

.4 NRPS

.5 Threshold

.6 Weather-stripping

.7 Door sweep

.8 Heavy duty closer

.9 Door viewer x 2 both directions, installed at same height side by side, centered, installed by manufacturer

.1 Approved models: Ives No. 698B3 and Loxem 190

.16 Door D50

.1 HCM 45mm thick with 1.2mm CRS door skin

.2 1.6mm steel door frame with strike bucket to accept 25mm throw dead bolt; wedge or grout in are of strike bucket to prevent spreading

.3 Lockset: ANSI F07K

.4 Door Closer

.5 Weather-Stripping

.6 Door Sweep

.17 Door D51

.1 HCM 45mm thick

.2 Vertical viewport with shutter

.3 6mm tempered glass

.4 Weather-Stripping

.5 Lockset: ANSI F18 with dummy trim knob or finger pull on the outside, no inside trim

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C542-05 (2011), Standard Specification for Lock-Strip Gaskets.

.2 ASTM D2240-05 (2010), Standard Test Method for Rubber Property - Durometer Hardness.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 12.1-2017, Safety Glazing.

.3 Glass Association of North American (GANA)

.1 GANA Glazing Manual – current edition.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories; include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Include plans, elevations, sealants, fasteners, thicknesses.

.4 Certificates: Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.3 CLOSEOUT SUBMITTALS

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

.2 Operation and Maintenance Data: Submit operation and maintenance data for glazing for incorporation into manual.

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect glazing and frames from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Door vision lights:

.1 Safety glass: To CAN/CGSB 12.1, tempered, transparent, 6 mm thick.

.2 Sealant: In accordance with Section 07 92 00 - Joint Sealants.

2.2 ACCESSORIES

.1 Setting blocks: Neoprene, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.

.2 Spacer shims: Neoprene, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self-adhesive on one face.

.3 Glazing tape: Preformed butyl compound with integral resilient tube spacer, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; widths as required for application, black colour.

.4 Glazing splines: Resilient silicone, extruded shape to suit glazing channel retaining slot, colour as selected.

.5 Lock-strip gaskets: To ASTM C542.

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates are acceptable for glazing installation in accordance with manufacturer's written instructions.

.1 Verify openings for glazing are correctly sized and within tolerance.

.2 Verify surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

.3 Visually inspect substrate.

.4 Inform Departmental Representative of unacceptable conditions.

.5 Proceed with installation only after unacceptable conditions have been remedied.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

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

.1 Perform work in accordance with GANA Glazing Manual and for glazing installation methods.

.2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line. Butt-joint tape edges, seal joints with butyl sealant.

.3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.

.4 Set glass unit on setting blocks; apply pressure against fixed stop for full contact.

.5 Place glazing tape on free perimeter of glazing in same manner described.

.6 Install removable stop without displacement of tape. Apply pressure on tape for full continuous contact.

.7 Knife trim protruding tape.

3.4 CLEANING

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

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

.1 Remove traces of primer, caulking.

.2 Remove glazing materials from finish surfaces.

.3 Remove labels.

.4 Clean glass using approved non-abrasive cleaner in accordance with manufacturer's instructions.

.2 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.5 PROTECTION

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

.2 After installation, mark each light with an "X" by using removable plastic tape or paste.

.3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C864-05 (2015) - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

.2 ASTM C920-14a - Standard Specification for Elastomeric Joint Sealants.

.3 ASTM C1115-06 (2011) - Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.

.4 ASTM C1330-02 (2013) - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 12.1-M90, Tempered or Laminated Safety Glass.

.2 CAN/CGSB 12.8-97, Insulating Glass Units.

1.2 SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittal Procedures.

.2 Product Data: Descriptive data and performance attributes for vision control glass.

.3 Closeout Submittals:

.1 Maintenance Instructions: Manufacturer’s printed instructions for cleaning and maintenance of glazed units, including operators.

1.3 QUALITY ASSURANCE

.1 Perform Work in accordance with GANA Glazing Manual.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver and store glass units in upright position, on blocks, in dry and safe location.

.2 Do not place units in direct sunlight.

.3 Handle units using corner protectors.

Part 2 PRODUCTS

2.1 MANUFACTURERS

.1 Acceptable manufacturer: Unicel Architectural, 800-668-1580, www.unicelarchitectural.com.

2.2 SYSTEM DESCRIPTION

.1 Vision Control Glass: Hermetically sealed glazed units with vision controlled by rotating horizontal louvers mounted in the air space between the glass panes.

.1 Louvre operation: Manual.

2.3 MATERIALS

.1 Glass: To CAN/CGSB 12.1, transparent, clear, tempered, 6 mm thickness.

.2 Louvers: Hollow extruded aluminum, interlocking profile, 10 mm thick x 35 mm deep.

.1 Colour: As selected by Departmental Representative from manufacturer's standard range.

.3 Manual Operators: Anti-ligature knob type.

2.4 ACCESSORIES

.1 Setting Blocks: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 70 to 90 Shore A durometer hardness.

.2 Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 50 to 60 Shore A durometer hardness.

.3 Glazing Gaskets: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone or thermoplastic polyolefin rubber, molded or extruded shape to fit glazing channel retaining slot.

.4 Glazing Sealant:

.1 ASTM C920, Type S, Grade NS, Class 25; single component silicone type, low modulus, non-sag.

.2 Sealant backing: ASTM C1330, Type O, size and density to control glazing sealant depth and produce optimum glazing sealant performance.

2.5 FABRICATION

.1 Sealed Insulating Glass Units:

.1 Comply with CAN/CGSB 12.8.

.2 Fabricate spacer bar frame of tubular aluminum filled with desiccant.

.3 Bond spacer bar frame to glass panes.

.4 Fill space outside frame to glass edge with elastomeric sealant.

.2 Unit Configurations:

.1 Outer lite: 6 mm thick clear tempered glass.

.2 Airspace: 63 mm.

.3 Inner lite: 6 mm thick clear tempered glass.

Part 3 EXECUTION

3.1 PREPARATION

.1 Clean glazing rabbets; remove loose and foreign matter.

.2 Remove protective coatings on metal surfaces.

.3 Clean glass just prior to installation.

3.2 INSTALLATION - GENERAL

.1 Install glass in accordance with glass manufacturer's instructions.

.2 Maintain manufacturer's recommended edge and face clearances between glass and frame members.

3.3 INSTALLATION - GASKET GLAZING METHOD

.1 Fabricate gaskets to fit openings; allow for stretching of gaskets during installation.

.2 Set soft compression gasket against fixed stop or frame with bonded miter cut joints at corners.

.3 Set glass centered in openings on setting blocks.

.4 Install removable stops and insert dense compression gaskets at corners, working toward centers of glass, compressing glass against soft compression gaskets to produce weathertight seal.

.5 Seal joints in gaskets.

3.4 INSTALLATION - SEALANT GLAZING METHOD

.1 Apply sealant to full depth of permanent stops.

.2 Press glass into sealant with slight lateral movement to ensure adhesion.

.3 Apply sealant to full depth of removable stops. Secure stops in position, forcing contact with sealant bead and completely filling joint.

3.5 PROTECTION

.1 After installation, mark glass with an 'X' using removable plastic tape.

END OF SECTION

NO.	FLOOR	BASE	CEILING		WALL								NOTES
					NORTH		EAST		SOUTH		WEST		
	Material	Mat.	Material	Fin.	Material	Fin.	Material	Fin.	Material	Fin.	Material	Fin.	
124	EX	EX	EX	EX	EX	EX	EX	EX	EX	EX	EX	EX	
125A	EX	EX	EX	EX	EX	PT	EX	EX	EX	EX	EX	EX	1
125B	EX	EX	GWB	PT	EX	EX	EX	EX	EX	PT	EX	EX	1
127	EX	EX	GWB	PT	EX	EX	EX	EX	EX	EX	EX	EX	
128	EX/SV	EX/RB	GWB	PT	-	-	EX	EX	EX/GWB	PT	EX/CMU	PT	1, 2
129	EX	EX	GWB	PT	EX	EX	EX	EX	-	-	EX	EX	
132	EPX	EPX	SLB	EC	CMU	EP	CMU	EP	CMU	EP	CMU	EP	
133	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	3
134	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	
135	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	
136	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	
137	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	4
138	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	
139	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	4
140	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	4
141	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	
142	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	4
143	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	
144	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	4
145	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	5
146	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	6
147	EX	EX	EX	EX	EX	EX	EX	EX	MLP	PT	EX	EX	7
148	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	
149	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	
150	EPX	EPX	SLB	EP	CMU	EP	CMU	EP	CMU	EP	CMU	EP	
151	EPX	EPX	SLB	EC	CMU	EC	CMU	EC	CMU	EC	CMU	EC	

GENERAL NOTES

1. PATCH AND PAINT TO MATCH EXISTING WHERE REQUIRED.
2. PATCH FLOOR AND RUBBER BASE TO MATCH EXISTING WHERE REQUIRED.
3. TOLIET WALL TO RECEIVE 2 PART EPOXY GROUT.
4. FINISH WITH 2 PART EPOXY GROUT AROUND LIGHTS
5. ACOUSTIC PANELS ON N, E AND S WALLS.
6. GROUT ENTIRE EAST WALL PRIOR TO PAINTING TO ENSURE FLUSH SURFACE.
7. METAL LINER PANEL TO UNDERSIDE OF CEILING. CONFIRM FINISH WITH DEPARTMENT REP.

LEGEND

CMU	CONCRETE MASONARY
EPX	EPOXY
EX	EXISTING
EC	EPOXY COATING
EP	EPOXY PAINT
GWB	GYPSUM WALLBOARD
PT	PAINT
MLP	METAL LINER PANEL
RB	RUBBER BASE
SLB	SLAB
SV	SHEET VINYL

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A653/A653M-13, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM C475/C475M-15, Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

.3 ASTM C557-03 (2009)e1, Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

.4 ASTM C645-14, Non-Structural Steel Framing Members.

.5 ASTM C754-11, Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.6 ASTM C840-13, Standard Specification for Application and Finishing of Gypsum Board.

.7 ASTM C954-11, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.

.8 ASTM C1002-07, 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.

.9 ASTM C1047-14a, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.

.10 ASTM C1396/C1396M-14, Standard Specification for Gypsum Wallboard.

.11 ASTM D523-14, Standard Test Method for Specular Gloss.

.12 ASTM D822/D822M-13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.2 Expanded Metal Mesh Association (EMMA)

.1 EMMA 557-15, Standards for Expanded Metal.

.3 Gypsum Association (GA)

.1 GA-214-15, Recommended Levels of Finish for Gypsum Board, Glass Mat, and Fiber-Reinforced Gypsum Panels.

.2 GA-216-13, Application and Finishing of Gypsum Panel Products.

.4 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S102-10, Standard Method of Fire Endurance Tests of Building Construction and Materials.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for gypsum board and liner panels; include product characteristics, performance criteria, physical size, finish, and limitations.

1.3 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire rated assemblies in conjunction with Section 09 22 16 as follows:

.1 Fire resistance classifications to CAN/ULC S102.

.2 Fire rated Design Assembly No. as listed on Drawings.

1.4 MOCK-UPS

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.

.2 Construct wall assembly, full height by 1200 mm wide, incorporating steel mesh, illustrating materials installation and interface.

.3 Locate where directed.

.4 Accepted mock-up may remain as part of finished work.

.5 Allow for photographic inspection of mock-up by Departmental Representative before proceeding with gypsum wall partition Work.

1.5 DELIVERY, STORAGE, AND HANDLING

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

.2 Deliver materials to site in original packaging, labelled with manufacturer's name and identification.

.3 Storage and Handling Requirements:

.1 Store gypsum board assemblies materials level off ground and indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.

.3 Protect from weather, elements and damage from construction operations.

.4 Handle gypsum boards to prevent damage to edges, ends or surfaces.

.5 Replace defective or damaged materials with new.

1.6 AMBIENT CONDITIONS

.1 Maintain temperature 10°C minimum, 21°C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost-free surfaces.

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

Part 2 Products

2.1 MATERIALS

.1 Standard gypsum board: ASTM C1396/C1396M, regular and Type X, thickness as shown on Drawings, 1200 mm wide x maximum practical length, ends square cut, edges square.

.2 Carrying Channels: Cold rolled steel to ASTM C645, galvanized.

.3 Tie Wire: To ASTM C754.

.4 Hangers: To ASTM C754, galvanized.

.5 Steel drill screws: ASTM C1002.

.6 Stud adhesive: ASTM C557.

.7 Laminating compound: As recommended by manufacturer, asbestos-free.

.8 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.

.9 Sealants: In accordance with Section 07 92 00 - Joint Sealants.

.1 Acoustic sealant: In accordance with Section 07 92 00 - Joint Sealants.

.10 Polyethylene: CAN/CGSB 51.34, Type 2.

.11 Joint tape: ASTM C475, 52 mm wide fibre paper tape.

.12 Joint compound: ASTM C475, asbestos-free.

2.2 FRAMING MATERIALS

.1 Studs and Tracks: As specified in Section 09 22 16.

.2 Furring, framing, and accessories: ASTM C645.

.3 Anchorage to substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application, and to rigidly secure materials in place.

.1 Tie wire: To ASTM C754.

.2 Hangers: To ASTM C754, galvanized.

2.3 STEEL MESH

.1 To EMMA 557, flattened stainless steel mesh, style ¾-9F:

.1 Strand thickness: 3.05 mm (0.120 inch).

.2 Strand width: 4.2 mm (0.165 inch).

.3 Diamond opening: 14.3 x 42.9 mm (0.563 x 1.688 inch).

.4 Attachment: 4.8 mm (3/16 inch) steel pop rivets with 38 mm OD x 4.8 mm ID (1-1/2 inch OD x 3/16 inch ID) stainless steel fender washers, installed at 200 mm on centre.

2.4 LINER PANELS

.1 Panels: ASTM A653, Z275 (G90) galvanized sheet steel, pre-finished. Include starter strips and trims to match.

- .1 Thickness: Minimum 0.61 mm (24 gauge).
- .2 Finish: Factory applied silicone modified polyester.
  - .1 Colour: White.
  - .2 Specular gloss: 30 units +/-5 to ASTM D523.
  - .3 Coating thickness: 25 micrometres minimum.
  - .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D822 as follows:
    - .1 Outdoor exposure period 1000 hours minimum.
    - .2 Humidity resistance exposure period 1000 hours minimum.
- .3 Sealants:
  - .1 Concealed: Tape or compound, non-skinning, non-drying butyl rubber.
  - .2 Exposed: Thermoplastic elastomer.

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates are acceptable for installation of gypsum board assemblies in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Apply and finish gypsum board to ASTM C840 or GA-216 except where specified otherwise.

.2 Frame with furring channels, perimeter of openings for access panels.

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

.4 Install wall furring for gypsum board wall finishes to ASTM C840, except where specified otherwise.

.5 Install furring as required for fire resistance ratings indicated.

.6 Furr openings and around built-in equipment, cabinets, and access panels on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.7 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.8 Erect drywall resilient furring transversely across studs, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with drywall screws.

.9 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

.1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical work, and mechanical work have been approved.

.2 Apply single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing.

.3 Double layer gypsum board:

- .1 Base layer application:
  - .1 Apply gypsum board with long dimension parallel to studs.
  - .2 Position board with abutting edges located in centre of stud flanges.
  - .3 Stagger joints on opposite sides of partition so that joints occur on different studs.
  - .4 Screw-fasten base layer gypsum board to steel studs with 25 mm screws.
- .2 Face layer application:
  - .1 Apply gypsum board with long dimension parallel to studs.
  - .2 Position board with abutting edges located in centre of stud flanges.
  - .3 Stagger joints from base layer joints, and on opposite sides of the partition.
  - .4 Screw-fasten face layer to steel studs with screws that are minimum 10 mm longer than the total thickness of the material being attached to the studs.

.4 Install fire rated gypsum board in accordance with applicable ULC design number.

.5 Apply board using stud adhesive on furring or framing and laminating adhesive on base layer of gypsum board.

.6 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.

.7 Install gypsum board with face side out.

.8 Do not install damaged or damp boards.

.9 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION - GENERAL

.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 using contact adhesive at 150 mm on centre.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Splice corners and intersections together and secure to each member with 3 screws.

.6 Install access doors to electrical and mechanical fixtures as specified in their respective sections.

.1 Rigidly secure frames to furring or framing systems.

.7 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.

.8 Place corner beads at external corners.

.1 Use longest practical length.

.2 Place edge trim where gypsum board abuts dissimilar materials [and as indicated].

.9 Finish gypsum board walls to following levels in accordance with GA-214:

.1 Levels of finish:

.1 Concealed locations - 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 Exposed locations - 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; surfaces smooth and free of tool marks and ridges.

.10 Finish corner beads, control joints and trim as required with two coats of joint compound and one coat of taping compound, feathered out onto panel faces.

.11 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board to be invisible after surface finish is completed.

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

.13 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

3.5 ACOUSTIC ACCESSORIES INSTALLATION

.1 Install resilient channels. Locate joints over framing members.

.2 Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

.3 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes, and ducts, in partitions where perimeter sealed with acoustic sealant.

.4 Apply two 12 mm beads of acoustic sealant to bottoms of floor tracks and tops of ceiling tracks.

3.6 STEEL MESH INSTALLATION

.1 Install mesh on ‘attack’ side of room.

.2 Support edges with anti-spread bracing, studs, or corners.

.3 Align sheet edges at all vertical and horizontal seams on centre line of steel stud or anti-spread bracing. Secure sheets with specified rivets installed at 200 mm on centre.

.4 Screws are not acceptable for permanent attachment of security mesh.

3.7 LINER PANEL

.1 Install liner panel in accordance with manufacturer’s recommendations.

.2 Install liner panel straight and plumb.

3.8 TOLERANCES

.1 Maximum variation of finished gypsum board surface from true flatness: 3 mm in 3 m, in any direction.

3.9 CLEANING

.1 Progress Cleaning: Clean in accordance with Section 01 74 11 - Cleaning. Leave Work area clean at end of each day.

.2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.10 PROTECTION

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

.2 Repair damage to adjacent materials caused by installation of gypsum board assemblies.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C645-14, Standard Specification for Nonstructural Steel Framing Members.

.2 ASTM C754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.181-99, Ready-Mixed Zinc-Rich Coating.

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing. Include product characteristics, performance criteria, physical size, finish and limitations.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect metal framing from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Non-load bearing channel stud framing: To ASTM C645, stud size as shown on drawings, roll formed from hot dipped galvanized steel sheet, for screw attachment of gypsum board.

- .1 Base steel thickness unless otherwise indicated in drawings:
  - .1 General wall construction: Minimum 1.14 mm (0.043 inches).
- .2 Knock-out service holes at 460 mm centres.
- .3 Floor and ceiling tracks: In widths to suit stud sizes, 32 mm flange height.

.2 Metal channel stiffener: 1.4 mm (0.054 inch) thick cold rolled steel, coated with rust inhibitive coating.

.3 Deflection track: To ASTM C645, 1.14 mm (0.043 inches) thick, with one slotted leg and one solid leg; complete with 2 mm thick adhered intumescent material.

.4 Acoustical sealant: In accordance with Section 07 92 00 - Joint Sealants.

.5 Insulating strip: Rubberized, moisture resistant 3 mm thick foam strip, 12 mm (1/2 inch) wide, with adhesive on one face, lengths as required.

.6 Touch-up primer for galvanized surfaces: CAN/CGSB 1.181.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that conditions of substrate are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 ERECTION

.1 Align partition tracks at floor and ceiling and secure at maximum 600 mm on centre.

.2 Install damp proof course under stud shoe tracks of partitions on slabs on grade.

.3 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners.

- .1 Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom track using pop rivets.

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

.7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified.

.1 Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install heavy gauge single jamb studs at openings.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs.

.1 Secure track to studs at each end, in accordance with manufacturer's instructions.

.2 Install intermediate studs above and below openings in same manner and spacing as wall studs.

.11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Provide wood blocking secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures attached to steel stud partitions. Refer to Section 06 10 00 – Rough Carpentry.

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

.14 Extend partitions to ceiling height except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs.

.1 Use deflection track as indicated.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Install two continuous 12 mm wide beads of acoustical sealant under studs and tracks around perimeter of sound control partitions.

3.3 CLEANING

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

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

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM D2240-05 (2010), Standard Test Method for Rubber Property—Durometer Hardness.

.2 ASTM D3389-10, Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader).

.3 ASTM F1861-08 (2012)e1 – Standard Specification for Resilient Wall Base.

.2 Canadian Standards Association (CSA)

.1 CSA B651-12, Accessibility for the Built Environment.

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 Product data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for base, transition strips, adhesive. Include product characteristics, performance criteria, physical size, finish, and limitations.

.2 Submit WHMIS MSDS in accordance with Section 01 35 29 – Health and Safety Requirements.

.3 Samples:

.1 Submit duplicate 150 mm pieces of rubber base, demonstrating profiles.

.2 Submit duplicate 100 mm pieces of transition strip in proposed colours and finish.

.4 Closeout Submittals:

.1 Provide maintenance data for resilient base for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products

2.1 MATERIALS

.1 Resilient base: To ASTM F1861, continuous, top set, composition homogeneous throughout material.

- .1 Type: Rubber.
- .2 Thickness: 3.2 mm.
- .3 Height: 101.6 mm.
- .4 Lengths: Cut lengths minimum 2400 mm.
- .5 Profile: Cove (with toe).
- .6 Colour: As selected by Departmental Representative.

.2 Transition Mouldings: PVC with additives and colourants, composition homogeneous through material.

- .1 Hardness to ASTM D2240: Minimum 85 Shore A.
- .2 Abrasion resistance to ASTM D3389: 0.22 mg/cycle.
- .3 Slip resistance: To meet ASTM D2047.
- .4 Changes in level to comply with accessibility requirements of CSA B651:
  - .1 0 to 6 mm vertical rise: Vertical transition strip permitted.
  - .2 7 to 13 mm vertical rise: Bevelled transition, not to exceed 1:2 ratio for rise:run.
  - .3 Over 13 mm vertical rise: Bevelled transition, not to exceed 1:12 ratio for rise:run.
- .5 Provide adhesive as recommended by transition strip manufacturer.

.3 Primers and adhesives: Types recommended by resilient flooring manufacturer for specific material on applicable substrate.

.4 Sub-floor filler and leveller: Self-levelling cementitious compound capable of bonding to properly prepared substrate surfaces.

- .1 Compressive strength: Minimum 36.5 MPa (5300 psi) at 28 days.
- .2 Capable of being walked on without damage after 3 hours.
- .3 Capable of being coated after 24 hours at 21°C.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 Verify conditions of substrates are acceptable for product installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.3 APPLICATION: BASE

.1 Clean substrate.

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

.3 Do not stretch resilient base during installation.

.4 Mitre base at corners.

.5 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.6 Install base straight and level, with base in continuous contact with horizontal and vertical substrates.

.7 Scribe and fit to door frames and other obstructions. Use pre-moulded end pieces at flush door frames.

3.4 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 Waste Management and Disposal: Remove waste material in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.3 Remove excess adhesive from floor, base and wall surfaces without damage.

3.5 PROTECTION

.1 Protect new floors from time of final set of adhesive until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM C307-03 (2012), Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

.2 ASTM C413-01 (2012), Standard Test Method for Absorption of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.3 ASTM C580-02 (2012), Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.4 ASTM D2240-05 (2012), Standard Test Method for Rubber Property-Durometer Hardness.

.5 ASTM D2794-93 (2010), Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

.6 ASTM D4060-10, Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

1.2 SUBMITTALS

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on specified products, describing performance characteristics; sizes, patterns and colours available.

.1 Samples: Submit duplicate manufacturer samples, minimum 150 x 150 mm (6 x 6 inches) in size, illustrating colour and pattern for each floor material for each colour specified.

.2 Installation Data: Manufacturer's special installation requirements indicating special procedures, perimeter conditions requiring special attention.

1.3 CLOSEOUT SUBMITTALS

.1 Section 01 78 00: Submission procedures.

.2 Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.

1.4 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Store resin materials in a dry, secure area.

.3 Maintain minimum temperature of 16°C.

.4 Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Maintain ambient temperature required by manufacturer three days prior to, during, and 24 hours after installation of materials.

Part 2 Products

2.1 MATERIALS

.1 Matrix: Epoxy, two-component.

.1 Colour: As selected by Departmental Representative.

.2 Non-slip Surfacing: Quartz broadcast aggregate.

.1 Colour: As selected by Departmental Representative.

.3 Cove base: Troweled, epoxy mortar system.

.4 Top Coat: Epoxy, two-component, clear.

.5 Flooring system: Conform to the following:

Property	ASTM Standard	Test Result
Tensile Strength	C307	11 MPa (1600 psi)
Flexural Strength	C580	27.6 MPa (4000 psi)
Hardness	D2240, Shore D	85 to 90
Water Absorption	C413	0.1%
Abrasion Resistance	D4060, CS-17	Maximum weight loss 0.06 g
Impact Resistance	D2794	Minimum 18 N.m (160 in.lb)

2.2 ACCESSORIES

.1 Subfloor Filler: Type recommended by flooring material manufacturer.

.2 Primers: Waterproof; types recommended by flooring manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that surfaces are smooth and flat with maximum variation of 6 mm in 3 m (1/4 inch in 10 ft) and are ready to receive work.

.1 Verify concrete floor levels for moisture and alkalinity are within manufacturer's recommended ranges for flooring installation.

.2 Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

3.2 PREPARATION

.1 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.

.2 Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.

.3 Vacuum clean substrate.

.4 Protect adjacent surfaces from damage or overspray resulting from work of this Section. Mask and cover adjacent surfaces.

.5 Post "WET FLOORING" signs while work is in progress and during curing of flooring application/

.6 Apply primer to flooring manufacturer instructions.

3.3 INSTALLATION - FLOORING

.1 Install trowelled cove base to manufacturer instructions.

.2 Install flooring to manufacturer instructions.

.3 Apply flooring to cured thickness of 3 mm (1/8 inch).

.4 Finish to smooth level surface.

.5 Fillet and cove at vertical surfaces.

3.4 PROTECTION OF FINISHED WORK

.1 Prohibit traffic on floor finish for 48 hours after installation.

.2 Barricade area to protect flooring until cured.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM C423-09a - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

.2 ASTM E84-10b, Standard Test Method for Surface Burning Characteristics of Building Materials.

1.2 SYSTEM DESCRIPTION

.1 Acoustic Panels: Shop-fabricated acoustic panels covered by vinyl facing, wall mounted.

1.3 SUBMITTALS

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data Manufacturer's descriptive literature for panel system, including component item data, physical sizes, clearances required.

.3 Shop Drawings:

.1 Indicate general layout showing acoustic panel locations and orientation, reflective and absorptive, required construction and anchorage details, rough openings affected, size and tolerances of openings.

.2 Indicate panel dimensions and seam locations.

.4 Samples: Submit duplicate samples, minimum 150 x 150 mm (6 x 6 inches), including fabric retainer, absorptive panel other core substrate panel (if applicable), and fabric covering.

.5 Manufacturer's Certificate: Certify that products meet or exceed specified performance requirements.

Part 2 Products

2.1 COMPONENTS

.1 Absorptive Panel Construction: Medium-density core with fabric finish.

.1 Core: Fibreglass, 6 to 7 lb/ft^3 density, acoustically absorptive, sanded to uniform thickness, with resin-reinforced edges and clip-attachment zones.

.1 Thickness: 28 mm (1-1/8 inch).

.2 Edges: Square.

.2 Facer: Impact resilient, 3 mm thick, high density, acoustically transparent.

.3 Finish: Vinyl.

.1 Colour: As selected by Departmental Representative from manufacturer's standard range.

.4 Panel acoustic absorptiveness to ASTM C423 at 28 mm (1-1/8 inch) thickness: NRC 0.90.

.2 Accessories:

.1 Wall attachment and levelling clips: 20 gauge steel, satin finish, mechanically mounted to reinforced areas on acoustic panels.

2.2 FABRICATION

.1 Bond vinyl to face and edges of core, with minimum 1 inch return on back of core.

.2 Tailor-finish corners with no exposed darting.

.3 Ensure vinyl is flat and free of wrinkles and puckers.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that adjacent materials and surfaces are dry, dust-free, free of obstructions, and ready to receive system installation.

.3 Verify painting and finish woodwork are complete prior to installation.

.4 Verify wall penetrations have been acoustically sealed.

3.2 INSTALLATION

.1 Install panels to manufacturer's instructions.

.2 Install and orient panels as identified on accepted shop drawings.

.3 Align and secure intermediate and perimeter retainers, level and plumb.

.4 Use screws to attach frames to wall or partition substrate.

.5 Install acoustic panels to pattern determined by shop drawings. Orient surface facings of panels to optimize absorption characteristics.

.6 Place and position panels plumb and level.

3.3 CLEANING

.1 Section 01 74 11: Cleaning installed work.

.2 Clean finish surfaces and accessories.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.

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

.1 Material Safety Data Sheets (MSDS).

.3 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specifications Manual, 2014.

.2 MPI Maintenance Repainting Manual, 2015.

.3 MPI Approved Products List, 2016.

.4 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

1.2 SCHEDULING

.1 Schedule painting operations to prevent disruption of occupants.

1.3 SUBMITTALS

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

.2 Product Data:

.1 Submit product data and instructions for each paint and coating product to be used.

.2 Submit product data for the use and application of paint thinner.

.3 Submit Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) for products used in the project. Indicate VOCs during application and curing.

.3 Samples:

.1 Submit full range colour sample chips to indicate where colour availability is restricted.

.2 Submit duplicate 200 x 200 mm sample panels of each paint and clear coating with specified paint or coating in colours, gloss/sheen and textures required to MPI Architectural Painting Specification Manual standards submitted on following substrate materials:

.1 3 mm plate steel for finishes over metal surfaces.

.2 13 mm birch plywood for clear finishes over wood surfaces.

.3 50 mm concrete block for finishes over concrete or concrete masonry surfaces.

.4 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.

.3 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.4 Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Manufacturer's Instructions:

.1 Submit manufacturer's application instructions.

.6 Closeout Submittals: Submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

1.4 MOCK-UPS

.1 Mock-ups: Apply mock-ups of each paint system indicated, in each colour and finish selected, to verify preliminary selections made under sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

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

.2 Departmental Representative will select surfaces to represent surfaces and conditions for application of each paint system specified.

.1 Vertical and Horizontal Surfaces: Provide samples of at least 9 m^2 (100 ft^2).

.2 Other Items: Departmental Representative will designate items or areas required.

.3 Apply mock-up samples after permanent lighting and other environmental services have been activated.

.4 Final approval of colour selections will be based on mock-ups.

.1 If preliminary colour selections are not approved, apply additional mock-ups of additional colours selected by Departmental Representative at no added cost to contract.

.5 Approved mock-up may remain as part of finished work.

1.5 MAINTENANCE

.1 Extra Materials:

.1 Deliver to extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Section 01 78 00 - Closeout Submittals.

.2 Quantity: provide one 4 litre can of each type and colour of primer, stain, and finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

.3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

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

.2 Acceptance at Site:

.1 Identify products and materials with labels indicating:

.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 Storage and Protection:

.1 Provide and maintain dry, temperature controlled, secure storage.

.2 Store materials and supplies away from heat generating devices.

.3 Store materials and equipment in well-ventilated area within temperature range 7°C to 30°C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:

.1 Provide one 9 kg 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 National Fire Code of Canada requirements.

.9 Waste Management and Disposal:

.1 Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

.3 Ensure emptied containers are sealed and stored safely.

.4 Dispose unused paint and coating materials at official hazardous material collections site.

.5 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) 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.

.6 Material that cannot be reused is to be treated as hazardous waste and disposed of in an appropriate manner.

.7 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.8 To reduce the amounts of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:

.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 approved legal manner in accordance with hazardous waste regulations.

.5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.9 Set aside and protect surplus and uncontaminated finish materials. Turn over to Departmental Representative for maintenance purposes.

1.7 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Provide heating facilities to maintain ambient air and substrate temperatures above 10°C for 24 hours before, during and after paint application until paint has cured sufficiently.

.2 Provide continuous ventilation for seven days after completion of application of paint.

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

.4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.

.5 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless pre-approved with written approval by specifying body and product manufacturer, perform no painting when:

.1 Ambient air and substrate temperatures are below 10°C.

.2 Substrate temperature is above 32°C unless paint is specifically formulated for application at high temperatures.

.3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.

.4 The relative humidity is under 85% or when the dew point is more than 3°C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3°C below the ambient or surface temperature.

.5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:

.1 Allow new concrete and masonry to cure minimum of 28 days.

.2 15% for wood.

.3 12% for plaster and gypsum board.

.3 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:

.1 Apply paint finish 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 to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Conform to latest MPI requirements for painting work, including preparation and priming.

.4 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.

.5 Linseed oil, shellac, and turpentine: Highest quality product from approved manufacturer listed in MPI Architectural Painting Specification Manual, compatible with other coating materials as required.

2.2 COLOURS

.1 Selection of colours to be from manufacturer’s full range of colours.

.2 Second coat in 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. Obtain written approval from Departmental Representative for tinting of painting materials.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.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 is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete Unit Masonry:

.1 INT 4.2D – High performance architectural latex, G3.

.1 Coat 1: Latex block filler, MPI #4.

.2 Coats 2 and 3: HIPAC latex, MPI #139.

.2 Galvanized metal: Doors and door frames:

.1 INT 5.3B – Waterborne light industrial coating, G5 finish.

.1 Coat 1: Cementitious primer, MPI #26.

.2 Coats 2 and 3: waterborne light industrial coating, MPI #153.

.3 Gypsum wallboard, include access panels:

.1 INT 9.2B - High performance architectural latex.

.1 Walls: G4 finish.

.1 Coat 1: Latex primer/sealer, MPI #50.

.2 Coats 2 and 3: HIPAC latex, MPI #140.

.4 Wood bench slats:

.1 INT 6.3EE – Polyurethane varnish over waterborne stain – G6 (gloss) finish.

.1 Coat 1: Semi-transparent stain, MPI #186.

.2 Coats 2 and 3: Polyurethane varnish, MPI #56.

.3 Colour: Clear.

.5 Electrical backboards.

.1 INT 6.4PP – Fire retardant coating, pigmented, waterborne, MPI #64.

.1 Apply in accordance with manufacturer’s instructions. Apply to all six sides of plywood electrical backboards.

2.6 INTERIOR REPAINTING

.1 Concrete Unit Masonry:

.1 RIN 4.2K – High performance architectural latex, G3.

.1 Touch-up, spot prime: MPI #139.

.2 Coats 1 and 2: MPI #139.

.2 Galvanized metal: High contact/high traffic areas (doors, frames).

.1 RIN 5.3B – Waterborne light industrial coating, G5 finish.

.1 Coat 1: Touch-up and spot prime, MPI #153.

.2 Coats 2 and 3: waterborne light industrial coating, MPI #153.

.3 Gypsum wallboard:

.1 RIN 9.2B – High performance architectural latex.

.1 Walls: G4 finish.

.1 Coat 1: Touch-up, MPI #140.

.2 Coats 2 and 3: HIPAC latex, MPI #140.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Prior to commencing work, examine site conditions and existing substrates to be painted and repainted. Report to Departmental Representative damages, defects, or unsatisfactory or unfavourable conditions or surfaces that will adversely affect this work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Do not commence until such adverse conditions and defects have been corrected and surfaces and conditions are acceptable to Painting Subcontractor and Inspection Agency.

.4 Assess degree of surface deterioration for areas to be repainted, using MPI identifiers and assessment criteria indicated in MPI Repainting Manual. MPI DSD ratings and descriptions are as follows:

Condition	Description
DSD-0	Sound Surface (includes visual (aesthetic) defects that do not affect film's protective properties).
DSD-1	Slightly Deteriorated Surface (indicating fading; gloss reduction, slight surface contamination, minor pin holes, scratches).
DSD-2	Moderately Deteriorated Surface (small areas of peeling, flaking, slight cracking, and staining).
DSD-3	Severely Deteriorated Surface (heavy peeling, flaking, cracking, checking, scratches, scuffs, abrasion, small holes and gouges).
DSD-4	Substrate Damage (repair or replacement of surface required).

.5 Where an assessed degree of surface degradation of DSD-1 to DSD-3 before preparation of surfaces for repainting is revealed to be DSD-4 after preparation, repair or replacement of such unforeseen defects discovered are to be corrected, as mutually agreed, before repainting is started.

.6 Maximum moisture content as follows:

.1 Gypsum board, stucco, and plaster: 12%.

.2 Concrete: 12%.

.3 Concrete Block: 12%.

.4 Wood: 15%.

3.4 PREPARATION

.1 Protection:

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings, and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as fire labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect passing pedestrians, building occupants, and general public in and about the building.

.2 Surface Preparation:

.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.

.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress. Signs to be acceptable to Departmental Representative.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual and Maintenance Repainting Manual requirements. Refer to MPI Manual for specific requirements and as follows:

.1 Remove dust, dirt, and other surface debris by vacuuming and wiping with dry, clean cloths.

.2 Wash surfaces with a biodegradable detergent, bleach where applicable, and clean warm water, using 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. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes and vacuum cleaning.

.5 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 pre-treatment as soon as possible after cleaning and before deterioration occurs.

.6 Touch up of shop primers with primer as specified.

.7 Do not apply paint until prepared surfaces are acceptable to Departmental Representative.

.8 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.

3.5 APPLICATION

.1 Method of application to be as acceptable to Departmental Representative. Apply paint by brush and roller. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:

- .1 Apply paint in uniform layer using brush and/or roller type 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 free of roller tracking and heavy stipple.
- .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.

.4 Apply coats of paint 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 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.

.8 Repaint top, bottom, and vertical edges of doors to be repainted.

.9 Finish closets and alcoves as specified for adjoining rooms.

.10 Finish top, bottom, edges and cut-outs of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint finished area exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as indicated.

.2 Boiler room, mechanical and electrical rooms: Paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.

.3 Other unfinished areas: Leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

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

.5 Do not paint over nameplates.

.6 Keep sprinkler heads free of paint.

.7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.

.8 Paint fire protection piping red.

.9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.10 Paint natural gas piping yellow.

.11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

.12 Do not paint interior transformers and substation equipment.

3.7 SITE TOLERANCES

.1 Walls: No defects visible from 1000 mm at 90 degrees to surface.

.2 Ceilings: No defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Ensure walls, bunks, and epoxy transitions are smooth and free of burrs and sharp edges.

.4 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 FIELD QUALITY CONTROL

.1 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.2 Cooperate with inspection firm and provide access to areas of work.

.3 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.9 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM C307-03 (2012), Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

.2 ASTM C579-01 (2012), Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.3 ASTM C580-02 (2012), Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

.4 ASTM D2240-05 (2010), Standard Test Method for Rubber Property—Durometer Hardness.

.5 ASTM D2794-93 (2010), Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 Manufacturer's Instructions: provide to indicate special handling criteria, installation sequence, and cleaning procedures.

.3 Product data: Provide data on coating products, including technical data, performance characteristics, sizes, patterns, and available colours.

.1 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 29 – Health and Safety Requirements.

.1 Indicate VOC content.

.4 Samples: Submit duplicate manufacturer samples, minimum 120 x 120 mm samples of proposed product, with coating applied to smooth hardboard, illustrating colour and finish.

.5 Closeout Submittals: Provide maintenance data for coatings for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 DELIVERY, STORAGE AND HANDLING

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

.1 Deliver and store materials in manner to prevent damage.

.2 Ensure materials remain in original wrapping and containers until used.

.2 Waste Management and Disposal: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 SITE CONDITIONS

.1 Safety:

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.

.2 Ensure no open flame heating devices are used.

.3 Discourage occupancy of treated space until volatile materials are no longer being emitted and there is no odour.

.4 Provide adequate respiratory protection to exposed individuals.

.2 Ventilation: Provide ventilation continuously during and after coating application. Run system 24 hours per day during application; provide continuous ventilation for 7 days after completion of application.

.3 Temperature:

.1 Do not apply emulsion systems unless uniform minimum 10°C air temperature at installation area for 24 hours prior to and after application.

.2 Maintain minimum temperature 10°C within area of installation until final acceptance of building.

Part 2 Products

2.1 MATERIALS

.1 Base coat: Multi-component epoxy, 100% solids, impact and chemical resistant, trowel-applied, for use on vertical surfaces.

.1 Compressive strength (ASTM C579): 45 MPa (6500 psi) after 7 days.

.2 Tensile strength (ASTM C307): 6.9 MPa (1000 psi).

.3 Flexural strength (ASTM C580): 22 MPa (3200 psi).

.4 Hardness (ASTM D2240, Shore D): 75 to 80.

.5 Impact resistance (ASTM D2794): > 18 Nm (> 160 inch-lbs).

.2 Topcoat: Multi-component epoxy, high performance, high solids, pigmented, cures to hard finish.

.1 Hardness (ASTM D2240, Shore D): 80 to 85.

.2 Colour: As selected by Departmental Representative from manufacturer’s standard range.

.3 Primer: As recommended by coating manufacturer for substrate intended for coating application.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 Verify conditions of substrates are acceptable for product installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

.2 Verify masonry mortar has cured a minimum 28 days and is dry to coating manufacturer’s recommendations.

.3 Remove excess masonry mortar and residual laitance prior to coating installation.

3.3 PREPARATION

.1 Prepare surfaces in accordance with coating material manufacturer's instructions.

.2 Mask surrounding surfaces to provide neat, clean juncture lines.

.3 Protect adjacent surfaces and equipment from damage by overspray.

3.4 APPLICATION

.1 Mix coatings according to manufacturer's instructions.

.2 Apply coating system to produce smooth surface, uniform in sheen, colour and finish, free from marks, dirt, particles, runs, crawls, curling, holes, air pockets and other defects.

.3 Apply primer coats to porous surfaces as recommended by coating manufacturer.

.4 Apply base by trowel to 3 mm thickness.

.5 Apply top glaze coat by spray or roller.

- .1 Roller: 2 coats x 125 microns wet film thickness.
- .2 Spray: 1 coat x 250 microns wet film thickness.

3.5 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

- .1 Clean surfaces to coating manufacturer's printed instructions.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wall and corner guards and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit WHMIS MSDS for products used on the project:

.1 Caulking materials during application.

.2 Adhesives.

.3 Installation Drawings:

.1 Indicate on drawings large scale details, materials, finishes, dimensions, anchorage and assembly.

.4 Samples:

.1 Submit duplicate manufacturer samples of profiles for corner guards.

1.2 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wall and corner guards from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CORNER GUARDS

.1 Corner Guards: Surface mount stainless steel corner guards, 50 mm leg, 3 mm (1/8 inch) radius, edge burrs removed.

.1 Material: Minimum 18 gauge, stainless steel, type 304.

.2 Finish: Satin finish, grain oriented parallel with length.

.3 Height: From top of base to 1200 mm AFF.

2.2 ACCESSORIES

.1 Adhesive: Water-resistant type as recommended by manufacturer for substrate.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that conditions of substrate are acceptable for corner guard installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

.1 Install units on solid backing and erect with materials and components straight, tight and in alignment.

.2 Adhere corner guards in locations as indicated.

3.4 CLEANING

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

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

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

.3 Clean surfaces after installation using manufacturer's written recommended cleaning procedures.

.4 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.

.5 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by corner guard installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

.1 ASTM A167-99(2009), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM A653/A653M-08, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA)

.1 CSA B651-12, Accessible Design for the Built Environment.

1.2 SUBMITTALS

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

.2 Product Data: Provide manufacturer's printed product literature and data sheets; include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.3 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for toilet and bath accessories for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Tools:

.1 Provide special tools required for assembly, disassembly, or removal of toilet and bath accessories, in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.

.2 Deliver special tools to Departmental Representative.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect toilet and bathroom accessories from nicks, scratches, and blemishes.

.3 Replace defective and damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Sheet steel: To ASTM A653/A653M.

.2 Stainless steel sheet metal: To ASTM A167, Type 304 with No. 4 finish.

.3 Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.

.4 Fasteners: Concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

.1 Toilet tissue dispenser: Roll type, surface mounted, chrome plated steel frame, capacity to dispense two jumbo rolls; exposed surfaces in satin finish stainless steel; with supply level viewer.

.2 Paper towel dispenser: for roll paper towels, stainless steel cabinet, hinged front panel, refill indicator slot, lock and key, surface mounted.

.3 Combination paper towel dispenser/waste receptacle: Surface mounted, stainless steel cabinet; lockable access door with continuous full height stainless steel hinge.

.1 For paper towel rolls 203 mm (8 inch) wide, hands-free operation.

.2 Waste receptacle: Removable, galvanized steel.

.4 Soap dispenser: Push-in valve, foam dispensing, 1 L capacity, surface mounted, exposed components with brushed chrome or stainless steel finish.

.5 Sanitary napkin disposal bin: Surface mounted, all-welded construction; satin finish stainless steel construction; complete with magnet catch and cable door-swing limiter.

.1 Waste bin: Removable, capacity 2.3 L.

.6 Grab bars: 18-8, Type 304, 1.2 mm thickness stainless steel tubing, 32 mm outside diameter.

.1 Accessories: 18-8, Type 304, 3 mm thick, stainless steel plate wall flanges, concealed screw attachment, provided with snap covers and all accessories.

.2 Peen bar at area of hand grips.

.3 Grab bar material and anchorage to withstand downward pull of 2.2 kN.

.7 Waste receptacle: Surface mounted, size 355 x 455 mm x 150 mm, stainless steel with vinyl liner.

.8 Mirrors:

.1 Frame: Type 430 stainless steel channel, one piece construction, mitered corners.

.2 Glass: Tempered float glass, 6 mm thick, electrolytically plated.

.3 Attachment: Mechanical, with manufacturer's screws and brackets.

.9 Fold-Down Seats: Wall mounted, minimum capacity 227 kg (500 lb); spring-loaded to return seat to upright position when seat is unoccupied.

.1 Frame: Tubing, stainless steel, Type 304.

.2 Seat: One piece, phenolic resin, 8 mm thick.

.3 Attachment: Type 304 stainless steel brackets, plates, and flanges, heavy gauge.

.10 Robe hook: Stainless steel with 75 mm projection.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back-paint components where contact is made with building finishes to prevent electrolysis.

.6 Concealed ferrous metal anchors and fastening devices: Galvanized.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that conditions of substrates and surfaces to receive toilet and bathroom accessories are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:

.1 Stud walls: Install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units, existing plaster or drywall: Use toggle bolts drilled into cell or wall cavity.

.3 Solid masonry, marble, stone or concrete: Use bolts with lead expansion sleeves set into drilled holes.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Install toilet and bath accessories level and plumb, except grab bars intended for angled mounting.

.4 Install wall-mounted fold-down seat with adequate blocking and backing to support weight of occupant, up to 227 kg (500 lbs).

.5 Use tamper proof screws/bolts for fasteners.

.6 Fill units with necessary supplies shortly before final acceptance of building.

3.3 ADJUSTING

.1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

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

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

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by toilet and bathroom accessories installation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 National Fire Protection Association (NFPA)

.1 NFPA 10 - Portable Fire Extinguishers, 2013 Edition.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC S503-05 (R2010) – Standard for Carbon Dioxide Fire Extinguishers.

.2 CAN/ULC S504-12 - Dry Chemical Fire Extinguishers.

.3 CAN/ULC S508-02 (R2013) - Rating and Fire Testing of Fire Extinguishers.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and datasheets; include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.

.4 Manufacturer's Instructions: Submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.

.5 Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

.6 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 REGULATORY REQUIREMENTS

.1 Conform to National Building Code and NFPA 10 for requirements for extinguishers.

1.4 DELIVERY, STORAGE, AND HANDLING

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

.2 Waste Management and Disposal: Remove waste materials for recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

.1 Stored pressure type with large loop pull pin and shut-off nozzle, ULC labelled, and all metal valve assemblies.

- .1 Size: 2.25 kg.
- .2 Valve assemblies: All metal, with On/Off squeeze grip handles.
- .3 Finish: High gloss polyester powder paint or baked enamel.
  - .1 Colour: Red.
- .4 Allowable types:
  - .1 To CAN/ULC S503, CO_2 type.
    - .1 Carbon dioxide charged.
    - .2 Aluminum tank.
    - .3 Provide CO_2 type extinguishers where proximal to LAN Room and other contamination-sensitive areas.
  - .2 To CAN/ULC S504, ABC type, complete with pressure gauge.
    - .1 Ammonium phosphate powder charged.
    - .2 Drawn steel cylinder.
    - .3 Hose and nozzle.

2.2 CABINETS

.1 Semi-recessed type as indicated, formed sheet steel, minimum 1.2 mm thick with flat trim, 180 degrees opening door with latching device.

.2 Cabinets to maintain fire resistive rating of construction in which they occur.

.3 Door Glazing: Glass, clear, 3 mm thick, tempered.

.4 Cabinet Exterior Trim and Door Finish: Baked enamel, colour as selected by Departmental Representative.

2.3 IDENTIFICATION

.1 Identify extinguishers in accordance with recommendations of NFPA 10 and CAN/ULC S508.

.2 Attach tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

- .1 Languages: To suit language of Contract.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify rough openings for cabinet are correctly sized and located.

3.3 INSTALLATION

.1 Install or mount extinguishers as indicated, in accordance with NFPA 10 and manufacturer's instructions.

.2 Install cabinets plumb and level in wall openings, location as shown on drawings.

.3 Secure rigidly in place to walls.

.4 Position cabinet signage at locations acceptable to authority having jurisdiction.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM A1008/A1008M-10, Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

1.2 SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets for firearm lockers; include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Indicate on drawings: Dimensions, panels, doors, trim, numbering, locking method, finishes.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Steel: To ASTM A1008, commercial quality, cold rolled carbon sheet steel.

2.2 MANUFACTURED UNITS

.1 Lockers:

.1 Assembly: Welded construction.

.2 Configuration: 4 openings tall x 1 opening wide.

.3 Mounting: Recessed flush wall mount.

.4 Body:

.1 Back material, exposed ends: Steel minimum nominal thickness 1.52 mm (16 gauge).

.5 Doors: Double-wall welded construction, steel nominal thickness minimum 1.21 mm (18 gauge).

.6 Hinges: Steel, heavy duty, continuous piano-style hinge; full height of doors.

.1 Steel: Nominal minimum thickness 1.52 mm (16 gauge).

.2 Weld one of end of each hinge to prevent pin removal.

.7 Finish: Powder coat paint.

.1 Colour: As selected by Departmental Representative from manufacturer's standard range.

.8 Acceptable product: Spacesaver Model EDHGF04V.

2.3 ACCESSORIES

.1 Locking system: Tube-style locks. Provide minimum 2 keys per lock.

.2 Number plates: Manufacturer's standard, plastic plates, etched, embossed, or engraved with minimum 13 mm (1/2 inch) high numerals. Affix number plates with two rivets.

.3 Shelf bottom liners: Neoprene, 3 mm (1/2 inch) thick.

.4 Door stops: Nylon or polypropylene webbing; provide one per door.

2.4 FABRICATION

.1 Body: Form backs, tops, bottoms, sides, and intermediate partitions from steel sheet. Make joints between components tight, with no gaps.

.2 Doors: Form steel into pan shape; form to prevent flexing of door when opening or closing. Weld corners and polish smooth.

.3 Sand and polish welds smooth.

Part 3 Execution

3.1 EXAMINATION

.1 Verify conditions of substrates to receive firearm lockers are acceptable for product installation in accordance with manufacturer's instructions.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Assemble and install lockers in accordance with manufacturer's written instructions.

.2 Set locker plumb, level, and aligned.

.3 Securely fasten lockers to grounds and nailing strips.

3.3 ADJUSTING

.1 Adjust lockers for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

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

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

.3 Final Cleaning: Upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.4 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by locker installation.

END OF SECTION

Part 1 General

1.1 DESIGN REQUIREMENTS

.1 Design and construct metal storage shelving to support uniform load of 60 kg per m^2 of span with maximum deflection L/140.

.2 Design shelving to accommodate vertical adjustment of shelves in 38 mm increments and to permit easy assembly, expansion, dismantling and re-use of shelving component parts.

1.2 SUBMITTALS

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

.2 Shop drawings: Indicate shelving layouts, number of shelves, system of bracing and anchoring devices.

.3 Manufacturer's Instructions: Submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Waste Management and Disposal: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 SHELVING SYSTEM

.1 Four-post type shelving system consisting of uprights, shelves, shelf supports, and bases.

2.2 COMPONENTS

.1 Uprights: Roll formed steel angles and tees with perforations or slots to accommodate shelves and other components, sized as required to support specified total load.

.2 Shelves: Brake formed sheet metal, reinforced to carry specified loads.

.3 Gusset plates: Heavy gauge metal plates to reinforce corner connections of shelving components.

.4 Braces: Provide sway braces for open type shelving.

.5 Base plates: Metal plates to take uprights and to protect floor surfaces.

2.3 FINISH

.1 Finish: Powder coat paint, in colour selected by Departmental Representative.

.2 Manufacturer’s or brand names on face of units are not acceptable.

2.4 FABRICATION

.1 Fabricate units with sharp and true bends, with no exposed sharp edges.

.2 Fabricate shelving without dents, oil-canning, buckling, or other surface irregularities.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install metal storage shelving in accordance with reviewed layout.

.2 Brace, secure, and anchor shelving units in place.

.3 Secure shelving to wall.

.4 Make good surfaces damaged during shipment and installation.

3.3 CLEANING

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Product Data: Provide manufacturer's printed product literature and data sheets; include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings: Indicate size and description of components, base material, surface finish inside and out, hardware.

.4 Closeout submittals: Provide maintenance data for security mirrors for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.2 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect security mirrors from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Lens material: Polycarbonate, 3 mm (1/8 inch) thick, mirror quality with reflective coating on inside surface, distortion-free, with pre-drilled counterbored mounting holes.

.1 Lens configuration: Quarter dome.

.2 Size: 300 x 300 mm (12 x 12 inches); based on 600 mm diameter.

.3 Cavity fill: Polyurethane foam insert.

.4 Frame: Steel.

.5 Finish: Powder coat paint.

.6 Fasteners: Recessed screws or bolts, hot dip galvanized, with tamper-proof heads.

.7 Acceptable product: DuraVision Mirror Systems Model 17527HD.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that conditions of surfaces to receive security mirrors are acceptable for product installation in accordance with manufacturer's instructions.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install in accordance with manufacturer’s instructions.

.2 Install plumb, level, and rigidly anchored to substrate.

.3 Install with foam backing.

.4 Locate security mirrors as indicated.

.5 Use tamper proof screws/bolts for fasteners. Ensure head of screw is flush with counterbored mounting holes.

.6 Apply bead of pick-resistant sealant at interface of frame and substrate; refer to Section 07 92 00 – Joint Sealing.

3.3 CLEANING

.1 Cleaning: In accordance with Section 01 74 11 - Cleaning.

.1 Remove labels after work is complete.

.2 Clean surfaces as required, following procedures and using cleaning materials as recommended by security mirror manufacturer.

.2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by security mirror installation.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

.1 Section 01 33 00: Submittal Procedures.

.2 Product Data: Provide manufacturer's data on equipment and accessories.

.3 Installation Data: Manufacturer's special installation requirements.

.4 Maintenance Documentation: Include maintenance information on regular servicing.

1.2 QUALITY ASSURANCE

.1 Equipment: Conform to applicable code for CSA or UL approval/certification.

Part 2 Products

2.1 APPLIANCES

.1 Refrigerator:

.1 Upright type, self-defrosting, 762 mm (30 inches) wide; nominal height 1700 mm (67 inches), depth to suit counter depth.

.1 Capacity: 18 to 20 cubic feet.

.2 Electrical: 110/120 volt, single phase.

.3 Internal ice compartment with cube tray.

.4 Meat keeper and vegetable crisper.

.5 Single reversible door.

.6 Freezer: Top mount, with door mounted shelves or pockets,

.7 Shelving: Cantilevered wire or glass.

.8 Colour: White.

.2 Combination stacking washer/dryer: Commercial grade.

.1 Dimensions: Approximately 700 wide x 750 deep x 1880 mm high.

.2 Controls: Microprocessor.

.3 Electrical requirements: 120/240 V, 60 Hz.

.4 Colour: White.

.5 Washer: Front-loading type, 3.2 cubic foot basket capacity.

.1 Motor: Variable speed, reversible, thermoprotected, high-efficiency, controlled induction.

.2 Extract speed: Maximum 1000 rpm.

.3 Dispenser for liquid soap, liquid softener, and bleach.

.6 Dryer: 6.7 cubic foot drum capacity.

.1 Electric, with interior light and removable lint screen.

.2 Motor: Variable speed, reversible, thermoprotected, high-efficiency, controlled induction, 0.25 kW (0.33 HP).

.3 Heating element rating: 5250 W.

.4 Air flow: 6.1 cubic metres/min (215 cubic feet/min).

.3 Microwave Oven:

.1 1000 watt power.

.2 Adjustable power levels.

.3 Interior space: 1.6 cu ft.

.4 Digital controls.

.5 Glass turntable, minimum 300 mm (12 inch) diameter.

.6 Interior light.

2.2 ACCESSORIES

.1 Power cord to connect to utilities.

.2 Duct for dryer exhaust.

.3 Fasteners and Anchors: Galvanized or stainless steel type, anchors, screws, bolts, expansion shields, set screws; required by the type of construction to which they are attached.

Part 3 Execution

3.1 PREPARATION

.1 Verify that prepared openings are ready to receive work and opening dimensions are as indicated on shop drawings and as instructed by the manufacturer.

.2 Verify that proper power supply is available.

3.2 INSTALLATION

.1 Install appliances to manufacturer's written instructions and CSA requirements.

.2 Set and adjust units level and plumb.

.3 Activate units to confirm correct operation.

.4 Turn refrigerators on to moderate temperature setting.

.5 Connect to utilities and make units operational.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Product Data: Provide manufacturer's printed product literature and data sheets; include product characteristics, performance criteria, physical size, finish, and limitations.

.3 Shop Drawings: Indicate size and description of components, base material, surface finishes, hardware.

.4 Closeout Submittals: Provide maintenance data for specialties for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.2 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 PEDESTAL STYLE DESK

.1 Frame: Steel tubing, 14 gauge, 75 mm (3 inch) diameter.

.1 Mounting plates: 6 mm (1/4 inch) thick, 150 x 150 mm (6 x 6 inch) steel plate.

.2 Seat: High density compression molded composite with molded-in thread inserts for connection to mounting plate; circular.

.3 Desk top: Particle board with embedded nuts for attachment to base; laminated to high pressure laminate; radiused edges, 38 mm (1-1/2 inch) thick profile.

.4 Hardware: Stainless steel, tamper resistant.

2.2 FIXED DESK

.1 Frame: 11 gauge steel, formed to angled profiles; with powder coat paint finish.

.1 Fabricate feet of desk for direct bolt attachment to floor.

.2 Top: Stainless steel, Type 304, 3B polished finish.

.3 Hardware: Stainless steel, tamper resistant.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that conditions of substrates and surfaces to receive furniture are acceptable for product installation in accordance with manufacturer's instructions.

.2 Inform Departmental Representative of unacceptable conditions.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Locate furniture as indicated.

.2 Install in accordance with manufacturer’s instructions.

.3 Install plumb, level, and rigidly anchored to substrate.

.4 Install rigidly in place.

.5 Use tamper-resistant screws/bolts for fasteners.

3.3 CLEANING

.1 Cleaning: In accordance with Section 01 74 11 - Cleaning.

.1 Clean surfaces as required, following procedures and using cleaning materials as recommended by furniture manufacturer.

.2 Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: Remove waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by furniture installation.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.3 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.

.4 LEED Canada for Existing Buildings, Operations and Maintenance-2009, LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for plumbing fixtures, equipment’s and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province where work is taking place.

.2 Indicate on drawings:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.3 Shop drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.4 Sustainable Design Submittals:

.1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.

.2 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial, post-consumer] content, and total cost of materials for project.

.4 Regional Materials: submit evidence that project incorporates required percentage 50% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.3 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing fixtures and equipment's for incorporation into manual.

.1 Operation and maintenance manual approved by, and final copies deposited with Departmental Representative before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit [2] copies of draft Operation and Maintenance Manual to 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.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right-hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

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

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

1.4 Maintenance Material Submittals

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

.2 Furnish spare parts as follows:

.1 One set of packing for each pump.

.2 One casing joint gasket for each size pump.

.3 One glass for each gauge glass.

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

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

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse by manufacturer and return of packaging materials crates, padding, pallets, as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Painting Repairs And Restoration

.1 Do painting in accordance with Section 09 91 23 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.3 System Cleaning

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

3.4 Field Quality Control

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

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.5 Demonstration

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Trial usage to apply to following equipment and systems:

.1 Pumps.

.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, as-built drawings, and audio-visual aids as part of instruction materials.

.5 Instruction duration time requirements as specified in appropriate sections.

.6 Departmental Representative will record these demonstrations on video tape for future reference.

3.6 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

3.7 Protection

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

END OF SECTION

PART 1 GENERAL

1.1 Summary

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

1.2 Reference Standards

.1 Canadian Standards Association (CSA):

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

1.3 Definitions

.1 Demolish: Detach items from existing construction and legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.2 Remove: Planned deconstruction and disassembly of electrical items from existing construction including removal of conduit, junction boxes, cabling and wiring from electrical component to panel taking care not to damage adjacent assemblies designated to remain; legally dispose of items off site, unless indicated as removed and salvaged, or removed and reinstalled.

.3 Remove and Salvage: Detach items from existing construction and deliver them to Departmental Representative ready for reuse.

.4 Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.

.5 Existing to Remain: Existing items of construction that are not removed and that are not otherwise indicated as being removed and salvaged, or removed and reinstalled.

.6 Hazardous Substances: Dangerous substances, dangerous goods, hazardous commodities and hazardous products may include asbestos, mercury and lead, PCB's, poisons, corrosive agents, flammable substances, radioactive substances, or other material that can endanger human health or wellbeing or environment if handled improperly as defined by the Federal Hazardous Products Act (RSC 1985) including latest amendments.

1.4 Action And Informational Submittals

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

.1 Construction Waste Management Plan (CWM Plan): Submit plan addressing opportunities for reduction, reuse, or recycling of materials prepared in accordance with Section 01 74 19– Construction Waste Management and Disposal.

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

1.5 Administrative Requirements

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

.2 Scheduling: Account for Departmental Representative's continued occupancy requirements during selective demolition with Section 02 41 19.19, Section 02 41 19.13 and schedule staged occupancy and worksite activities as a defined Critical Path item in accordance with Section 01 32 16– Construction Progress Schedule.

1.6 Site Conditions

.1 Existing Conditions: Condition of materials identified as being salvaged or demolished are based on their observed condition at time of site examination before tendering.

.2 Existing Hazardous Substances: Departmental Representative performed a hazardous substances assessment and it is not expected that hazardous substances will be encountered in the Work.

.1 Hazardous substances will be removed by a hazardous abatement specialist engaged by the Departmental Representative before start of the Work.

.3 Existing Hazardous Substances: Departmental Representative has performed a hazardous substances assessment and identified materials requiring abatement as follows:

.1 Hazardous substances are as defined in the Hazardous Products Act.

.2 Hazardous substances will be removed by the Contractor as a part of the Contract before starting Work in accordance with work results described in Related Requirements listed above.

.4 Discovery of Hazardous Substances: It is not expected that Hazardous Substances will be encountered in the Work; immediately notify Departmental Representative if materials suspected of containing hazardous substances are encountered and perform the following activities:

.1 Refer to Section 01 41 00– Regulatory Requirements for directives associated with specific material types.

.2 Hazardous substances will be as defined in the Hazardous Products Act.

.3 Stop work in the area of the suspected hazardous substances.

.4 Take preventative measures to limit users' and workers' exposure, provide barriers and other safety devices and do not disturb.

.5 Hazardous substances will be removed by Departmental Representative under a separate contract or as a change to the Work.

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

PART 2 PRODUCTS

2.1 Repair Materials

.1 General Patching and Repair Materials: Refer to Section 02 41 19.23/Section 02 41 19.13 for listing of patching and repair materials incidental to removal or demolition of components associated with work of this Section.

.2 Plumbing Repair Materials: Use only new materials required for completion or repair matching materials damaged during performance of work of this Section; new materials are required to meet assembly or system characteristics as existing systems indicated to remain and carry CSA approval labels required by the Authority Having Jurisdiction.

.3 Firestopping Repair Materials: Use firestopping materials compatible with existing firestopping systems where removal or demolition work affects rated assemblies, restore to match existing fire rated performance.

2.2 Salvage And Debris Materials

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

.2 Salvaged Materials: Carefully remove materials designated for salvage and store in a manner to prevent damage or devaluation of materials in accordance with Section 02 42 00.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Existing Conditions: Visit site, thoroughly examine and become familiar with conditions that may affect the work of this Section before tendering the Bid; Departmental Representative will not consider claims for extras for work or materials necessary for proper execution and completion of the contract that could have been determined by a site visit.

3.2 Preparation

.1 Protection of Existing Systems to Remain: Protect systems and components indicated to remain in place during selective demolition operations and as follows:

.1 Prevent movement and install bracing to prevent settlement or damage of adjacent services and parts of existing buildings scheduled to remain.

.2 Notify Departmental Representative and cease operations where safety of buildings being demolished, adjacent structures or services appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

.3 Prevent debris from blocking drainage inlets.

.4 Protect mechanical systems that must remain in operation.

.2 Protection of Building Occupants: Sequence demolition work so that interference with the use of the building by the Departmental Representative and users is minimized and as follows:

.1 Prevent debris from endangering the safe access to and egress from occupied buildings.

.2 Notify Departmental Representative and cease operations where safety of occupants appears to be endangered and await additional instructions before resuming demolition work specified in this Section.

3.3 Execution

.1 Demolition: Coordinate requirements of this Section with information contained in Section 02 41 19.19/Section 02 41 19.13 and as follows:

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

3.4 Closeout Activities

.1 Demolition Waste Disposal: Arrange for legal disposal and remove demolished materials to accredited provincial landfill site or alternative disposal site recycle centre except where explicitly noted otherwise for materials being salvaged for re use in new construction in accordance with Section 02 42 00.

.2 Hazardous Substances Disposal: Arrange for disposal of hazardous substances in accordance with requirements of Section 02 82 00/Section 02 81 01.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 American Society of Mechanical Engineers International (ASME)

- .1 ANSI/ASME B16.15-13, Cast Cooper Alloy Threaded Fittings, Classes 125 and 250.
- .2 ANSI/ASME B16.18-12, Cast Copper Alloy Solder Joint Pressure Fittings.
- .3 ANSI/ASME B16.22-13, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- .4 ANSI/ASME B16.24-11, Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500.
- .5 ASME B16.26-13, Cast Copper Alloy Fittings for Flared Copper Tubes.
- .6 ASME B31.9-14, Building Services Piping.
- .7 ASME B36.19M-04, Stainless Steel Pipe.

.2 ASTM International

- .1 ASTM A182/A 182M-16, Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service.
- .2 ASTM A269-15a, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- .3 ASTM A307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .4 ASTM A312/A312M-16, Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
- .5 ASTM A351/A351M-16, Castings, Austenitic, for Pressure Containing Parts.
- .6 ASTM A403/A403M-16, Wrought Austenitic Stainless Steel Piping Fittings.
- .7 ASTM A536-84 (2014), Standard Specification for Ductile Iron Castings.
- .8 ASTM B32-08 (2014), Standard Specification for Solder Metal.
- .9 ASTM B42-15a, Seamless Copper Tube, Standard Sizes.
- .10 ASTM B88M-14, Standard Specification for Seamless Copper Water Tube (Metric).
- .11 ASTM F876-15, Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
- .12 ASTM F877-11, Standard Specification for Crosslinked Polyethylene (PEX) Hot and Cold Water Distribution System.

.3 American National Standards Institute/American Water Works Association (ANSI)/(AWWA)

- .1 ANSI/AWWA C111/A21.11-12, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .2 ANSI/AWWA C151/A21.51-09, Ductile Iron Pipe, Centrifugally Cast, for Water.

.3 AWWA C904-06, Crosslinked Polyethylene (PEX) Pressure Pipe, ½ In. (12 mm) through 3 In. (76mm), for Water Service.

.4 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-[2007], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.5 CSA Group

.1 CSA B137.5-13, Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.

.2 CSA B242-05, Groove and Shoulder Type Mechanical Pipe Couplings.

.6 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC S101-07, Fire Endurance Tests of Buildings Construction and Materials.

.2 CAN/ULC S102.2-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

.3 CAN/ULC S115-11, Standard Method of Fire Tests of Firestop.

.7 Department of Justice Canada (Jus)

.1 Canadian Environmental Protection Act, 1999, c. 33 (CEPA).

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

.1 Material Safety Data Sheets (MSDS).

.9 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).

.1 MSS-SP-67-02a, Butterfly Valves.

.2 MSS-SP-70-06, Grey Iron Gate Valves, Flanged and Threaded Ends.

.3 MSS-SP-71-05, Grey Iron Swing Check Valves, Flanged and Threaded Ends.

.4 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.

.10 National Research Council (NRC)

.1 National Plumbing Code of Canada (NPC) [2015].

.11 Transport Canada (TC)

.1 Transportation of Dangerous Goods Act, 1992, c. 34 (TDGA).

1.2 Action And Informational Submittals

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

.2 Product Data

.1 Provide manufacturer's printed product literature and datasheets for insulation and adhesives, and include product characteristics, performance criteria, physical size,

.3 Sustainable Design Submittals:

.1 LEED - CI Version, NC Version 1.0 Submittals: in accordance with [Section 01 35 21 - LEED Requirements.

.4 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 Delivery, Storage And Handling

.1 Store and manage hazardous materials in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

.2 Packaging Waste Management: remove for reuse by manufacturer and return of crates padding, packaging materials, pallets in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.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 Materials and Resources Credit MRc2.1 Construction Waste Management: Divert 50% From Landfill and MRc2.2 Construction Waste Management: Divert 75% From Landfill: prepare Construction Waste Management plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.4 Sustainable Requirements

.1 Construction:

.1 Construction requirements detailed in Section 01 47 15 - Sustainable Requirements: Construction] form integral part of this project including materials and products of this Section. Sustainable construction requirements include:

.1 Specific construction requirements for project.

.2 Specification text to ensure that project will comply with PSPC green design process and sustainability requirements.

.3 Administrative, temporary and procedural requirements for the use of materials and methods of construction.

PART 2 PRODUCTS

2.1 Piping

.1 Domestic hot, cold and recirculation systems, within building.

.1 Above ground:

.1 Copper tube, hard drawn, type L: to ASTM B88M.

.2 PEX Piping to CSA B137.5.

.2 Buried or embedded:

.1 Copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

.2 PEX Piping to CSA B137.5.

2.2 Fittings

.1 Bronze pipe flanges and flanged fittings, Class 150: to ANSI/ASME B16.24.

.2 Cast bronze threaded fittings, Class 125: to ANSI/ASME B16.15.

.3 Cast copper, solder type: to ANSI/ASME B16.18.

.4 Wrought copper and copper alloy, solder type: to ANSI/ASME B16.22.

.5 NPS 2 and larger:

.1 ANSI/ASME B16.18 or ANSI/ASME B16.22 roll grooved to CSA B242.

.2 PEX fittings to CSA B137.5 and F1960.

.6 NPS 1 ½ and smaller:

.1 Wrought copper to ANSI/ASME B16.22; with 301 stainless steel internal components and EPDM seals. Suitable for operating pressure to 1380 kPa.

.2 PEX fittings to CSA B137.5.

2.3 Joints

.1 Rubber gaskets, 1.6mm thick: to AWWA C111.

.2 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.

.3 Solder: 95/5.

.4 Teflon tape: for threaded joints.

.5 Grooved couplings: designed with angle bolt pads to provide rigid joint, complete with EPDM gasket.

.6 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

.7 NPS 1 ½ and smaller: PEX fittings to CSA B137.5.

.8 NPS 2 and larger: PEX fittings to CSA B137.5 and ASTM F1960. Elbows, adapters, couplings, plugs, tees, multi-port tees and valves.

2.4 Gate Valves

.1 NPS 2 and under, soldered:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 Rising stem: to MSS-SP-80, Class 125, 860 kPa, bronze body, screw-in bonnet, solid wedge disc as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over, Mechanical Room, flanged:

.1 Rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, OS&Y bronze trim specified Section 23 05 23.02 - Valves - Cast Iron.

.4 NPS 2 1/2 and over, other than mechanical rooms, flanged:

.1 Non-rising stem: to MSS-SP-70, Class 125, 860 kPa, flat flange faces, cast-iron body, bronze trim, bolted bonnet specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.5 Globe Valves

.1 NPS2 and under, soldered:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, renewable composition disc, screwed over bonnet as specified Section 23 05 23.01 - Valves - Bronze.

.2 Lockshield handles: [as indicated].

.2 NPS 2 and under, screwed:

.1 To MSS-SP-80, Class 150, 1 MPa, bronze body, screwed over bonnet, renewable composition disc as specified Section 23 05 23.01 - Valves - Bronze.

.2 Lockshield handles: [as indicated].

2.6 Swing Check Valves

.1 NPS 2 and under, soldered:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, screwed:

.1 To MSS-SP-80, Class 125, 860 kPa, bronze body, bronze swing disc, screw in cap, regrindable seat as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 1/2 and over, flanged:

.1 To MSS-SP-71, Class 125, 860 kPa, cast iron body, flat flange faces, renewable seat, bronze disc, bolted cap specified Section 23 05 23.02 - Valves - Cast Iron: Gate, Globe, Check.

2.7 Ball Valves

.1 NPS 2 and under, screwed:

.1 Class 150.

.2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle as specified Section 23 05 23.01 - Valves - Bronze.

.2 NPS 2 and under, soldered:

.1 To ANSI/ASME B16.18, Class 150.

.2 Bronze body, chrome plated brass ball, PTFE adjustable packing, brass gland and PTFE seat, steel lever handle, with NPT to copper adaptors as specified Section 23 05 23.01 - Valves - Bronze.

.3 NPS 2 and under, mechanical:

.1 To CSA B137.5 and ASTM F1960.

.2 Lead free brass body.

2.8 Butterfly Valves

.1 NPS 2-1/2 and over, lug or wafer:

.1 To MSS-SP-67, Class 200.

.2 Cast iron body, ductile iron chrome plated disc, stainless steel stem, EPT liner.

.3 Lever operated, NPS8 and over, gear operated.

.2 NPS 2-1/2 and over, grooved ends:

.1 Class 300 psig CWP, bubble tight shut-off, bronze body EPDM coated ductile iron disc with integrally cast stem.

.2 Operator:

.1 NPS 4 and under: lever handle.

.2 NPS 6 and over: gear operated.

PART 3 EXECUTION

3.1 Application

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

3.2 Installation

.1 Install in accordance with NPC, local Authority Having Jurisdiction.

.2 Install pipe work in accordance with Section 23 05 05 - Installation of Pipework, supplemented as specified herein.

.3 Assemble piping using fittings manufactured to ANSI and Standard Council of Canada (SCC) standards.

.4 Install CWS piping below and away from HWS and HWC and other hot piping so as to maintain temperature of cold water as low as possible.

.5 Connect to fixtures and equipment in accordance with manufacturer's written instructions unless otherwise indicated.

.6 Buried tubing:

.1 Lay in well compacted washed sand in accordance with AWWA Class B bedding.

.2 Bend tubing without crimping or constriction. Minimize use of fittings.

.7 Valves

.1 Isolate equipment, fixtures and branches with gate or ball valves.

.2 Balance recirculation system using lockshield globe valves. Mark settings and record on as-built drawings on completion.

3.3 Pressure Tests

.1 Conform to requirements of Section 22 05 00 - Common Work Results for Plumbing.

.2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.4 Flushing And Cleaning

.1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours, then draw two sample off longest run. Submit to testing laboratory to verify

that system is clean copper to Provincial potable water guidelines. Let system flush for additional 2 hours, then draw off another sample for testing.

3.5 Pre-Start-Up Inspections

.1 Systems to be complete, prior to flushing, testing and start-up.

.2 Verify that system can be completely drained.

.3 Ensure that pressure booster systems are operating properly.

.4 Ensure that air chambers, expansion compensators are installed properly.

3.6 Disinfection

.1 Flush out, disinfect and rinse system to requirements of authority having jurisdiction approval of Departmental Representative.

.2 Coordinate with Section 33 11 16 - Site Water Utility Distribution Piping and Section 33 11 16.01 - Incoming Site Water Utility Distribution Piping.

.3 Upon completion, provide laboratory test reports on water quality for Departmental Representative approval.

3.7 Start-Up

.1 Timing: start up after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.4 Water treatment systems operational.

.2 Provide continuous supervision during start-up.

.3 Start-up procedures:

.1 Establish circulation and ensure that air is eliminated.

.2 Check pressurization to ensure proper operation and to prevent water hammer, flashing and/or cavitation.

.3 Bring HWS storage tank up to design temperature slowly.

.4 Monitor piping HWS and HWC piping systems for freedom of movement, pipe expansion as designed.

.5 Check control, limit, safety devices for normal and safe operation.

.4 Rectify start-up deficiencies.

3.8 Performance Verification

.1 Scheduling:

.1 Verify system performance after pressure and leakage tests and disinfection are completed, and Certificate of Completion has been issued by authority having jurisdiction.

.2 Procedures:

.1 Verify that flow rate and pressure meet Design Criteria.

.2 TAB HWC in accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.3 Adjust pressure regulating valves while withdrawal is maximum and inlet pressure is minimum.

.4 Sterilize HWS and HWC systems for Legionella control.

.5 Verify performance of temperature controls.

.6 Verify compliance with safety and health requirements.

.7 Check for proper operation of water hammer arrestors. Run one outlet for 10 seconds, then shut of water immediately. If water hammer occurs, replace water hammer arrestor or re-charge air chambers. Repeat for outlets and flush valves.

.8 Confirm water quality consistent with supply standards, and ensure no residuals remain as result of flushing or cleaning.

.3 Reports:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Reports, using report forms as specified in Section 01 91 13 - General Commissioning (Cx) Requirements: Report Forms and Schematics.

.2 Include certificate of water flow and pressure tests conducted on incoming water service, demonstrating adequacy of flow and pressure.

3.9 Operation Requirements

.1 Co-ordinate operation and maintenance requirements including, cleaning and maintenance of specified materials and products with Section 23 05 05 - Installation of Pipework.

.2 Operational requirements in accordance with Section 01 47 19 - Sustainable Requirements: Operation, include:

.1 Cleaning materials and schedules.

.2 Repair and maintenance materials and instructions.

3.10 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 ASTM International Inc.

- .1 ASTM B32-08, Standard Specification for Solder Metal.
- .2 ASTM B306-02, Standard Specification for Copper Drainage Tube (DWV).
- .3 ASTM C564-03a, Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

.2 Canada Green Building Council (CaGBC)

- .1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum 2007).
- .2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide for Commercial Interiors.

.3 Canadian Standards Association (CSA International).

- .1 CSA B67-1972 (R1996), Lead Service Pipe, Waste Pipe, Traps, Bends and Accessories.
- .2 CAN/CSA-B70-06, Cast Iron Soil Pipe, Fittings and Means of Joining.
- .3 CAN/CSA-B125.3-05, Plumbing Fittings.

.4 Green Seal Environmental Standards (GSES)

- .1 Standard GS-36-00, Commercial Adhesives.

.5 National Research Council Canada (NRC)

- .1 National Plumbing Code of Canada, Latest Edition (NPC).

.6 South Coast Air Quality Management District (SCAQMD), California State

- .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.2 Action And Informational Submittals

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

.2 Product Data:

- .1 Provide manufacturer's printed product literature and datasheets for adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

- .1 LEED Submittals: in accordance with Section 01 35 21 - LEED Requirements.

1.3 Delivery, Storage And Handling

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

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

.3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets padding, packaging materials, crates in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Sustainable Material

.1 Sustainable Requirements: materials and products in accordance with Section 01 47 15 Sustainable Requirements: Construction.

.2 Adhesives and Sealants: in accordance with Section 07 92 00 - Joint Sealants.

2.2 Copper Tube And Fittings

.1 Above ground storm, sanitary and vent Type DWV to: ASTM B306.

.1 Fittings.

.1 Cast brass: to CAN/CSA-B125.3.

.2 Wrought copper: to CAN/CSA-B125.3.

.2 Solder: lead free, tin-alloy 95:5, to ASTM B32.

2.3 Cast Iron Piping And Fittings

.1 Buried storm, sanitary and vent minimum NPS 3, to: CAN/CSA-B70, with one layer of protective coating of bituminous.

.1 Joints:

.1 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets: to CAN/CSA-B70.ASTM C564 or

.2 Stainless steel clamps.

.2 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Cold caulking compounds.

.2 Above ground storm, sanitary and vent: to CAN/CSA-B70.

.1 Joints:

.1 Hub and spigot:

.1 Caulking lead: to CSA B67.

.2 Mechanical joints:

.1 Neoprene or butyl rubber compression gaskets with stainless steel clamps.

PART 3 EXECUTION

3.1 Application

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

3.2 Installation

.1 In accordance with Section 23 05 05 - Installation of Pipework.

.2 Install in accordance with National Plumbing Code, local authority having jurisdiction.

3.3 Testing

.1 Pressure test buried systems before backfilling.

.2 Hydraulically test to verify grades and freedom from obstructions.

3.4 Performance Verification

.1 Cleanouts:

- .1 Ensure accessible and that access doors are correctly located.
- .2 Open, cover with linseed oil and re-seal.
- .3 Verify that cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Storm water drainage:

- .1 Verify domes are secure.
- .2 Ensure weirs are correctly sized and installed correctly.
- .3 Verify provisions for movement of roof system.

.4 Ensure that fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, pump discharge etc.) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 ASTM International Inc.

.1 ASTM D2235-04, Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

.2 ASTM D2564-04e1, Standard Specification for Solvent Cements for Poly(Vinyl-Chloride) (PVC) Plastic Piping Systems.

.2 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-Series B1800-06, Thermoplastic Non-pressure Pipe Compendium - B1800 Series.

.4 Green Seal Environmental Standards (GSES)

.1 Standard GS-36-00, Commercial Adhesives.

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

.1 Material Safety Data Sheets (MSDS).

.6 National Research Council Canada (NRC)

.1 National Plumbing Code of Canada, Latest Edition (NPC).

.7 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for piping and adhesives, and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 35 43 - Environmental Procedures.

.3 Sustainable Design Submittals:

.1 LEED Submittals: in accordance with Section 01 35 21 - LEED Requirements.

1.3 Delivery, Storage And Handling

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

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

.3 Store at temperatures and conditions recommended by manufacturer.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of crates packaging materials, pallets, padding in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Material

.1 Sustainable Requirements: materials and products in accordance with Section 01 47 15Sustainable Requirements: Construction.

.2 Adhesives and Sealants: in accordance with Section 07 92 00 - Joint Sealants.

2.2 Piping And Fittings

.1 For buried DWV piping to:

.1 CAN/CSA B181.1.

.2 CAN/CSA B181.2.

.3 CAN/CSA B182.1.

.2 For aboveground DWV piping for combustible construction to:

.1 CAN/CSA B181.2

.3 For aboveground DWV piping for non-combustible construction:

.1 Flame spread rating less than 25 and smoke developed classification less than 50.

.2 CAN/CSA B181.2

2.3 Joints

.1 Solvent weld for PVC: to ASTM D2564.

.2 Solvent weld for ABS: to ASTM D2235.

PART 3 EXECUTION

3.1 Application

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

3.2 Installation

.1 In accordance with Section 23 05 05 - Installation of Pipework.

.2 Install in accordance with local authority having jurisdiction and National Plumbing Code.

3.3 Testing

.1 Pressure test buried systems before backfilling.

.2 Hydraulically test to verify grades and freedom from obstructions.

3.4 Performance Verification

.1 Cleanouts:

.1 Ensure accessible and that access doors are correctly located.

.2 Open, cover with linseed oil and re-seal.

.3 Verify cleanout rods can probe as far as the next cleanout, at least.

.2 Test to ensure traps are fully and permanently primed.

.3 Storm water drainage:

.1 Verify domes are secure.

.2 Ensure weirs are correctly sized and installed correctly.

.3 Verify provisions for movement of roof system.

.4 Ensure fixtures are properly anchored, connected to system and effectively vented.

.5 Affix applicable label (storm, sanitary, vent, pump discharge) c/w directional arrows every floor or 4.5 m (whichever is less).

3.5 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 ASTM International

.1 ASTM A126-04 (2009), Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

.2 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.

.2 American Water Works Association (AWWA)

.1 ANSI/AWWA C700-09, Standard for Cold Water Meters-Displacement Type, Bronze Main Case.

.2 ANSI/AWWA C701-12, Standard for Cold Water Meters-Turbine Type for Customer Service.

.3 ANSI/AWWA C702-10, Standard for Cold Water Meters-Compound Type.

.3 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.3 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.

.4 LEED Canada for Existing Buildings, Operations and Maintenance-2009, LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

.4 CSA International

.1 CSA-B64 Series-11, Backflow Preventers and Vacuum Breakers.

.2 CSA B79-08, Commercial and Residential Drains and Cleanouts.

.3 CAN/CSA-B356-10, Water Pressure Reducing Valves for Domestic Water Supply Systems.

.5 Efficiency Valuation Organization (EVO)

.1 International Performance Measurement and Verification Protocol (IPMVP).

.1 IPMVP 2007 Version.

.6 National Research Council Canada (NRC)

.1 National Plumbing Code of Canada, Latest Edition (NPC).

.7 Plumbing and Drainage Institute (PDI)

.1 PDI-G101-R2010, Testing and Rating Procedure for Grease Interceptors with Appendix of Installation and Maintenance.

.2 PDI-WH201-R2010, Water Hammer Arresters Standard.

1.2 Administrative Requirements

.1 Pre-installation Meetings:

.1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative in accordance with Section 01 31 19 - Project Meetings to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building construction subtrades.

.4 Review manufacturer's written installation instructions and warranty requirements.

1.3 Action And Informational Submittals

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

.2 Product Data:

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

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements, 01 35 43 - Environmental Procedures. Indicate VOC's:

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Province where work is taking place.

.2 Indicate on drawings to indicate accessories, dimensions, construction and assembly details, number of anchors, finishes, materials, method of anchorage.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturers' Field Reports: manufacturers' field reports specified.

.7 Sustainable Design Submittals:

.1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.

.2 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products,

showing their costs and percentages of post-industrial or post-consumer content, and total cost of materials for project.

.4 Regional Materials: submit evidence that project incorporates required percentage 10% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for plumbing specialties and accessories for incorporation into manual.

.1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 35 21 - LEED Requirements.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, padding, crates, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Floor Drains

.1 Floor Drains: to CSA B79.

.2 Refer to plumbing fixtures schedule.

2.2 Hose Reel

.1 Refer to plumbing fixtures schedule.

2.3 Cleanouts

.1 Cleanout Plugs: heavy cast iron male ferrule with vandal-proof brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.

.2 Access Covers:

.1 Wall Access: face or wall type, stainless steel square cover with vandal-proof flush head securing screws, beveled edge frame complete with anchoring lugs.

.2 Floor Access: round cast iron body and frame with adjustable secured nickel bronze top and:

.1 Plugs: bolted bronze with neoprene gasket.

.2 Cover for Unfinished Concrete Floors: cast iron round, gasket, vandal-proof screws.

.3 Cover for Terrazzo Finish: polished nickel bronze with recessed cover for filling with terrazzo, vandal-proof locking screws.

.4 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.

.5 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

2.4 Water Hammer Arrestors

.1 Stainless steel or Copper construction, bellows or piston type: to PDI-WH201.

2.5 Back Flow Preventers

.1 Preventers: to CSA-B64 Series.

.2 Application: domestic service entrance and fire protection system service entrance.

.1 Domestic water:

.1 Reduced pressure principle type consisting of a pressure differential relief valve located between two independently operated spring-loaded centre guided check valves.

.2 Ductile iron construction with FDA approved fusion epoxy coat inside and out.

.3 Compound check.

.4 Single access cover.

.5 Maximum temperature range: 0.5ºC to 60ºC.

.6 Maximum pressure: 1205 kPa.

.7 CSA certified.

.3 Application: install on domestic cold water supply to electrode steam humidifier, emergency eyewash and drench shower.

.1 Bronze body construction.

.2 Internal pressure differential relief valve located in a zone between two positive seating check modules with captured springs and silicone seat discs.

.3 Seats and discs replaceable in both check modules and the relief valve.

.4 Assembly to include two resilient seated isolation valves, four resilient seated test cocks, protective wye strainer with 20 mesh screen, union end connections and an air gap drain fitting.

.5 Reduced pressure zone type backflow preventer.

.4 Provide backflow preventer test kit as follows:

.1 Maximum working pressure: 1205 kPa.

.2 Maximum working temperature: 98.8ºC.

.3 0-103 kPa and 0-15 psig dual scale pressure gauge with 114 mm diameter face, ±2% accuracy.

.4 Test valves: two (2) ball valves and one (1) needle valve.

.5 Hoses: three (3) one (1) metre test hoses with female threaded swivel coupling.

.6 Adapters:

.1 Three (3) NPS ¼ threaded coupling adapters.

.2 Three (3) NPS ½ x NPS ¼ bushings.

.3 Three (3) NPS ¾ x NPS ¼ bushings.

.7 400 mm long securing strap.

.8 Moisture resistant instruction guide.

.9 Light weight, shock resistant molded plastic case with foam inserts.

2.6 Vacuum Breakers

.1 Breakers: to CSA-B64 Series.

.2 Atmospheric vacuum breaker, where indicated:

.1 Plain brass body with silicone disc.

.2 Suitable for temperatures up to 82ºC.

.3 Maximum operating pressure: 860 kPa.

.4 Size: as indicated.

.3 Hose connection vacuum breaker:

.1 NPS ¾ female hose thread inlet, NPS ¾ male hose threat outlet, brass finish.

2.7 Pressure Regulators

.1 Capacity: as indicated.

.1 Inlet pressure: 1034 kPa.

.2 Outlet pressure: 413 kPa.

.2 Up to NPS 1-1/2 bronze bodies, screwed: to ASTM B62.

.3 NPS 2 and over, semi-steel bodies, Class 125, flanged: to ASTM A126, Class B.

.4 Semi-steel spring chambers with bronze trim.

2.8 Trap Seal Primers

.1 Brass, with integral vacuum breaker, NPS 1/2 solder ends, NPS 1/2 drip line connection.

2.9 Strainers

.1 860 kPa, Y type with 20 mesh, monel, bronze or stainless steel removable screen.

.2 NPS 2 and under, bronze body, screwed ends, with brass cap.

.3 NPS 2 1/2 and over, cast iron body, flanged ends, with bolted cap.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for plumbing specialties and accessories installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Manufacturer's Instructions

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

3.3 Installation

.1 Install in accordance with National Plumbing Code of Canada (NPC) and local authority having jurisdiction.

.2 Install in accordance with manufacturer's instructions and as specified.

3.4 Cleanouts

.1 Install cleanouts at base of soil and waste stacks, and rainwater leaders, at locations required code, and as indicated.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

3.5 Water Hammer Arrestors

.1 Install on branch supplies to fixtures or group of fixtures [where indicated].

3.6 Back Flow Preventers

.1 Install in accordance with CSA-B64 Series, where indicated and elsewhere as required by code.

.1 Drains.

.2 Backwater Valves.

.3 Water Make-up Assembly.

.4 Grease Interceptors.

.2 Pipe discharge to terminate over nearest drain, service sink or sump pit.

3.7 Trap Seal Primers

.1 Install for floor drains and elsewhere, as indicated.

.2 Install on cold water supply to nearest frequently used plumbing fixture, in concealed space, to approval of Departmental Representative.

.3 Install soft copper tubing to floor drain.

3.8 Strainers

.1 Install with sufficient room to remove basket for maintenance.

3.9 Start-Up

.1 General:

.1 In accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified herein.

.2 Timing: start-up only after:

.1 Pressure tests have been completed.

.2 Disinfection procedures have been completed.

.3 Certificate of static completion has been issued.

.4 Water treatment systems operational.

.3 Provide continuous supervision during start-up.

3.10 Testing And Adjusting

.1 General:

.1 Test and adjust plumbing specialties and accessories in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: General Requirements, supplemented as specified.

.2 Timing:

.1 After start-up deficiencies rectified.

.2 After certificate of completion has been issued by authority having jurisdiction.

.3 Application tolerances:

.1 Pressure at fixtures: +/- [70] kPa.

.2 Flow rate at fixtures: +/- 20%.

.4 Adjustments:

.1 Verify that flow rate and pressure meet design criteria.

.2 Make adjustments while flow rate or withdrawal is (1) maximum and (2) 25% of maximum and while pressure is (1) maximum and (2) minimum.

.5 Floor drains:

.1 Verify operation of trap seal primer.

.2 Prime, using trap primer. Adjust flow rate to suit site conditions.

.3 Check operations of flushing features.

.4 Check security, accessibility, removability of strainer.

.5 Clean out baskets.

.6 Vacuum breakers, backflow preventers:

.1 Test tightness, accessibility for O&M of cover and of valve.

.2 Simulate reverse flow and back-pressure conditions to test operation of vacuum breakers, backflow preventers.

.3 Verify visibility of discharge from open ports.

.7 Access doors:

.1 Verify size and location relative to items to be accessed.

.8 Cleanouts:

.1 Verify covers are gas-tight, secure, yet readily removable.

.9 Water hammer arrestors:

.1 Verify proper installation of correct type of water hammer arrester.

.10 Pressure regulators, PRV assemblies:

.1 Adjust settings to suit locations, flow rates, pressure conditions.

.11 Strainers:

.1 Clean out repeatedly until clear.

.2 Verify accessibility of cleanout plug and basket.

.3 Verify that cleanout plug does not leak.

3.11 Closeout Activities

.1 Commissioning Reports: in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: reports, supplemented as specified.

.2 Training: provide training in accordance with Section 01 91 13 - General Commissioning (Cx) Requirements: Training of O&M Personnel, supplemented as specified.

3.12 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

3.13 Protection

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

.2 Repair damage to adjacent materials caused by plumbing specialties and accessories installation.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide for Commercial Interiors.

.3 LEED Canada 2009 for Design and Construction-2010, LEED Canada 2009 for Design and Construction Leadership in Energy and Environmental Design Green Building Rating System Reference Guide.

.4 LEED Canada for Existing Buildings, Operations and Maintenance-2009, LEED Canada 2009 Leadership In Energy and Environmental Design Green Building Rating System Reference Guide.

.2 CSA Group

.1 CAN/CSA-B45 Series-02 (R2013), Plumbing Fixtures, (Consists of B45.0, B45.1, B45.2, B45.3, B45.4, B45.5, B45.6, B45.7, B45.8 and B45.9).

.2 CSA B125.3-12, Plumbing Fittings.

.3 CSA B651-12, Accessible Design for the Built Environment.

.3 Green Seal (GS)

.1 GS-36-2013, Adhesives for Commercial Use.

.4 National Research Council Canada (NRC)

.1 National Building Code of Canada, Latest Edition (NBC).

.5 South Coast Air Quality Management District (SCAQMD)

.1 SCAQMD Rule 1168-A2011, Adhesive and Sealant Applications.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [washroom fixtures] and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Indicate fixtures and trim:

.1 Dimensions, construction details, roughing-in dimensions.

.2 Factory-set water consumption per flush at recommended pressure.

.3 For water closets, urinals: minimum pressure required for flushing.

.3 Sustainable Design Submittals:

.1 LEED Canada submittals: in accordance with Section 01 35 21 - LEED Requirements.

.2 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75% of construction wastes were recycled or salvaged.

.3 Recycled Content:

.1 Submit listing of recycled content products used, including details of required percentages or recycled content materials and products, showing their costs and percentages of post-industrial or post-consumer content, and total cost of materials for project.

.4 Regional Materials: submit evidence that project incorporates required percentage 10% of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

.5 Low-Emitting Materials:

.1 Submit listing of paints and coatings, adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restriction requirements.

1.3 Closeout Submittals

.1 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials in dry location indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

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

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, packaging materials, crates, padding, as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Sustainable Material

.1 Adhesives and sealants: in accordance with Section 01 35 21 - LEED Requirements.

2.2 Manufactured Units

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CSA B125.3.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: as indicated.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

.7 Water closets/Urinals:

.1 Refer to Plumbing Fixtures Schedule.

.8 Fixture piping:

.1 Hot and cold water supplies to fixtures:

.1 Chrome plated flexible supply pipes with screwdriver stop, reducers, escutcheon.

.2 Waste:

.1 Brass P trap with clean out on fixtures not having integral trap.

.2 Chrome plated in exposed places.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for washroom fixtures installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Mounting heights:

.1 Standard: to manufacturer's recommendations unless otherwise indicated or specified.

.2 Wall-hung fixtures: as indicated, measured from finished floor].

.3 Barrier-free: to most stringent CSA B651 or NBC.

3.3 Adjusting

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .5 Set controls of automatic flush valves for WCs and urinals to prevent unnecessary flush cycles.

.3 Checks:

- .1 Water closets, urinals: flushing action.
- .2 Aerators: operation, cleanliness.
- .3 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:

- .1 Verify temperature settings, operation of control, limit and safety controls.

3.4 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

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

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

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package for New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide for Commercial Interiors.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02 (R2008), Plumbing Fixtures.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

.3 National Research Council Canada (NRC)

.1 National Building Code of Canada, Latest Edition (NBC).

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 LEED Submittals: in accordance with Section 01 35 21 - LEED Requirements.

1.3 Closeout Submittals

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

.2 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 Delivery, Storage And Handling

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

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

.3 Packaging Waste Management: remove for reuse by manufacturer and return of crates padding, pallets, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Sustainable Material

.1 Materials and products in accordance with Section 01 47 15Sustainable Requirements: Construction.

2.2 Manufactured Units

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: architectural drawings to govern.

.5 Fixtures to be product of one manufacturer.

.6 Trim to be product of one manufacturer.

.7 Sinks/Lavatories:

.1 Refer to Plumbing Fixtures Schedule.

.8 Fixture piping:

.1 Hot and cold water supplies to each fixture:

.1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon.

.2 Waste:

.1 Brass P trap with clean out on each fixture not having integral trap.

.2 Chrome plated in all exposed places.

.9 Chair carriers:

.1 Factory manufactured floor-mounted carrier systems for all wall-mounted fixtures.

PART 3 EXECUTION

3.1 Application

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

3.2 Installation

.1 Mounting heights:

.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

.2 Wall-hung fixtures: as indicated, measured from finished floor.

.3 Physically handicapped: to comply with most stringent of either NBC or CAN/CSA-B651.

3.3 Adjusting

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers, backflow preventers: operation under all conditions.

.3 Wash fountains: operation of flow-actuating devices.

.4 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

3.4 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Canada Green Building Council (CaGBC)

.1 LEED Canada-NC Version 1.0-2004, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations (including Addendum 2007).

.2 LEED Canada-CI Version 1.0-2007, LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Guide For Commercial Interiors.

.2 Canadian Standards Association (CSA International)

.1 CAN/CSA-B45 Series-02 (R2008), Plumbing Fixtures.

.2 CAN/CSA-B125.3-05, Plumbing Fittings.

.3 CAN/CSA-B651-04, Accessible Design for the Built Environment.

.3 National Research Council Canada (NRC)

.1 National Building Code of Canada, Latest Edition (NBC).

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 LEED Submittals: in accordance with Section 01 35 21 - LEED Requirements.

1.3 Closeout Submittals

.1 Provide maintenance data including monitoring requirements for incorporation into manuals specified in Section 01 78 00 - Closeout Submittals.

.2 Include:

.1 Description of fixtures and trim, giving manufacturer's name, type, model, year, capacity.

.2 Details of operation, servicing, maintenance.

.3 List of recommended spare parts.

1.4 Delivery, Storage And Handling

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

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

.3 Packaging Waste Management: remove for reuse by manufacturer and return of pallets padding, crates, packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Sustainable Material

.1 Sustainable Requirements:

.1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.

2.2 Manufactured Units

.1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.

.2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.

.3 Exposed plumbing brass to be chrome plated.

.4 Number, locations: architectural drawings to govern.

.5 Fixtures in any one location to be product of one manufacturer and of same type.

.6 Trim in any one location to be product of one manufacturer and of same type.

.7 Showers:

.1 Refer to Plumbing Fixtures Schedule.

.8 Fixture piping:

.1 Hot and cold water supplies to each fixture.

.1 Chrome plated flexible supply pipes each with screwdriver stop, reducers, escutcheon.

.2 Waste:

.1 Brass P trap with cleanout on each fixture not having integral trap.

.2 Chrome plated in all exposed places.

PART 3 EXECUTION

3.1 Application

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

3.2 Installation

.1 Mounting heights:

.1 Standard: to comply with manufacturer's recommendations unless otherwise indicated or specified.

.2 Physically handicapped: to comply with most stringent of either NBC or CAN/CSA B651.

3.3 Adjusting

.1 Conform to water conservation requirements specified this section.

.2 Adjustments:

.1 Adjust water flow rate to design flow rates.

.2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.

.3 Checks:

.1 Aerators: operation, cleanliness.

.2 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls:

.1 Verify temperature settings, operation of control, limit and safety controls.

3.4 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

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

END OF SECTION

PART 1 GENERAL

1.1 Scope

.1 Clean all HVAC systems within the area of renovation and 10 meters beyond the area or renovation.

1.2 References

.1 Definitions:

.1 HVAC System: complete air duct system from exterior penetrations/units to furthest air supply terminal unit and including:

.1 Rigid supply and return ductwork;

.2 Including all existing ductwork to 10 meters beyond the area of renovation;

.3 Flexible ductwork;

.4 Return air plenums including ceiling plenums;

.5 Cooling and heating coils and compartments;

.6 Condensate drain pans, eliminator blades and humidifiers;

.7 Fans, fan blades and fan housing;

.8 Filter housing and frames;

.9 Acoustically insulated duct linings;

.10 Diffusers, registers and terminal units;

.11 Dampers and controls;

.2 Reference Standards:

.1 National Air Duct Cleaners Association (NADCA)

.1 ACR Standard: Assessment, Cleaning and Restoration of HVAC Systems.

.2 North American Insulation Manufacturers Association (NAIMA)

.1 NAIMA, Cleaning Fibrous Glass Insulated Duct Systems - Recommended Practices.

.3 United States Environmental Protection Agency (US EPA)

.1 US EPA, 40 CFR Parts 152 and 156.

1.3 Administrative Requirements

.1 Site Evaluation: conduct site visit 2 weeks before start of work to establish specific cleaning plan, determining how areas of facility and HVAC systems will be protected during cleaning operations.

.1 Organize and lay out plan for video survey and identify camera and cleaning apparatus insertion points.

.2 Ensure plan identifies sequence and schedule of survey and cleaning operations for each individual HVAC system and for complete facility.

.1 Take account of elbows, bends, turning vanes, dampers, transitions, take-offs, and other internal features.

.3 Departmental Representative to review cleaning plan 1 week minimum prior to start of work.

.1 Proceed with cleaning work only after receiving written approval from Departmental Representative.

.2 Scheduling:

.1 Conduct work during hours approved by Departmental Representative only. Allow for work after hours.

.2 Work may not be carried out during statutory holidays.

.3 Project Co-ordination: assign Project Co-ordinator to oversee air duct cleaning processes.

.1 Provide Departmental Representative with contact information of Project Co-ordinator including: name, telephone number, cell phone number.

.4 Security: Departmental Representative will pay costs and provide security escort at times requested on Contractor's submitted work schedule.

.1 Cancellation of security escort requires 72 hours minimum written notice.

.2 Failure to cancel security escort requirements 72 hours minimum before scheduled event will result in Contractor paying for security costs.

.5 Damaged or broken equipment and components found during initial testing and inspection will be repaired or replaced by Departmental Representative.

1.4 Action And Informational Submittals

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

.2 Submit video survey and cleaning plan developed during site evaluation.

.1 Ensure plan includes sequence of operation, identification of camera and cleaning apparatus insertion points and schedule for work.

.3 Product Data:

.1 Submit manufacturer's printed product literature and data sheets for antimicrobial agents and include product characteristics, performance criteria and limitations.

.2 Provide two copies of WHMIS MSDS for antimicrobial agents or coatings.

.4 Testing Laboratory Services: submit name and address of laboratory engaged for work of this Section.

.1 Submit laboratory analysis report of particulate collection indicating:

.1 Location of collection;

.2 Particulate grade;

.3 Particulate size;

.4 Percentage concentration of individual particulates in each sample.

.5 US EPA Registration: submit verification of EPA Registration of antimicrobial agent.

.6 Submit verification of delivery of hazardous or toxic waste materials to contaminated waste facility, as described in PART 3 - CLEANING - Waste Management.

1.5 Closeout Submittals

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

.2 Post Cleaning Inspection Report: submit 4 copies of Final Inspection Report, including data collected, observations and recommendations as well as following information:

.1 Name and address of facility;

.2 Name and address of HVAC cleaning contractor;

.3 Description of HVAC systems with drawings identifying systems cleaned;

.4 Identification scheme for location points in systems that were inspected with accompanying notes describing methods of inspection or tests used;

.5 Identification of points where samples were collected and type of analysis used for each collection;

.6 Identification of each sample collected;

.7 Comments complete with photographs of each sampling location and other observed system features;

.8 Identify systems tested, observations, actions taken and recommendations for future maintenance.

.3 Submit verification of delivery of hazardous or toxic waste materials to contaminated waste facility.

1.6 Extra Materials

.1 Extra Stock Materials:

.1 Supply 4 extra filters for each HVAC System cleaned.

.2 Ensure filters are correct match, size, type and configuration of existing HVAC Systems.

1.7 Quality Assurance

.1 Contractor: verification of 5 years minimum experience in work similar to or exceeding work of this Section.

.2 Project Co-ordinator: verification of 5 years minimum experience in work similar to or exceeding work of this Section.

PART 2 PRODUCTS

2.1 Access Doors And Panels

.1 Ductwork Access Doors: construct access doors from 1.27 mm minimum galvanized sheet steel with gasketted seal.

.1 Ensure access door is 25 mm greater in every dimension than access opening.

.2 Access door size 200mm x 200 mm minimum.

.3 Secure access doors with sheet metal screws on 75 mm centres minimum. Ensure 3 screws per side minimum.

.2 Access Doors and Panels Acoustic Lining:

.1 Install acoustic lining to match existing.

.2 Self-adhesive glass fibre tape capable of adhering to both acoustic lining and metal access door or panel materials.

.3 Water-based duct sealer for repairing cut acoustic lining.

2.2 System Filters

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

2.3 Air Duct Cleaning Equipment

.1 Manually propelled full contact brushes:

.1 Ensure brushes are specifically manufactured and shaped to fit individual ducts, equipment and components of HVAC system.

.1 Ensure brushes are sized to fit various duct sizes in HVAC system.

.2 Ensure brushes make scrubbing motion and full contact with HVAC system interior surfaces to be cleaned.

.2 Brushes: manually propelled with integrally-mounted motor and nylon bristles.

.1 Ensure motor has capacity to continue to push brush after bristles are distorted.

.2 Replace worn and ineffective brushes when required.

2.4 Multi-Functional Robotic Cleaning System

.1 Self-propelled emote controlled, track or wheeled drive equipped with: camera and lights: rotatingbrushes, air supply nozzle, vacuum and spraying system attachment.

.1 Ensure brushes are specifically manufactured and shaped to fit individual ducts, equipment and components of HVAC system.

.2 Ensure brushes make scrubbing motion and full contact with HVAC system interior surfaces.

.3 Replace worn and ineffective brushes when required.

.2 Camera: fully rotational remote control focus and dust proof video digital with 480 lines of resolution, capable of storing 4 hours of recorded media.

.1 Camera Light: 2 x 20 watt Halogen with dimmer

2.5 Hepa Filter Evacuation Fan

.1 Evacuation Fan: includes fan, HEPA filter, flexible hose and motor capable of maintaining debris and particulates airborne in airstream until they reach evacuation fan and maintaining system under negative pressure.

.1 Ensure HEPA filters are clean and maintain evacuation fan and HEPA filter to run efficiently.

2.6 Hepa Vacuum Unit

.1 Vacuum Unit: includes vacuum fan, integral HEPA filter, suction hose and vacuum head, capable of maintaining HVAC System debris and particulates airborne in air stream until they reach vacuum unit and maintaining system under negative pressure.

.1 Ensure HEPA filters are clean and maintain vacuum unit and HEPA filter to run efficiently.

PART 3 EXECUTION

3.1 Preparation

.1 Close down HVAC system.

.2 Locate and identify externally visible HVAC system features which may affect cleaning process including:

.1 Control devices;

.2 Fire and smoke control dampers;

.3 Balancing dampers: indicate and record positions for resetting;

.4 Air volume control boxes: indicate and record positions for resetting;

.5 Fire alarm devices;

.6 Monitoring devices and controls;

.3 Cut openings in ductwork for access to system interior.

.1 Square or rectangular opening sizes: 200 mm minimum each side.

.2 Circular opening sizes: 200 mm minimum diameter.

.4 Installation of Access Doors in Ductwork: install access doors in ductwork where required to facilitate system inspection and cleaning.

.1 Access door installation is not permitted in flexible ductwork.

.1 Inspect flexible ductwork only by disconnecting from main duct and inspecting from open end.

.5 When acoustically lined duct is cut for access, repair cut edges of acoustic lining using self-adhesive fibre glass tape and water based duct sealer.

.1 Adhere new acoustic lining to match existing to inside of access panel or door to ensure continuity of acoustic properties of system.

.6 Remove and reinstall ceiling tiles to gain access to HVAC system as required.

.1 Replace ceiling tiles damaged or soiled by air duct cleaning procedures.

3.2 Examination / Pre-Cleaning Inspection

.1 Verification of Conditions:

.1 Make visual inspection of interior of HVAC system using remote controlled robotic camera.

.2 Insert camera at pre-established strategic locations to evaluate condition and cleanliness of HVAC systems and components.

.2 Evaluation and Assessment:

.1 Identify location and type of internal components.

.2 Identify extent of potential problems.

.3 If toxic or hazardous materials or deposits are suspected after initial inspection immediately stop work and inform Departmental Representative.

.1 Do not proceed further with inspection operations until written approval from Departmental Representative.

3.3 Particulate Collection

.1 Before starting duct cleaning, identify locations for sample collection and collect particulate samples.

.2 Take samples from interior surfaces of HVAC system using sterile wipes for submission to independent testing laboratory.

.3 For each HVAC system collect 4 samples from each HVAC unit as follows:

.1 Sample 1: collect from inside ventilation unit downstream of air filters but before fan discharge;

.2 Sample 2: collect downstream of fan discharge and 1 metre maximum downstream in first horizontal branch;

.3 Sample 3: collect at junction of last horizontal branch and start of low-pressure duct;

.4 Sample 4: collect at junction each air terminal unit and supply duct.

3.4 Laboratory Analysis

.1 Ensure independent testing laboratory has demonstrated experience in work associated with air duct cleaning.

.2 Ensure Super Electron Microscope (SEM) is used for analyzing and determining components of particulate collection samples:

.1 Identify components by grade and size;

.2 Report findings including percentage concentration of components to Departmental Representative.

.3 Proceed with HVAC System Cleaning only after laboratory analysis test results have been received.

.4 Ensure cleaning technicians have safety equipment appropriate for toxic or hazardous conditions identified by laboratory analysis before proceeding with cleaning operations.

3.5 Duct Cleaning

.1 Do duct cleaning in accordance with NADCA ACR Standard.

.2 Isolate and clean sections in zones to ensure that dirt deposits and debris from zone being cleaned does not pass through another zones which has already been cleaned.

.1 Isolate zone of duct using closed-cell polyurethane foam or air inflated zone bag before cleaning.

.3 Ensure vacuum units and evacuation fans are securely in place before starting cleaning operation of isolated section of HVAC air duct system.

.4 Install HEPA filter evacuation fan at one end of zone section and insert full contact brushes at other end.

.5 Clean HVAC supply air duct system and components where particulate sample collected from surfaces is greater than 75 mg of particulate per 0.01 square metres.

.6 Clean exhaust, return, transfer ductwork and plenums, equipment and components where particulate sample collected from surfaces is greater than 75 mg of particulate per 0.01 square metres.

.7 Energize brushes to travel from insertion point to HEPA filter evacuation fan.

.1 Pass brushes through sections as often as necessary to achieve required cleanliness.

.2 Change brush sizes as required to ensure positive contact with duct and component interiors.

.3 Clean corners and pockets where dirt and debris can accumulate.

.8 Clean equipment, components and other features in isolated zone before moving to next zone of HVAC air duct system.

.9 Clean diffusers, registers, louvers, and other terminal units.

.10 Remove perforated supply diffusers from suspended tee-bar ceiling.

.1 Dismantle and clean perforated plates and supply diffuser duct collars.

.2 Re-assemble perforated plate diffusers and reconnect to HVAC system using supply diffuser duct collar after cleaning.

.11 Advise Departmental Representative 72 hours minimum before deactivation of fire alarm and smoke detectors duct cleaning operations.

3.6 Acoustically Lined Ductwork Cleaning

.1 Clean glass fibre acoustically insulated ducts to NAIMA recommended practices.

.1 Use specifically designed robotic apparatus that has been demonstrated not to damage acoustic glass fibre lining.

.2 Monitor cleaning process progress by onboard camera.

3.7 Components And Equipment Cleaning

.1 Brush and vacuum coils, humidifiers, air handling unit enclosures, and heat exchanger surfaces to achieve required cleanliness.

.2 When cleaning equipment and components by brushing and vacuuming is inappropriate or insufficient, dismantle and remove equipment or component and move to area designated by Departmental Representative for cleaning.

.1 Pressure wash with water and cleaning solution until required cleanliness is achieved.

.2 Clean equipment and components in place only if there is no hazard to adjacent materials.

.3 Compressed air and manual cleaning is acceptable only for cleaning individual components and small areas as follows:

.1 Fan blades;

.2 Dampers;

.3 Turning vanes;

.4 Controls;

.5 Sensor bulbs;

.6 Fire alarms;

.7 Smoke detectors;

3.8 Anti Microbial Application

.1 Apply antimicrobial agents when fungal growth is suspected.

.2 Apply antimicrobial agents after removal of surface deposits and debris.

.1 Verify air duct interiors are free from deposits and debris by visual inspection

.2 Report findings to Departmental Representative.

.3 Proceed with application of antimicrobial agents after written approval from Departmental Representative

.3 Apply antimicrobial agents in accordance with manufacturer's written instructions and US EPA 40 CFR registration and listing.

.4 Manual or Robotic spray antimicrobial agents directly onto interior surfaces of HVAC air duct system.

.1 Do not use fog mist for downstream surfaces.

3.9 Field Quality Control/Final Inspections

.1 Post Cleaning Inspection: carry out final inspection using robotic camera and other visual inspection methods after final cleaning has been completed.

.1 Carry out video survey as directed by Departmental Representative.

.2 Include in final survey areas inspected by Departmental Representative prior to cleaning.

.3 Identify on HVAC system record drawings access points used for inspection and cleaning.

.4 Re-collect and analyze particulates collected at same locations where original samples were collected before cleaning.

.5 Reset components including dampers and sensors, which have been disturbed during cleaning operations.

3.10 System Startup

.1 Install new system filters after cleaning operations are completed.

.2 Cover each inspection opening with access door or panel and secure in place after inspection and cleaning are completed.

.3 Restart each HVAC system.

3.11 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE 90.1, Energy Standard for Buildings except Low-Rise Residential Buildings

.2 Electrical Equipment Manufacturers' Advisory Council (EEMAC)

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-C22.2 No. 100, Motors and Generators

.2 CAN/CSA-C747, Energy Efficiency for Single- and Three-Phase Small Motors

.3 CAN/CSA-C390, Energy Efficiency Test Methods for Three-Phase Induction Motors

.4 Underwriter's Laboratories of Canada (ULC)

.5 SMACNA

.1 HVAC Air Duct Leakage Test Manual

.2 HVAC Duct Construction Standards – Metal and Flexible

.6 Refer carefully to other parts of the specifications.

.7 Conform to the requirements and recommendations of all local municipal, provincial and federal codes, by-laws and ordinances.

.8 Do not reduce the quality of work specified and/or shown on the drawings because of the Regulatory requirements.

1.2 Applicable Codes And Standards

.1 In general and as applicable, the physical and chemical properties, the characteristics and the performance of items in this Division shall be as noted in the following:

.1 Canadian Standards Association.

.2 American National Standards Institute.

.3 Provincial Building Code.

.4 Civic Building By-Laws.

.5 Civic Water Works By-Laws and Sewer By-Laws.

.6 Provincial Fire Code.

.7 Worker's Compensation Board Requirements.

.8 American Society for Testing and Materials.

.9 Canadian Government Specifications Board.

.10 National Fire Protection Association.

.11 Canadian Council of Ministers of the Environment Codes.

.12 Underwriters' Laboratories of Canada.

1.3 Latest Editions

.1 The latest edition of all codes and standards, of the date of tender submission, shall apply; except for specific editions referenced by overriding codes.

1.4 Action And Informational Submittals

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

.2 Product Data:

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

.3 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province where work is taking place.

.2 Drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.3 Drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.4 Certificates:

.1 Provide CSA certified equipment.

.2 Where CSA certified equipment is not available, submit such equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.5 Quality Assurance

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting one week prior to beginning on-site installations

.1 Verify project requirements.

.2 Review installation [and substrate] conditions.

.3 Co-ordination with other building subtrades.

.4 Review [manufacturer's] installation instructions and warranty requirements.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 Authorities Having Jurisdiction (Ahj)

.1 Comply with all requirements of Authorities with competent jurisdiction, AHJ, including authorized inspectors, without additional compensation.

1.7 Permits, Fees And Certificates

.1 In addition to the requirements in Division 01, obtain all required Certificates of Inspection for the work and deliver same to the Departmental Representative before request for substantial performance. These include but are not limited to:

.1 Equipment start-up reports.

.2 Fire, smoke, and combination fire/smoke damper test reports.

.2 Correct installed work as directed by the local Authorized Inspector of the Regulatory body without extra compensation.

1.8 Equipment List

.1 Compile a complete list of HVAC equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

.2 Submit for review within ten (10) days after award of contract.

1.9 Specified Equipment Availability

.1 If specified equipment is not available (due to delays in delivery) at scheduled installation time an acceptable alternate shall be installed AT THE CONTRACTOR'S EXPENSE and replaced with the specified equipment when the specified equipment becomes available with no additional compensation.

1.10 Electrical Work

.1 Division 23 is responsible for the supply, physical installation, and operation of all electric motors, temperature and humidity controls systems, combustion controls systems, and other electrical devices and systems specified under its portion of the work. Bear full responsibility for factory installed wiring and equipment on packaged equipment, be responsible where detailed in equipment requirements for controlling devices such as, but not restricted to, pump and liquid level controls, multi-speed motor controllers, boiler controls, etc., which are necessarily integrally mounted on packaged equipment.

.2 Submit detailed composite wiring diagrams for all control systems as specified and as required for the HVAC work for review by the Departmental Representative. Distribute copies of reviewed drawings to the Electrical Division for their reference.

.3 Provide all wiring in approved rigid conduit to suit temperature and moisture conditions of area through which wire is to run. All wiring is in accordance with the relevant Electrical Codes, and in no case smaller than #12 AWG. Comply fully with the electrical specifications for all electrical work.

1.11 Electrical Characteristics

.1 Check with the electrical trade and provide all mechanical items with correct electrical characteristics to suit the electrical work.

.2 If correct characteristics are not available from the specified equipment manufacturer, contact the Departmental Representative prior to the close of tenders.

.3 At time of ordering HVAC equipment, confirm electrical characteristics with the electrical contractor, and ensure that they have been confirmed with the power authority.

.4 No additional compensation will be paid for problems arising from incorrect electrical characteristics.

1.12 Cutting, Patching, Repairing, Making Good

.1 In addition to the requirements in Division 01, each trade requiring such work shall be responsible for necessary cutting. Patching by appropriate trade. All work to be performed by experienced tradesmen.

.2 Neatly perform cutting and patching work to blend smoothly with surrounding surfaces.

.3 Patch and make good disturbed surfaces to match existing adjacent work. Leave finished, neat, to Departmental Representative's approval.

.4 Perform X-ray examination of wall and floors prior to making openings, where required to avoid damage to structural reinforcements and electrical conduits.

1.13 Tests

.1 In addition to the requirements in Division 01, carry out all tests hereinafter noted, as required by the regulatory agencies and as requested by the Departmental Representative and furnish all labour and equipment required for such tests without extra compensation.

.2 Before activating systems, recheck equipment, check all connections, set all controls for proper start-up, obtain necessary clearances from the electrical division, etc.

.3 Submit to the Departmental Representative, legible report for all tests conducted, within one week of the test.

.4 Notify the Departmental Representative at least two (2) working days ahead of all tests, so that the tests can be witnessed on a random basis.

1.14 Trial Usage

.1 Departmental Representative may use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

1.15 Functional Testing

.1 Test all HVAC equipment, devices and systems. Test as required by the AHJ and Departmental Representative, submitting comprehensive reports. Example forms are available from the Departmental Representative.

.2 Ensure all tests demonstrate compliance with the specified and manufacturers’ shop drawing and catalogued performance, as well as compliance with applicable standards.

1.16 Demonstration And Operating And Maintenance Instructions

.1 In addition to the requirements in Division 01, supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Manufacturers, or expert suppliers, to provide demonstrations and instructions.

.3 Use operation and maintenance manual, as-built drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Where deemed necessary, Departmental Representative or Owner may record these demonstrations on videotape for future reference.

.6 Submit training schedule and scope description to the Departmental Representative for review and approval for each training topic. Training shall not commence until approval of training schedule and scope if given by the Departmental Representative.

1.17 Spare Parts

.1 Furnish spare parts in accordance with Section 01 78 00 - Closeout Submittals and as follows:

.1 One set of filter media/cartridges, for each filter or filter bank in addition to final operating set.

1.18 Special Tools

.1 Provide one set of special tools required to service equipment in accordance with Section 01 78 00 - Closeout Submittals and as recommended by manufacturers.

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

1.19 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

.1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to 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.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of white prints as required for each phase of work. Mark changes as work progresses and as changes occur. [Include changes to existing mechanical systems, control systems and low voltage control wiring].

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

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

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

1.20 Maintenance Material Submittals

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

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

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

1.21 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

1.22 Substantial Completion / Certification By Engineer / Life Safety Submissions

.1 Provide minimum notice of ten (10) working days to the Departmental Representative prior to request to declare project substantially complete. Failure to do so may result in site review by Engineer being delayed.

.2 In addition to the requirements of Division 01 submit the following (as applicable) a minimum of five (5) working days ahead of required proposed date of substantial completion (unless a longer period of time is dictated by Authorities Having Jurisdiction):

.1 All certificates and documentation required by Authorities Having Jurisdiction.

.2 Fire and smoke damper test reports.

.3 Smoke exhaust/management systems commissioning reports

.4 Equipment start-up reports.

.5 Control systems commissioning reports pertaining to equipment/systems required for life safety system operation (i.e. ventilation interlocks/unit operation, CO detection/exhaust systems, etc.).

.6 Test reports for backflow prevention devices with test taps.

.7 Written confirmation that propane system is approved by the utility and/or Authority Having Jurisdiction, and turned on.

.8 Record ('As-Built') drawings.

.9 Operation and Maintenance Manuals, complete with revisions as directed.

.10 Written confirmation that all life safety and health systems are fully functional, including but not limited to ventilation, both supply and exhaust.

.11 Written confirmation that all HVAC equipment is operational and under control, indicating exceptions and temporary controls/arrangements.

.12 All other life safety and health reports and certificates.

.3 Confirm, in writing, systems are ready for occupancy and use for intended purpose in every respect.

.4 Before certification date submit detailed written confirmation of completion of deficient life safety work noted in the documentation listed above, including date completed.

.5 Before certification date submit detailed written confirmation of completion of deficient non-life safety work, including that noted in Departmental Representative reports, listing each deficient item. Submit schedule for completion of all deficient non-life safety work that will not be completed prior to the certification date, listing each deficient item for consideration.

.6 These requirements apply to each phase of a phased project.

1.23 Fan Connections

.1 Inlet and discharge conditions are critical to proper fan performance. Review proposed fan installations and ensure that proper conditions are provided; add straightening vanes or turning vanes where required.

.2 In general, provide a minimum of three (3) wheel diameters of straight duct immediately upstream of the fan inlet.

.3 Review special cases with the Departmental Representative and TAB Contractor prior to installation.

PART 2 PRODUCTS

2.1 Motors

.1 Motors to be high efficiency, in accordance with local Hydro company standards and the requirements of ASHRAE 90.1.

.2 Comply with all Canadian Electrical Code requirements, and in particular CSA C22.2 No. 100, c/w CSA label, unless otherwise specified.

.3 Motors included in the scope of CAN/CSA-C747 shall have a nominal full-load efficiency not less than the minimum specified in that standard. Efficiency ratings of motors included in the scope of this standard shall be based on a statistically valid quality control procedure conforming to the standard. Nameplates shall list the nominal full-load motor efficiency.

.4 Motors included in the scope of CAN/CSA-C390 shall have a nominal full-load efficiency not less than the minimum specified in that standard. Efficiency ratings of motors included in the scope of this standard shall be based on a statistically valid quality control procedure conforming to the standard. Nameplates shall list the nominal full-load motor efficiency.

.5 In general, motors are EEMAC Class B (for standard torque applications), 1,800 RPM, continuous duty, open drip proof, ball bearing, 40ºC temperature rise above 40ºC ambient, 1.15 service factor. Motors are squirrel cage induction unless specifically noted otherwise. Special motors are specified with the equipment driven.

.6 Single-phase motors shall be equipped with integral thermal overload protection.

.7 Provide adequate capacity on each motor to operate the associated driven device under all conditions of load and service without overloading and be of at least the power specified.

.8 Refer to Division 26 and provide motor characteristics within +5% of power source, or get written approval from the Departmental Representative.

.9 Co-operate with Division 26 during start-up and provide all necessary assistance in commissioning.

.10 Acceptable motor manufacturers may be listed under the Section 23 05 03 – Acceptable HVAC Manufacturers/Contractors.

.11 If delivery of specified motor will delay delivery or installation of equipment, install motor approved by Departmental Representative for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

2.2 Coupling For Direct Drive Equipment

.1 Couplings shall be sized such that it will endure an infinite number of starts when equipment is fully loaded. All couplings shall be covered with a removable safety guard.

2.3 Belt Drives

.1 Fit reinforced belts in sheave matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

.3 For motors under 7.5 kW: standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.

.4 For motors 7.5 kW and over: sheave with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheave of correct size to suit balancing.

.5 Correct size of sheave to be determined during commissioning.

.6 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.7 Motor slide rail adjustment plates to allow for centre line adjustment.

.8 Supply one set of spare belts for each set installed.

2.4 Guards

.1 Provide guards for all drives as specified and required by Authorities Having Jurisdiction.

.2 Guards for belt drives (minimum requirements):

.1 Expanded galvanized metal screen welded to galvanized steel frame.

.2 Minimum 1.2 mm thick galvanized sheet metal tops and bottoms.

.3 Prime coat for painting.

.4 38 mm diameter holes on both shaft centres for insertion of tachometer.

.5 Allow movement of motors for adjusting belt tension.

.3 Guards for flexible couplings (minimum requirements):

.1 "U" shaped, minimum 1.6 mm thick galvanized mild steel.

.2 Prime coat for painting.

.4 Guards are to be readily removable to permit servicing of equipment.

.5 Provide means to permit lubrication and use of test instruments with guards in place.

.6 Ensure that all guards are securely fastened in place, sufficiently sturdy to provide the required safety and free of rattles and excess vibration.

2.5 Fire Separation Repair

.1 Refer to Section 07 84 00 – Firestopping.

.2 Cooperate fully with other trades to ensure maintenance of the rating of fire separations that are penetrated, in strict compliance with the manufacturer's recommendations and requirements of the AHJ.

2.6 Accessibility

.1 Refer to Section 10 90 00 – Miscellaneous Specialties for access door specification.

.1 Standard Type:

.1 Door and Trim: 14 gauge steel. Trim 1-1/2 inches wide.

.2 Return Frame: 18 gauge steel. Depth 1-3/4 inches.

.3 Hinges: Fully-concealed. Opens 170 degrees. On long side of door. Number of hinges

.4 varies with size of door.

.5 Latches: Flush, stainless steel cam-operated with screwdriver. Positioned opposite hinge

.6 and at top and bottom on larger sizes.

.7 Finish: Electrostatically-applied, baked grey enamel coat over rust-inhibiting phosphate

.8 treated steel.

.9 Masonry Anchor Straps: Minimum of 4 straps per door, where required

.10 Cylinder Lock: Keyed alike with 2 keys per lock.

.11 Gaskets: Weather-resistant and air-tight neoprene gaskets.

.2 Fire Rated Type:

.1 UL Listed: rating to match assembly being installed in, 250 degrees C (450 degrees F) maximum temperature rise in 30 minutes for vertical wall installations.

.2 Frame: 16 gauge steel, 2 ½ inches deep.

.3 Insulation: 2 inches thick mineral wool in between 2 pieces of 22 gauge steel.

.4 Hinge: Continuous piano hinge allows opening to 180 degrees. Hinge is on long side of door.

.5 Latches: Specially designed Ultra Lock-self-latching keyed cylinder paddle latch opposite hinge.

.6 Automatic panel closer on all doors. Vertical position only. Ceiling position has self-assisted closing.

.7 Inside panel release on all doors.

.8 rust-inhibiting phosphate treated steel. This coating can be used as a finish or as a prime coat.

.9 Finish: Electrostatically-applied, baked grey enamel coat over rust-inhibiting phosphate treated steel.

.10 Hot smoke seal gasketing for 4 sides.

.2 Be responsible for supplying and locating all access panels in the ceiling, wall, partitions, etc., where openings are necessary for the inspection, servicing and/or removal of equipment, valves and other items that require periodic access. Panel type to suit the construction of the ceilings, walls, partitions, etc., in which they are

located. Determine the location subject to the approval of the Departmental Representative. Access panels to be installed by trade experienced in work with surface in which the panel is to be installed.

.3 Mark mechanical access points in accessible ceilings with distinctive but inconspicuous tags properly attached to the ceiling grid. Obtain sample approval before purchase and installation. Indicate on record drawings.

.4 Accessibility shall be defined as:

.1 Ability to place both hands on equipment or device, with no duct, pipe or other equipment in the way.

.2 Must be accessible while standing on maximum 2400 mm high stepladder.

.3 Must be in plain view.

.5 Mark mechanical access points in accessible ceilings with distinctive but inconspicuous tags properly attached to the ceiling grid. Obtain sample approval before purchase and installation. Indicate on record drawings.

2.7 Sleeves And Penetrations

.1 Install sleeves for all piping passing through floors and walls.

.2 Sleeves as specifically noted, or through structural walls shall be Schedule 40 steel. All other sleeves are 6 mm galvanized sheet steel.

.3 Fit sleeves flush on either side of the wall through which they pass, extend sleeves through floors and terminate 50 mm above finished floor. Adjust as necessary to accommodate the requirements of through-penetration fire-stopping systems.

.4 Where passing through walls, make sleeves a minimum 6 mm clear of the piping, through floors make sleeves a minimum of 20 mm clear of the piping. Pack for full depth with fiberglass insulation & finish with a lagging compound. Penetrations through fire separations shall be repaired to maintain rating.

.5 Provide escutcheon plates with setscrews to completely cover openings for all exposed pipes passing through walls, subject to the approval of the Departmental Representative. Provide chrome-plated plates in finished areas unless otherwise approved.

.6 Be responsible for maintaining integrity of building envelope when making penetration to install equipment or devices. Enlist services of qualified trade to make openings in and/or repairs to building envelope.

.7 Sleeving through steel beams shall be permitted only where approved by the Departmental Representative in writing or where expressly indicated on the Contract Documents. Sleeves are NOT permitted in concrete beams.

.8 Seal all sleeves to make watertight.

2.8 Counter Flashings

.1 In addition to the requirements in Division 01, provide watertight, non-corroding, counter flashings for all penetrations of the building envelope, painted to match adjacent materials after proper preparation and painting. Refer to drawings, including building drawings, for additional information.

.2 Installation to allow for movement and accommodate high temperatures where necessary.

.3 For short pipes, the flashing may overlap the end, in lieu of attachment to the pipe. Minimum 300 mm high above the roof, c/w water break above maximum water level on the roof, to negate wind effects.

.4 All galvanized material to be 0.7 mm thick minimum.

.5 In exposed locations, flashings must be aesthetically acceptable to the Departmental Representative.

.6 Co-ordinate with all other trades including roofer and metal wall panel installer.

.7 For copper pipe use 0.82 mm sheet copper, soldered to pipe end c/w solder joints.

.8 For galvanized ducts use galvanized sheet metal soldered to the duct and c/w soldered joints.

.9 For cast iron and steel pipes at normal temperature, use manufactured stretch fit heavy neoprene flashings c/w galvanized protective layer.

.10 For hot pipes clamp galvanized to the pipe with a temperature rated gasket and stainless steel worm gear clamp.

.11 For aluminum and stainless steel, use the same materials for the flashing.

.12 For manufactured hoods, fans and rooftop unit mounting, apply a low density neoprene gasket all around and fasten securely.

PART 3 EXECUTION

3.1 General

.1 All Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Do not scale the Drawings. Consult the Architectural Drawings and details for exact locations of fixtures and equipment; where some are not definitely located, obtain this information from the Departmental Representative.

.2 Follow Drawings as closely as possible in laying out work and check Drawings of all other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. When headroom or space conditions appear inadequate, notify the Departmental Representative before proceeding with the installation.

.3 Make reasonable modifications in the layout as needed without extra compensation to prevent conflicts with work of other trades or for proper execution of the work. This shall include, but not necessarily be confined to, offsets in piping or ducts, transformation in ductwork and relocation of ducts and piping up to 3.0 m either way on each item as required to suit on site job conditions.

.4 Where variances occur between the Drawings and Specifications or within either document itself, include in the contract, the item or arrangement of better quality, greater quantity, and higher cost or clarify before tenders close. The final decision on the item and manner in which work is installed rests with the Departmental Representative.

.5 Provide, with all trades involved, marked-up drawings, when requested, of mechanical spaces indicating all dimensions for all installations prior to the work being done. Report any discrepancies to the Departmental Representative. Any

conflicts arising that may have been resolved by laying the work out in this manner will be resolved WITHOUT ADDITIONAL COMPENSATION.

.6 Provide 48 hours minimum notice to Departmental Representative and Owner of all work before it is concealed. Expose concealed work for inspection, upon request, when proper notice was not provided and pay all costs therefore, including making good other trades' work.

3.2 Surveys And Measurements

.1 Base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements shown on the Drawings at the site, and check the correctness of same as related to the work.

.2 Notify the Departmental Representative if any discrepancy is discovered between the actual measurements and those indicated which prevent following good practice or the intent of the Drawings & Specifications. Do not proceed with the work until receiving instructions from the Departmental Representative.

3.3 Co-Ordination

.1 Give full co-operation to those doing work under other Divisions of the specifications and furnish in writing with copies to the Departmental Representative any information necessary to permit the work of all Divisions to be installed satisfactorily and with least possible interference or delay.

.2 Discuss work with other Divisions prior to installation. Confirm proposed locations for equipment installed by this Division will not interfere with work installed by others.

.3 If work is installed before coordinating with other trades or so as to interfere with work of other trades, make necessary changes in the work to correct the conditions without extra compensation.

.4 When requested, provide marked up drawings indicating required clearances for installation of plumbing equipment. Provide section drawings indicating location of other equipment not installed by Division 23, such as other equipment and piping,, cable trays, etc. Report any discrepancies to the Departmental Representative.

3.4 Accessibility

.1 Locate all equipment that must be serviced, operated or maintained in fully accessible positions, with minimum interference and maximum usable space. If required for better accessibility, furnish access doors for this purpose. Make deviations from Drawings to allow for good accessibility, obtaining prior approval for changes of magnitude.

3.5 Scaffolding, Rigging, Hoisting

.1 Unless otherwise specified, furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment apparatus furnished. Remove same from the premises when no longer required.

.2 Take precautions not to overload the structure in any manner nor provide inadequate scaffolding and rigging so as to endanger the safety of personnel on the site whether under this Division's employ or otherwise.

3.6 Cutting And Patching

.1 Cutting shall be performed neatly by this trade. No hammering or other methods are permitted without approval of the Departmental Representative and other trades affected. Utilize a rebar detector and stud finder to ensure cutting does not damage other elements.

.2 Patching is to be done by the appropriate trade. Arrange and pay for all patching not specifically specified elsewhere in these specifications, including fire rated patching at fire separations.

.3 Fill voids around pipes and ducts with fiberglass batt insulation and sheet metal closure strips. For fire separations, install fire stop material in accordance with manufacturer's details as required to meet the UL classification and to match separation rating. Ventilate adequately during curing. Provide adequate structural support in larger spaces. Install slightly above floors to provide positive drainage away from pipe or duct.

.4 Provide a structural shop drawing stamped by a Professional Engineer showing all reinforcements required for openings through the structure. Allow for all costs of the reinforcement.

3.7 Supports

.1 Provide all necessary and recommended supports for all equipment furnished under this Division. Co-ordinate and facilitate all necessary and recommended foundations, pads, bases and piers provided under other Divisions for equipment furnished or installed under this Division.

3.8 Waterproofing

.1 Obtain approval for the installation method employed where any work pierces waterproofing concrete and waterproofing. Furnish all necessary grout rings sleeves, caulking, curbs, counter flashing and flashing required to make openings through roofs, walls, floors, etc., absolutely watertight. This applies to, but is not restricted to, roof exhausters, relief vents, penthouses, ducts, grilles, pipes, etc. Work involving the roofing is done in conjunction with the roofing Division. Work passing through roofing is to be done in accordance with applicable C.R.C.A. "FL" Series details.

3.9 Protection

.1 Protect the work and material of all other sections from damage and make good all damage thus caused, to the satisfaction of the Departmental Representative.

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

3.10 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.11 Painting Repairs And Restoration

.1 Do painting in accordance with Section 09 91 23 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.12 Field Quality Control

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

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.

.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.

3.13 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

3.14 Protection

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

3.15 Equipment Start-Up

.1 HVAC contractor shall ensure that all electrical/HVAC components match and that it is safe to start-up HVAC equipment.

.2 All support such as electrical contractor, controls contractor, etc., shall be arranged by the mechanical and all trades directly involved in equipment being started shall be present for start-up.

3.16 Manufacturers' Recommendations

.1 Install, adjust, test, start-up, and maintain all equipment in strict accordance with the manufacturer's recommendations. If in conflict with the drawings and specifications, contact the Departmental Representative for clarification.

.2 Ensure that the manufacturer recommends the product for its intended use. If in doubt, contact the Departmental Representative.

3.17 Personnel Protection

.1 In addition to the requirements in Division 01, provide visual warning signs and/or markers and mechanical protection devices for all mechanical items mounted below the minimum limits listed below and suspended more than 1500mm clear of the floor.

.1 Occupied spaces 2286 mm (7'-6").

.2 Service spaces 2133 mm (7'-0").

.3 Crawl spaces 1524 mm (5'-0").

.2 Visual warning devices to be yellow tape with black stripes adhered to the entire perimeter of the item infringing on the occupied space. This will include but not be limited to:

.1 Length of pipes or equipment below specified height.

.3 Mechanical protection devices to be 7 mm (¼") wire mesh guard and/or 25 mm thick 'Armaflex' type insulation. This will include but not be limited to:

.1 Pipe and equipment hangers.

.2 Valves.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 American Society of Mechanical Engineers (ASME)

.1 ASME B31.1, Power Piping.

.2 ASTM International

.1 ASTM A125, Standard Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563, Standard Specification for Carbon and Alloy Steel Nuts.

.3 Factory Mutual (FM)

.4 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 MSS SP69, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.

.5 Underwriter's Laboratories of Canada (ULC)

1.2 Action And Informational Submittals

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

.2 Product Data: Submit manufacturer's instructions, printed product literature and data sheets for specified equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 Closeout Submittals

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 System Description

.1 Design Requirements:

.1 Construct pipe hanger and support to manufacturer's recommendations utilizing manufacturer's regular production components, parts and assemblies.

.2 Base maximum load ratings on allowable stresses prescribed by ASME B31.1 or MSS 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 MSS SP58.

.2 Finishes:

.1 Pipe hangers and supports: galvanized after manufacture.

.2 Ensure steel hangers in contact with copper piping are copper plated or epoxy coated.

.3 Upper attachment structural: Suspension from lower flange of I-Beam.

.1 Cold piping NPS 2 maximum: Malleable iron C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.

.1 Rod: 9mm.

.2 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers, UL/ULC listed to MSS-SP69.

.4 Upper attachment structural: Suspension from upper flange of I-Beam.

.1 Cold piping NPS 2 maximum: Ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip, ULC listed to MSS SP69.

.2 Cold piping NPS 2 1/2 or greater, all hot piping: Malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut ULC listed.

.5 Upper attachment to concrete.

.1 Ceiling: Carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.

.2 Concrete inserts: wedge shaped body with knockout protector plate ULC listed to MSS SP69.

.6 Shop and field-fabricated assemblies.

.1 Trapeze hanger assemblies: steel, sized to suit load.

.2 Steel brackets: sized to suit load.

.7 Hanger rods: threaded rod material to MSS SP58.

.1 Ensure that hanger rods are subject to tensile loading only.

.2 Provide linkages where lateral or axial movement of pipework is anticipated.

.3 Size based on the following schedule:

.1 10 mm rod for pipes up to 50 mm diameter.

.2 12 mm rod for 65 mm and 75 mm diameter.

.3 16 mm rod for 100 mm diameter.

.4 20 mm rod for 150 mm diameter.

.5 22 mm rod for 200 mm to 300 mm diameter.

.8 Pipe attachments: material to MSS SP58.

.1 Attachments for steel piping: carbon steel, galvanized.

.2 Attachments for copper piping: copper plated black steel.

.3 Use insulation shields for hot pipework.

.4 Oversize pipe hangers and supports.

.9 Adjustable clevis: material to MSS SP69, ULC listed, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.

.1 Ensure "U" has hole in bottom for riveting to insulation shields.

.10 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.

.11 U-bolts: carbon steel to MSS SP69 with 2 nuts at each end to ASTM A563.

.1 Finishes for steel pipework: galvanized.

.2 Finishes for copper, glass, brass or aluminum pipework: epoxy coated.

.12 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

.13 For refrigerant piping use a manufactured support system consisting of:

.1 U-shaped channel of gauge and size as recommended by manufacturer to support the load.

.2 Thermoplastic elastomer cushion that surrounds piping and hinges open for easy insertion of piping.

.3 Clamp with electro chromate finish that secures cushion to channel by means of shaped end tabs that fit into the U-shaped channel and a tightening bolt at the top.

2.3 Wall Support

.1 For piping supported off wall, roof or floor, use a manufactured support system consisting of:

.1 U-shaped channel of gauge and size as recommended by manufacturer to support the load.

.2 Thermoplastic elastomer cushion that surrounds piping and hinges open for easy insertion of piping.

.3 Clamp with electro chromate finish that secures cushion to channel by means of shaped end tabs that fit into the U-shaped channel and a tightening bolt at the top.

.2 Spacing shall be as recommended by manufacturer for load being supported.

.3 For groups of piping that are arranged perpendicular to wall, install Unistrut to to form a triangular angle bracket.

2.4 Riser Clamps

.1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42, ULC listed.

.2 Copper pipe: carbon steel copper plated to MSS SP58, type 42.

.3 Bolts: to ASTM A307.

.4 Nuts: to ASTM A563.

2.5 Insulation Protection Shields

.1 Insulated cold piping:

.1 64 kg/m3 density insulation plus insulation protection shield to: MSS SP69, galvanized sheet carbon steel. Length designed for maximum 3 m span.

.2 Insulated hot piping:

.1 Curved plate 300 mm long, with edges turned up, welded-in centre plate for pipe sizes NPS 12 and over, carbon steel to comply with MSS SP69.

2.6 Constant Support Spring Hangers

.1 Springs: alloy steel to ASTM A125, shot-peened, magnetic particle inspected, with +/-5% spring rate tolerance, tested for free height, spring rate, loaded height and provided with Certified Mill Test Report (CMTR).

.2 Load adjustability: 10 % minimum adjustability each side of calibrated load. Adjustment without special tools. Adjustments not to affect travel capabilities.

.3 Provide upper and lower factory set travel stops.

.4 Provide load adjustment scale for field adjustments.

.5 Total travel to be actual travel + 20%. Difference between total travel and actual travel 25 mm minimum.

.6 Individually calibrated scales on each side of support calibrated prior to shipment, complete with calibration record.

2.7 Variable Support Spring Hangers

.1 Vertical movement: 13 mm minimum, 50 mm maximum, use single spring pre-compressed variable spring hangers.

.2 Vertical movement greater than 50 mm: use double spring pre-compressed variable spring hanger with 2 springs in series in single casing.

.3 Variable spring hanger to be complete with factory calibrated travel stops. Provide certificate of calibration for each hanger.

.4 Steel alloy springs: to ASTM A125, shot-peened, magnetic particle inspected, with +/-5 % spring rate tolerance, tested for free height, spring rate, loaded height and provided with CMTR.

2.8 Equipment Supports

.1 Fabricate equipment supports not provided by equipment manufacturer from structural grade steel meeting requirements of Division 05 - Structural Steel for Buildings.

.2 Submit calculations with shop drawings.

2.9 Equipment Anchor Bolts And Templates

.1 Provide templates to ensure accurate location of anchor bolts.

2.10 House-Keeping Pads

.1 For base-mounted equipment: Concrete, at least 100 mm high, 50 mm larger all around than equipment, and with chamfered edges.

2.11 Roof Mounted Equipment And Services

.1 Applies to exterior piping and conduit on roof, condensing units.

.1 Does not apply to ERV. ERV shall have factory curb.

.2 Manufactured support system for support of gas and refrigeration piping systems, cable tray, electrical conduit, multiple lines, HVAC equipment.

.1 Material

.1 Base - 100% recycled rubber, UV resistant

.2 Channel - 14 gauge galvanized steel (1 5/8” wide x 1 5/8” high)

.2 Maximum Load - 750 lbs. - for each 9.6” long support

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Install in accordance with:

.1 Manufacturer's instructions and recommendations.

.2 Vibration Control Devices:

.1 Install on piping systems at pumps, boilers, chillers, cooling towers, and as indicated.

.3 Clamps on riser piping:

.1 Support independent of connected horizontal pipework using riser clamps and riser clamp lugs welded to riser.

.2 Bolt-tightening torques to industry standards.

.3 Steel pipes: install below coupling or shear lugs welded to pipe.

.4 Cast iron pipes: install below joint.

.4 Clevis plates:

.1 Attach to concrete with 4 minimum concrete inserts, one at each corner.

.5 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

.6 Use approved constant support type hangers where:

.1 Vertical movement of pipework is 13 mm or more,

.2 Transfer of load to adjacent hangers or connected equipment is not permitted.

.7 Use variable support spring hangers where:

.1 Transfer of load to adjacent piping or to connected equipment is not critical.

.2 Variation in supporting effect does not exceed 25 % of total load.

3.3 Hanger Spacing

.1 Plumbing piping: to National Plumbing Code of Canada and t Provincial Code.

.2 Fire protection: to applicable fire code.

.3 Gas and fuel oil piping: up to NPS 1/2: every 1.8 m.

.4 Copper piping: up to NPS 1/2: every 1.5 m.

.5 Flexible joint roll groove pipe: in accordance with table below for steel, but not less than one hanger at joints. Table listings for straight runs without concentrated loads and where full linear movement is not required.

.6 Within [300] mm of each elbow.

Maximum Pipe Size : NPS	Maximum Spacing Steel	Maximum Spacing Copper
up to 1-1/4	2.4 m	1.8 m
1-1/2	3.0 m	2.4 m
2	3.0 m	2.4 m
2-1/2	3.7 m	3.0 m
3	3.7 m	3.0 m
3-1/2	3.7 m	3.3 m
4	3.7 m	3.6 m
5	4.3 m	
6	4.3 m	
8	4.3 m	
10	4.9 m	
12	4.9 m	

.7 Pipework greater than NPS 12: to MSS SP69.

3.4 Hanger Installation

.1 Install hanger so that rod is vertical under operating conditions.

.2 Adjust hangers to equalize load.

.3 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

3.5 Horizontal Movement

.1 Angularity of rod hanger resulting from horizontal movement of pipework from cold to hot position not to exceed 4 degrees from vertical.

.2 Where horizontal pipe movement is less than 13 mm, offset pipe hanger and support so that rod hanger is vertical in the hot position.

3.6 Final Adjustment

.1 Adjust hangers and supports:

.1 Ensure that rod is vertical under operating conditions.

.2 Equalize loads.

.2 Adjustable clevis:

.1 Tighten hanger load nut securely to ensure proper hanger performance.

.2 Tighten upper nut after adjustment.

.3 C-clamps:

.1 Follow manufacturer's recommended written instructions and torque values when tightening C-clamps to bottom flange of beam.

.4 Beam clamps:

.1 Hammer jaw firmly against underside of beam.

3.7 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section Includes:

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

.2 Sustainable requirements for construction and verification.

1.2 References

.1 Canadian Gas Association (CGA)

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

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.60, Interior Alkyd Gloss Enamel.

.2 CAN/CGSB-24.3, Identification of Piping Systems.

.3 National Fire Protection Association (NFPA)

.1 NFPA 13, Standard for the Installation of Sprinkler Systems.

.2 NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

1.3 Action And Informational Submittals

.1 Product Data:

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

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

.4 Samples:

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

.2 Samples to include nameplates, labels, tags, lists of proposed legends.

1.4 Quality Assurance

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

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 Manufacturer's Equipment Nameplates

.1 Metal or plastic laminate nameplate mechanically fastened to each piece of equipment by manufacturer.

.2 Lettering and numbers raised or recessed.

.3 Information to include, as appropriate:

.1 Equipment: manufacturer's name, model, size, serial number, capacity.

.2 Motor: voltage, Hz, phase, power factor, duty, frame size.

2.2 System Nameplates

.1 Colours:

.1 Hazardous: red letters, white background.

.2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:

.1 3 mm thick laminated plastic, matte finish, with square corners, letters accurately aligned and machine engraved into core.

.3 Sizes:

.1 Conform to following table:

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

.2 Use maximum of 25 letters/numbers per line.

.4 Identification for 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 Existing Identification Systems

.1 Apply existing identification system to new work.

.2 Where existing identification system does not cover for new work, use identification system specified this section.

.3 Before starting work, obtain written approval of identification system from Departmental Representative.

2.4 Piping Systems Governed By Codes

.1 Identification:

.1 Sprinklers: to NFPA 13.

.2 Standpipe and hose systems: to NFPA 14.

2.5 Identification Of Piping Systems

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

.2 Pictograms:

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

.3 Legend:

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

.4 Arrows showing direction of flow:

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

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

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

.5 Extent of background colour marking:

.1 To full circumference of pipe or insulation.

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

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

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

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

.7 Colours and Legends:

.1 Where not listed, obtain direction from 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
** Add design temperature		
++ Add design temperature and pressure		
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Storm water	Green	STORM
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT

2.6 Identification Ductwork Systems

.1 50 mm high stencilled letters and directional arrows 150 mm long x 50 mm high.

.2 Colours: back, or co-ordinated with base colour to ensure strong contrast.

2.7 Valves, Controllers

.1 Brass tags with 12 mm stamped identification data filled with black paint.

.2 Include flow diagrams for each system, of approved size, showing charts and schedules with identification of each tagged item, valve type, service, function, normal position, location of tagged item.

2.8 Controls Components Identification

.1 Identify all systems, equipment, components, controls, sensors with system nameplates specified in this section.

.2 Inscriptions to include function and (where appropriate) fail-safe position.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Timing

.1 Provide identification only after painting specified Section 09 91 23 - Interior Painting has been completed.

3.3 Installation

.1 Perform work in accordance with CAN/CGSB-24.3 except as specified otherwise.

.2 Provide ULC, CSA registration plates as required by respective agency.

.3 Identify systems, equipment to conform to PWGSC PMSS.

3.4 Nameplates

.1 Locations:

.1 In conspicuous location to facilitate easy reading and identification from operating floor.

.2 Standoffs:

.1 Provide for nameplates on hot and/or insulated surfaces.

.3 Protection:

.1 Do not paint, insulate or cover.

3.5 Location Of Identification On Piping And Ductwork Systems

.1 On long straight runs in open areas in boiler rooms, equipment rooms, galleries, tunnels: at not more than 17 m intervals and more frequently if required to ensure that at least one is visible from any one viewpoint in operating areas and walking aisles.

.2 Adjacent to each change in direction.

.3 At least once in each small room through which piping or ductwork passes.

.4 On both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of separations such as walls, floors, partitions.

.6 Where system is installed in pipe chases, ceiling spaces, galleries, confined spaces, at entry and exit points, and at access openings.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves, and dampers. Where this is not possible, place identification as close as possible, preferably on upstream side.

.9 Identification easily and accurately readable from usual operating areas and from access points.

.1 Position of identification approximately at right angles to most convenient line of sight, considering operating positions, lighting conditions, risk of physical damage or injury and reduced visibility over time due to dust and dirt.

3.6 Valves, Controllers

.1 Valves and operating controllers, except at plumbing fixtures, radiation, or where in plain sight of equipment they serve: Secure tags with non-ferrous chains or closed "S" hooks.

.2 Install one copy of flow diagrams, valve schedules mounted in frame behind non-glare glass where directed by Departmental Representative. Provide one copy (reduced in size if required) in each operating and maintenance manual.

.3 Number valves in each system consecutively.

3.7 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 TAB is used throughout this Section to describe the process, methods and requirements of testing, adjusting and balancing for HVAC.

.2 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do other work as specified in this section.

1.2 Qualifications Of Tab Personnel

.1 Submit names of personnel to perform TAB to Departmental Representative within 30 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:

.1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing.

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.3 Purpose Of Tab

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

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.4 Exceptions

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

1.5 Co-Ordination

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.6 Pre-Tab Review

.1 Review contract documents before project construction is startedconfirm 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 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:

.3 Installation of ceilings, doors, windows, other construction affecting TAB.

.4 Application of weatherstripping, sealing, and caulking.

.5 Pressure, leakage, other tests specified elsewhere Division 23.

.6 Provisions for TAB installed and operational.

.7 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 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.

1.10 Application Tolerances

.1 Do TAB to following tolerances of design values:

.1 Other HVAC systems: plus 5 %, minus 5 %.

1.11 Accuracy Tolerances

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

1.12 Instruments

.1 Prior to TAB, submit to Departmental Representative list of instruments used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Departmental Representative.

1.13 Action And Informational Submittals

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.14 Preliminary Tab Report

.1 Submit for checking and approval of Departmental Representative, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.15 Tab Report

.1 Format in accordance with referenced standard.

.2 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit 6 copies of TAB Report to Departmental Representative for verification and approval, in English in D-ring binders, complete with index tabs.

1.16 Verification

.1 Reported results subject to verification by Departmental Representative.

.2 Provide personnel and instrumentation to verify up to 30% of reported results.

.3 Number and location of verified results as directed by 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, and ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.18 Completion Of Tab

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

1.19 Air Systems

.1 Standard: TAB to most stringent of this section.

.2 Do TAB of systems, equipment, components, controls specified Division 23 and as follows:

.1 Ventilation system including all inlets and outlets, terminal units, RTU system, and exhaust and supply fans

.2 Test and tag all fire dampers

.3 Ensure all pressure relations between are tested and documented in TAB report.

.3 Qualifications: personnel performing TAB current member in good standing of AABC and NEBB.

.4 Quality assurance: perform TAB under direction of supervisor qualified by AABC and NEBB.

.5 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage, noise, vibration.

.6 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of dampers, filter, coil, humidifier, fan, other equipment causing changes in conditions.

.2 At controllers, controlled device.

.7 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

1.20 Other Tab Requirements

.1 General requirements applicable to work specified this paragraph:

.1 Qualifications of TAB personnel: as for air systems specified this section.

.2 Quality assurance: as for air systems specified this section.

1.21 Post-Occupancy Tab

.1 Participate in systems checks twice during Warranty Period - #1 approximately 3 months after acceptance and #2 within 1 month of termination of Warranty Period.

PART 2 PRODUCTS

2.1 Not Used

.1 Not used.

PART 3 EXECUTION

3.1 Not Used

.1 Not used.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section Includes:

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

1.2 References

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

.1 Material Safety Data Sheets (MSDS).

.2 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)

.1 SMACNA HVAC Air Duct Leakage Test Manual, 1985.

1.3 Action And Informational Submittals

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

.2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties. Include pressure test information and results as follows:

.1 Submit proposed report form and test report format to Departmental Representative for approval at least three months before proposed date of first series of tests. Do not start tests until approval received in writing.

.2 Prepare report of results and submit to Departmental Representative within 24 hours of completion of tests. Include:

.1 Schematic of entire system.

.2 Schematic of section under test showing test site.

.3 Required and achieved static pressures.

.4 Orifice differential pressure at test sites.

.5 Permissible and actual leakage flow rate (L/s) for test sites.

.6 Witnessed certification of results.

.3 Include test reports in final TAB report.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's field reports specified.

PART 2 PRODUCTS

2.1 Test Instruments

.1 Test apparatus to include:

- .1 Fan capable of producing required static pressure.
- .2 Duct section with calibrated orifice plate mounted and accurately located pressure taps.
- .3 Flow measuring instrument compatible with the orifice plate.
- .4 Calibration curves for orifice plates used.
- .5 Flexible duct for connecting to ductwork under test.
- .6 Smoke bombs for visual inspections.

.2 Test apparatus: accurate to within +/- 3 % of flow rate and pressure.

.3 Submit details of test instruments to be used to Departmental Representative at least three months before anticipated start date.

.4 Test instruments: calibrated and certificate of calibration deposited with Departmental Representative no more than 28 days before start of tests.

.5 Re-calibrated every six months thereafter.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Test Procedures

.1 Maximum lengths of ducts to be tested consistent with capacity of test equipment.

.2 Section of duct to be tested to include:

- .1 Fittings, branch ducts, tap-ins.

.3 Repeat tests until specified pressures are attained. Bear costs for repairs and repetition to tests.

.4 Base partial system leakage calculations on SMACNA HVAC Air Duct Leakage Test Manual.

.5 Seal leaks that can be heard or felt, regardless of their contribution to total leakage.

3.3 Site Tolerances

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

.2 Leakage tests on following systems not to exceed specified leakage rates.

- .1 Small duct systems up to 250 Pa: leakage 2%.
- .2 VAV box and duct on downstream side of VAV box: leakage 2%.

.3 Large low pressure duct systems up to 500 Pa: leakage 2%.

.3 Evaluation of test results to use surface area of duct and pressure in duct as basic parameters.

3.4 Testing

.1 Test ducts before installation of insulation or other forms of concealment.

.2 Test after seals have cured.

.3 Test when ambient temperature will not affect effectiveness of seals, and gaskets.

.4 Flexible connections to VAV boxes.

3.5 Cleaning

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Definitions:

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - means "not concealed" as previouslydefined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork,

.2 CRF: Code Rectangular Finish.

.2 Reference Standards:

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc.

.1 ASTM B209M, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).

.2 ASTM C335, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.3 ASTM C411, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.

.4 ASTM C449/C449M, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.5 ASTM C547, Standard Specification for Mineral Fiber Pipe Insulation.

.6 ASTM C553, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.7 ASTM C612, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

.8 ASTM C795, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

.9 ASTM C921, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Green Seal Environmental Standards (GSES)

.1 Standard GS-36, Commercial Adhesives.

.5 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1168, Adhesive and Sealant Applications.

.6 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.7 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

.2 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Description of equipment giving manufacturer's name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

.3 Samples:

.1 Submit for approval: complete assembly of each type of insulation system, insulation, coating, and adhesive proposed.

.2 Mount sample on 12 mm plywood board.

.3 Affix typewritten label beneath sample indicating service.

.4 Manufacturers' Instructions:

.1 Provide manufacture's written duct insulation jointing recommendations and special handling criteria, installation sequence, cleaning procedures.

1.3 Quality Assurance

.1 Qualifications:

.1 Installer: specialist in performing work of this section, and have at least 3 years successful experience in this size and type of project, qualified to standards, member of TIAC.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 Fire And Smoke Rating

.1 To CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 Insulation

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).

.1 Mineral fibre: to ASTM C553.

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

.3 Maximum "k" factor: to ASTM C553.

2.3 Jackets

.1 Canvas:

.1 220 gm/m2 fire resistant cotton, plain weave, to ASTM C921 and ULC listed.

.2 Lagging adhesive: inorganic, water-based fire-resistive lagging adhesive and coating, ULC listed.

.2 Aluminium:

.1 Jacket: To ASTM B209, minimum H-14 temper with heat-laminated moisture barrier liner.

.2 Thickness: 0.50 mm sheet.

.3 Finish: Stucco embossed.

.4 Joining: Longitudinal and circumferential slip joints with 50 mm laps.

.5 Fittings: 0.5 mm thick die-shaped fitting covers with factory-attached protective liner.

.6 Metal jacket banding and mechanical seals: stainless steel, 19 mm wide, 0.5 mm thick at 300 mm spacing.

2.4 Accessories

.1 Vapour retarder lap adhesive:

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

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 Outdoor Vapour Retarder Mastic:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.2 Reinforcing fabric: Fibrous glass, untreated 305 g/m2.

.5 Tape: self-adhesive, aluminum, plain, 50 mm wide minimum.

.6 Contact adhesive: quick-setting

.7 Canvas adhesive: washable.

.8 Tie wire: 1.5 mm stainless steel.

.9 Banding: 19 mm wide, 0.5 mm thick stainless steel.

.10 Fasteners: 14 gauge diameter pins with 30mm diameter or 927 mm2 square clips, pin length to suit thickness of insulation.

PART 3 EXECUTION

3.1 Application

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

3.2 Pre-Installation Requirements

.1 Pressure test ductwork systems complete, witness and certify.

.2 Ensure surfaces are clean, dry, free from foreign material.

3.3 Installation

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturer's instructions and as indicated.

.3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Ensure hangers, and supports are outside vapour retarder jacket.

.5 Hangers and supports in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

.1 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

.6 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 Ductwork Insulation Schedule

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

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts	C-1	yes	50
Round cold and dual temperatire supply air ducts	C-2	yes	50
Rectangular warm air ducts	C-1	no	25
Round warm air ducts	C-1	no	25
Supply, return and exhaust ducts exposed in space being served	none		
Outside air ducts to mixing plenum	C-1	yes	25
Mixing plenums	C-1	[yes]	25
Exhaust duct between dampers and louvres	C-1	[no]	25
Rectangular ducts outside	C-1	special	50
Round ducts outside	C-1	special	50
Acoustically lined ducts	C-1		

.2 Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.1 Finishes: conform to following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed within mechanical room	CRF/1	CRD/2

Indoor, exposed elsewhere	CRF/2	CRD/3
Outdoor, exposed to precipitation	CRF/3	CRD/4
Outdoor, elsewhere	CRF/4	CRD/5

3.5 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 Summary

1.2 References

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).

.1 ASHRAE Handbook – Fundamentals.

.2 American Society for Testing and Materials International (ASTM)

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM A924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.3 Canadian Standards Association (CSA International)

.1 CAN/ULC-S109M, Standard for Flame Tests of Flame-Resistant Fabrics and Films.

.4 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 HVAC Duct Construction Standards - Metal and Flexible.

.2 HVAC Air Duct Leakage Test Manual.

1.3 Shop Drawings And Product Data

.1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Closeout Submittals

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS

2.1 Galvanized Steel

.1 Lock forming quality: to ASTM A653/A653M, G90/Z275 zinc coating, with tolerances to ASTM A924/A924M.

.2 Thickness, fabrication and reinforcement: to SMACNA HVAC Duct Construction Standards.

.3 Joints: to SMACNA HVAC Duct Construction Standards.

□

2.2 Pressure Classification

.1 Pressure Class: to match maximum design external static pressure of fans systems.

2.3 Ductwork

.1 Construction - round and oval.

.1 Ducts: factory fabricated, spiral wound, with matching fittings and specials to SMACNA HVAC Duct Construction Standards.

.2 Transverse joints up to 900 mm: slip type with tape and sealants.

.3 Transverse joints over 900 mm: Vanstone flanges.

.2 Construction - rectangular:

.1 Ducts: factory fabricated to SMACNA HVAC Duct Construction Standards.

.2 Transverse joints: to SMACNA HVAC Duct Construction Standards.

2.4 Fittings

.1 Fabrication: to SMACNA HVAC Duct Construction Standards.

.2 Radiused elbows:

.1 Rectangular: smooth radius. Centreline radius: 1.5 times width of duct.

.2 Round and oval: smooth radius or five-piece (for 90 degrees) and three-piece (for 45 degrees). Centreline radius: 1.5 times duct diameter.

.3 Mitred elbows:

.1 To 750 mm duct height in plane of turn: with single-thickness turning vanes.

.2 Over 750 mm duct height in plane of turn: with double-thickness turning vanes.

.4 Branches:

.1 Rectangular main and branch: connection with 45 degree entry.

.2 Round main and branch: conical connection.

.3 Provide volume control damper in branch duct near connection to main duct.

.5 Transitions:

.1 Diverging: 10 degrees maximum angle each side; 20 degrees maximum included angle for symmetrical fittings.

.2 Converging: 22.5 degrees maximum angle each side; 45 degrees maximum included angle for symmetrical fittings.

.6 Offsets:

.1 Full radiused or mitred elbows: as specified above.

.7 Obstruction deflectors: maintain full cross-sectional area of duct.

.1 Maximum included angles: as for transitions.

□

2.5 Seal Classification

.1 Seal class:

.1 Refer to equipment specifications and schedules and match expected static pressures.

.2 Seal Classification:

.1 Class B: longitudinal seams, transverse joints and connections made airtight with sealant and tape or combination thereof.

.2 Class C: transverse joints and connections made air tight with sealant and tape or combination thereof. Longitudinal seams unsealed.

2.6 Sealant

.1 Sealant: oil resistant, water-based, polymer type flame resistant duct sealant.

.2 Flame spread rating shall not exceed 25 and smoke developed classification shall not exceed 50.

.3 Operational temperature range of minus 32 degree C to plus 93 degree C. Application temperature range of plus 4 degree C to plus 43 degree C.

2.7 Reinforcing Tape

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

.2 Meets the flame-resistance requirements of CAN/ULC-S109M.

2.8 Hangers And Supports

.1 Hangers and Supports:

.1 Hanger configuration, design, and construction: to SMACNA HVAC Duct Construction Standards.

.2 Strap hangers: Maximum rectangular duct size supported by strap hanger: 500 mm on longest side.

.1 Straps of same material as duct but next sheet metal thickness heavier than duct.

.2 Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

.3 Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

.3 Band hangers: of same material as duct but next sheet metal thickness heavier than duct.

.1 Maximum round or oval duct size supported by strap hanger: 500mm diameter.

.4 Trapeze hangers and Riser Supports: ducts over 500 mm diameter or longest side, to SMACNA HVAC Duct Construction Standards.

.1 Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.

.2 Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.

.3 Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

.5 Hangers: galvanized steel angle with galvanized steel rods to SMACNA HVAC Duct Construction Standards.

.6 Upper hanger attachments:

.1 For concrete: manufactured concrete inserts.

.2 For steel joist: manufactured joist clamps.

.3 For steel beams: manufactured beam clamps.

.7 Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

PART 3 EXECUTION

3.1 General

.1 Do work in accordance with SMACNA HVAC Duct Construction Standards unless directed otherwise by Engineer.

.2 First class workmanship is required for fabrication and installation. Submit samples and/or detailed shop drawings of different types of fittings, joints, supports, sealants, etc, when requested by the Engineer.

.3 Locate ductwork approximately as shown on drawings unless otherwise prevented by jobsite conditions. Carefully coordinate duct layouts with other services, particularly where exposed in occupied spaces. Conceal all ductwork unless otherwise directed and approved by the Engineer. Report all layout deviations to the Engineer for approval prior to installation.

.4 Construct ducts in accordance with the dimensions shown on the drawings. Alter the duct dimensions, while maintaining the equivalent round duct diameter, where necessitated by jobsite conditions. Equivalent duct dimensions to be determined using ASHRAE Handbook duct design procedures.

.5 Duct dimension shown on drawings are inside dimensions. If ducts are internally lined or insulated, increase duct size such that clear dimensions after application of lining/insulation are equal to those shown on drawings.

.6 Adjust duct dimensions to suit standard control damper sizes.

.7 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.8 Support risers at each floor penetration. Provide neoprene pads between riser supports and the building structure. On exposed ductwork, provide galvanized angle collars to conceal the above work on both sides of the floor penetration.

.9 Lap all joints in the direction of air flow wherever possible.

.10 Provide a smooth interior surface at all seams and joints.

.11 Provide a straight collar, not less that 300 mm long, at the connection to each diffuser. Where this is not possible provide adjustable multi-blade type flow equalizing grid in the diffuser neck.

3.2 Fittings

.1 Fitting geometry to be in accordance with specifications and drawing details unless otherwise directed and approved by the Engineer.

.2 Provide mitred elbows with turning vanes where jobsite conditions prevent installation of radiused elbows.

3.3 Hangers

.1 Strap and band hangers: install in accordance with SMACNA HVAC Duct Construction Standards.

.2 Angle hangers: install in accordance with SMACNA HVAC Duct Construction Standards, complete with locking nuts and washers.

.3 Hanger spacing: in accordance with SMACNA HVAC Duct Construction Standards.

.4 Do not break continuity of insulation vapour barrier with hangers or rods.

3.4 Sealing And Taping

.1 Apply sealant to outside of joint in accordance with SMACNA HVAC Duct Construction Standards and to manufacturer's recommendations.

.2 Use reinforcing tape on all ducts with seal Class A; ducts with seal Class B or C and a pressure classification in excess of 500 Pa; and for larger gaps.

.3 Bed reinforcing tape in sealant and recoat with minimum of one coat of sealant to manufacturer’s recommendations.

.4 Seal all joints including, but not limited to, at coils, terminal units, grilles and diffusers.

.5 Eliminate all audible noise caused by air leakage.

3.5 Watertight Duct And Drip Pans

.1 Provide watertight duct for:

- .1 Intake and relief air outlets.
  - .1 Ductwork connect from ERV unit to outdoors
- .2 Outside air intakes.
- .3 In supply ducts with humidification distributer, minimum 3 m down stream and 1m upstream of distribution manifold.

□

.4 As directed by Engineer.

.2 Provide watertight evaporative pan below:

.1 Intake and relief air outlets.

.1 Beneath roof hoods for ERV unit

.3 Form bottom of horizontal duct or drip pan without longitudinal seams.

.1 Solder or weld joints of bottom and side sheets.

.2 Seal other joints with duct sealer.

.4 Slope horizontal branch ductwork down towards hoods served.

.1 Slope header ducts down toward risers.

.5 Fit base of riser with 150 mm deep drain sump and 25 mm drain, with deep seal trap and trap primer, discharging to open funnel or hub drain.

.6 Drip pan to be 75 mm wider all around ductwork or equipment served and complete with 75 mm deep drain sump. Elevated drip pans to be provided with 25 mm drain discharging to open funnel or hub drain. Provide sufficient clearance above drip pan to facilitate access and to permit unimpeded airflow to equipment or intake above.

.7 Provide angle iron supports under sumps and drip pans adequate to support weight when full.

.8 Install drip pans level to maximize holding capacity.

.9 Fill sumps and drip pans with water to demonstrate strength, level and waterproof, when requested by Engineer.

3.6 Leakage Tests

.1 Conduct tests in accordance with SMACNA HVAC Duct Leakage Test Manual.

.2 Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.

.3 Coordinate testing requirements with the TAB contractor who will perform leakage tests. Provide temporary caps and make duct modifications required to conduct the tests.

.4 Do leakage tests in sections.

.5 Leakage testing shall include HVAC equipment and terminal units. Where sections include equipment and terminal units, do not perform leakage testing until final connections have been made.

.6 Conduct trial leakage tests to demonstrate workmanship.

.7 Do not install additional ductwork until trial tests have been passed.

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.8 Complete testing before installation of insulation or concealment Work.

.9 Give seven days' advance notice for testing.

END OF SECTION

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PART 1 GENERAL

1.1 References

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [air duct accessories] and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Indicate:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

1.3 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 General

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 Flexible Connections

.1 Frame: galvanized sheet metal frame thick with fabric clenched by means of double locked seams.

.2 Material:

.1 Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at minus 40 degrees C to plus 90 degrees C, density of 1.3 kg/m2.

2.3 Access Doors In Ducts

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:

.1 Up to 300 x 300 mm: two sash locks complete with safety chain.

.2 301 to 450 mm: four sash locks complete with safety chain.

.3 451 to 1000 mm: piano hinge and minimum two sash locks.

.4 Doors over 1000 mm: piano hinge and two handles operable from both sides.

.5 Hold open devices.

.6 300 x 300 mm glass viewing panels.

2.4 Turning Vanes

.1 Factory or shop fabricated double thickness with trailing edge, to recommendations of SMACNA and as indicated.

2.5 Instrument Test

.1 1.6 mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.6 Spin-In Collars

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100 mm.

.3 Minimum distance between metal parts when system in operation: 75 mm.

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.2 Access Doors and Viewing Panels:

.1 Size:

.1 900 x 900 mm for person size entry.

.2 600 x 600 mm for servicing entry.

.3 300 x 300 mm for viewing.

.4 As indicated.

.2 Locations:

.1 Fire and smoke dampers.

.2 Control dampers.

.3 Devices requiring maintenance.

.4 Required by code.

.5 Reheat coils.

.6 Elsewhere as indicated.

.3 Instrument Test Ports:

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Install insulation port extensions as required.

.4 Locations:

.1 For traverse readings:

.1 Ducted inlets to roof and wall exhausters.

.2 Inlets and outlets of other fan systems.

.3 Main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations as approved by Departmental Representative.

.3 At inlet and outlet of coils.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 And as indicated.

.4 Turning Vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Sheet Metal and Air Conditioning National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-[2013].

1.2 Action And Informational Submittals

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

.2 Product Data:

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

1.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 General

.1 Manufacture to SMACNA standards.

2.2 Splitter Dampers

.1 Fabricate from same material as duct but one sheet metal thickness heavier, with appropriate stiffening.

.2 Double thickness construction.

.3 Control rod with locking device and position indicator.

.4 Rod configuration to prevent end from entering duct.

.5 Pivot: piano hinge.

.6 Folded leading edge.

2.3 Single Blade Dampers

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 Inside and outside nylon end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.4 Multi-Bladed Dampers

.1 Factory manufactured of material compatible with duct.

.2 Opposed-blade configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height: 150 mm.

.4 Maximum blade length: 1200 mm. Use multi-sectional dampers for applications exceeding 1200 mm.

.5 Bearings: pin in bronze bushings or self-lubricating nylon.

.6 Linkage: shaft extension to accommodate insulation thickness with locking quadrant.

.7 Channel frame of same material as adjacent duct, complete with angle stop.

.8 Vibration-free operation.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 Dampers: vibration free.

.6 Ensure damper operators are observable and accessible.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 ASTM International

.1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.

1.2 Action And Informational Submittals

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

.2 Product Data:

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

1.3 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for dampers for incorporation into manual.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 Multi-Leaf Dampers

.1 Opposed blade type as indicated.

.2 Structurally formed steel, interlocking blades, complete with extruded vinyl seals, spring stainless steel side seals, structurally formed and welded galvanized steel frame.

.3 Pressure fit self-lubricated bronze bearings.

.4 Linkage: plated steel tie rods, brass pivots and plated steel brackets, complete with plated steel control rod.

.5 Performance:

.1 Leakage: in closed position less than 2% of rated air flow at 250 Pa differential across damper.

.6 Insulated aluminum dampers:

.1 Frames: insulated with extruded polystyrene foam with RSI 0.88.

.2 Blades: constructed from aluminum extrusions with internal hollows insulated with polyurethane or polystyrene foam, RSI 0.88.

2.2 Disc Type Dampers

.1 Frame: insulated brake formed, welded, 1.6 mm thick, galvanized steel to ASTM A653/A653M.

.2 Disc: insulated spin formed, 1.6 mm thick, galvanized steel to ASTM A653/A653M.

.3 Gasket: extruded neoprene, field replaceable, with 10 year warranty.

.4 Bearings: roller self lubricated and sealed.

.5 Operator: compatible with damper, linear stroke operator, spring loaded actuator, zinc-aluminum foundry alloy casting cam follower.

.6 Performance:

.1 Leakage: in closed position less than 0.001% of rated air flow at 250 Pa pressure differential across damper.

2.3 Back Draft Dampers

.1 Automatic gravity operated, multi, aluminum construction with nylon bearings, spring assisted or counterweighted.

2.4 Relief Dampers

.1 Automatic multi-leaf steel dampers with ball bearing centre pivoted and counter-weights.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and manufacturer's instructions.

.3 Seal multiple damper modules with silicon sealant.

.4 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories.

.5 Ensure dampers are observable and accessible.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Air Movement & Control Association International Inc.

.1 AMCA Standard 500-D, Laboratory Methods of Testing Dampers for Rating.

.2 AMCA Standard 511, Certified Ratings Program for Air Control Devices.

.2 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)

.1 ANSI/NFPA 90A, Installation of Air Conditioning and Ventilating Systems.

.2 ANSI/NFPA 80, Standard for Fire Doors and other Opening Protectives

.3 National Fire Protection Association (NFPA)

.1 NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

.4 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S112, Standard Test Method of Fire Test of Fire Damper Assemblies.

.2 CAN/ULC-S112.2, Standard Method of Fire Test of Ceiling Fire Stop Flap Assemblies.

.3 ULC-S505, Standard for Fusible Links for Fire Protection Service.

1.2 Action And Informational Submittals

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

.2 Product Data: Submit manufacturer's instructions, printed product literature and data sheets for specified equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 Closeout Submittals:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 Additional Submittals

.1 Shop drawing submissions shall include the following additional information:

.1 Schedule with the following data (as applicable) for each damper:

.1 Type and model number.

.2 Installed orientation.

.3 Size.

.4 Air flow rate and pressure drop.

.5 Fire resistance rating.

.6 Closure type and temperature rating.

.7 Smoke damper temperature rating and leakage class.

.2 Damper actuator details including mounting, failure position, electrical characteristics and wiring diagrams.

.3 Accessories: including associated electrical data and wiring diagrams.

.4 Manufacturer's installation instructions for each model.

1.5 Maintenance Material Submittals

.1 Extra Materials:

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

.2 Provide:

.1 6 fusible links of each type.

1.6 Certification Of Ratings

.1 Catalogue or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency in adherence to all codes and standards required by the authority having jurisdiction.

1.7 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 Fire Dampers

.1 Fire dampers: listed and bear label of ULC, assemblies fire tested and rated in accordance with CAN/ULC-S112, meet requirements of authorities having jurisdiction.

.2 Classified for dynamic closure against maximum design airflow, at 2000 Pa minimum static pressure differential (across closed damper), for installed configurations and locations on systems where fan does not shut down on fire alarm.

.3 Factory fabricated for fire resistance rating requirement and installation orientation to maintain integrity of fire wall and/or fire separation.

.4 Curtain-type design: steel frame with reinforced corners, steel interlocking blades, sheet steel mounting sleeve (factory or field installed), transitions to suit connecting

ductwork. Galvanized steel construction where connecting ductwork is galvanized, stainless steel construction where connecting ductwork is stainless steel. Provide sealed high pressure construction where duct pressure class exceeds 500 Pa or Class B or C duct seal is specified.

.5 Closure type: fusible link actuated, weighted to close and lock in closed position when released or having stainless steel negator-type spring closing operator for damper in horizontal position with vertical air flow. Generally fusible links to be rated at 74EC for exhaust and recirculation applications, and 100EC on supply air applications. Revise, with Engineer's approval, as required to meet the needs of special locations. Fusible links shall be readily removable by hand to facilitate testing.

.6 Damper types and transition collars to be selected based on the following criteria unless otherwise directed by the Engineer:

.1 Duct pressure class less than or equal to 500 Pa, unsealed or Class C duct seal, and face velocities less than or equal to 15 m/s:

.1 Type A: square and rectangular ductwork with air velocities less than or equal to 5 m/s and aspect ratios of 2:1 or less.

.2 Type B: square and rectangular ductwork with air velocities exceeding 5 m/s or aspect ratios greater than 2:1.

.3 Type R: round ductwork.

.2 Duct pressure class greater than 500 Pa, Class B duct seal, or face velocities exceeding 15 m/s:

.1 Type C: square and rectangular ductwork.

.2 Type CO: flat oval ductwork.

.3 Type CR: round ductwork.

.7 Factory tested for proper operation.

2.2 Smoke Dampers

.1 Smoke dampers: listed and bear label of ULC, assemblies fire tested and rated in accordance with CAN4-S112.1, meet requirements of authorities having jurisdiction, licensed to bear the AMCA seal, assemblies tested and rated in accordance with AMCA Standards 500-D and 511.

.2 Factory fabricated for installation orientation to maintain integrity of smoke separation.

.3 Temperature rating: 177ºC.

.4 Leakage rating: Class I - leakage shall not exceed 40 L/s-m2 at 1000 Pa minimum static pressure differential (across closed damper).

.5 Multi-blade design: steel frame with reinforced corners and low profile head and sill, steel blades, square plated steel axles, bronze sleeve type bearings, flexible stainless steel jamb seals, pressure sensitive silicone blade edge seals, plated steel linkage concealed in frame, factory installed steel mounting sleeve, transition collars to suit connecting ductwork. Galvanized steel construction where connecting ductwork is galvanized, stainless steel construction where connecting ductwork is stainless steel. Frame leakage not to exceed that of connecting ductwork.

.6 Blade style and operation:

.1 Three-V style with parallel blade operation for face velocities less than or equal to 7 m/s, two-position (fully open or fully closed) operation, and where even airflow distribution is not required downstream of open damper.

.2 Airfoil-shaped, double-thickness style with opposed blade operation for face velocities exceeding 7 m/s, modulating operation, ducted outlets, or upstream of system components requiring even airflow distribution.

.7 Actuator: electric, controlled from smoke sensor or smoke detection system, spring return, fail to normally closed position, EEMAC Type 4 enclosure, factory installed on outside of damper mounting sleeve, factory wired to a single junction box for single-point wiring connection. All actuators to be provided by a single manufacturer. Confirm power supply characteristics prior to ordering.

.8 Accessories: package for remote indication of damper position complete with switch box, two 120 V rated micro switches (one closes when the damper is fully open and the other closes when the damper is fully closed), switch box mounting bracket, blade bracket and connecting hardware.

.9 Smoke dampers under 400 mm high shall be oversized by 50 mm (width and height) and provided with Type C enclosures with transition collars to suit connecting duct size to maximize free area.

.10 Factory tested for proper operation.

2.3 Combination Fire/Smoke Dampers

.1 Combination fire/smoke dampers: listed and bear labels of ULC for both fire and smoke dampers, assemblies fire tested and rated in accordance with CAN/ULC-S112 and CAN/ULC-S112.1, meet requirements of authorities having jurisdiction, licensed to bear the AMCA seal, assemblies tested and rated in accordance with AMCA Standards 500-D and 511.

.2 Damper: similar in all respects to smoke dampers specified above and incorporating required fire damper performance and rating.

.3 Combined actuator: electric, similar in all respects to smoke dampers specified above, controlled from smoke sensor or smoke detection system and from fusible link.

.4 Factory tested for proper operation.

2.4 Firestop Flaps

.1 Firestop flaps: listed and bear label of ULC, assemblies fire tested and rated in accordance with CAN4-S112.2, meet requirements of authorities having jurisdiction.

.2 Factory fabricated for fire resistance rating requirement to maintain integrity of fire separation.

.3 Galvanized steel frame and blades, non-asbestos ULC listed insulation and corrosion-resistant pins and hinges.

.4 Flaps to be held open with fusible link conforming to ULC-S505. Generally fusible links to be rated at 74 degrees C on exhaust and recirculation air ducts, and 100 degrees C on supply air ducts. Revise, with Engineer’s approval, as required to meet the needs of special locations. Fusible links shall be readily removable by hand to facilitate testing.

.5 Factory tested for proper operation.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Refer to Architectural drawings for locations and ratings of fire and smoke separations. Provide dampers and firestop flaps of approved types in all duct penetrations of fire and smoke separations.

.2 Review all damper and firestop flap locations and requirements with Engineer early in the project.

.3 Install in accordance with ANSI/NFPA 90A, requirements of authorities having jurisdiction, and in strict accordance with conditions of ULC listing. Maintain integrity of fire and smoke separations.

.4 Install and test in accordance with NFPA 80.

.5 Install break-away joints of approved design on each side of fire separation unless otherwise directed by Engineer.

.6 Coordinate with TAB contractor early in the project. Review locations and access requirements of all dampers and firestop flaps to facilitate testing.

.7 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.8 Provide access door adjacent to each damper.

.9 Coordinate with installer of firestopping. Any firestopping required by local codes or authorities having jurisdiction shall be done in strict accordance with conditions of ULC listing using approved materials. Fire stop in accordance with manufacturer’s installation instructions.

.10 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible for inspection, testing and replacement.

.11 Identify all dampers and firestop flaps clearly and accurately on project record drawings.

3.3 Testing

.1 Test for proper operation of all smoke and fire dampers, sensors, detectors, [___] installed as component parts of air systems specified Division 23.

.2 Test each fire damper by releasing it twice so as to check whether the damper is binding and is operating in accordance with requirements of the authority having jurisdiction. Reset dampers in accordance with manufacture's directions. Resolve all problems and then re-test, until satisfactory result is achieved. Permanently mark all dampers with an identification number which shall also appear on the "as-built" drawings. Submit a test report to the Engineer, listing the following data:

.1 Identification of each fire damper corresponding with the "as-built" drawings.

.2 Test results of each damper, including access problems.

.3 Repair procedures, if any, to each damper if not properly working.

.4 State the date of the check(s).

.5 Name of company and checker(s).

.3 Affix tag to duct adjacent fire and smoke dampers indicating date of test, TAB company name and contact info, technician initials.

.4 Include a complete copy of the written report in each Operating/Maintenance Manual.

.5 Confirm closure of smoke and combination fire/smoke dampers on during fire alarm condition and power failure.

.6 Confirm proper operation of smoke dampers and combination fire smoke dampers according to specified sequences of operation, including manual overrides and safeties.

3.4 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 CSA Group

.1 CSA C22.2 No.46, Electric Air-Heaters.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [duct heaters] and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit product data and include:

.1 Element support details.

.2 Heater: total kW rating, voltage, phase.

.3 Number of stages.

.4 Rating of stage: rating, voltage, phase.

.5 Heater element watt/density and maximum sheath temperature.

.6 Maximum discharge temperature.

.7 Unit support.

.8 Clearance from combustible materials.

.9 Internal components wiring diagrams.

.10 Minimum operating airflow.

.11 Pressure drop operating airflow.

1.3 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 Duct Heaters

.1 Duct heaters: flange type.

.2 Elements:

- .1 Helical coils of nickel chrome alloy resistance wire.
- .2 Finned tubular.
- .3 Incoloy sheathed.

.3 Staging:

- .1 Staged heaters: balanced line current at each stage.
- .2 Each stage: uniform face distribution.

.4 Controls:

- .1 Factory mounted and wired in control box. Use terminal blocks for power and control wiring to thermostat and sail switch.
- .2 Controls mounted in a CSA enclosure and to include:
  - .1 Control transformers.
  - .2 SCR controller.
- .3 Where controls are mounted in heater, exercise care in mounting contactors to minimize switching noise transmission through ductwork.
- .4 High temperature cutout and air proving switch.

.5 Main isolation disconnect switch.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate.
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Make power and control connections to CSA C22.2 No.46.

3.3 Field Quality Control

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

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.4 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 References

.1 American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

.1 ASHRAE 84, Method of Testing Air-to-Air Heat/Energy Exchangers (ANSI approved).

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for energy recovery equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.4 Test Reports:

.1 Catalogued or published ratings: obtained from tests carried out by manufacturer or those ordered from independent testing agency signifying adherence to codes and standards in force.

.2 Provide confirmation of testing.

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

.1 Departmental Representative will make available 1 copy of systems supplier's installation instructions.

1.3 Maintenance Material Submittals

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

.2 Extra Materials:

.1 Furnish list of individual manufacturer's recommended spare parts for equipment include:

.1 Bearings and seals.

.2 Addresses of suppliers.

.2 List of specialized tools necessary for adjusting, repairing or replacing.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan.

PART 2 PRODUCTS

2.1 General

.1 Comply with ASHRAE 84.

2.2 Enthalpy Type Air To Air Heat Exchanger

.1 Refer to schedules.

.2 The energy recovery component shall be of fixed-plate cross-flow construction, with no moving parts.

.3 No condensate drain pans or drains shall be allowed and unit shall be capable of operating in both winter and summer conditions without generating condensate.

.4 The unit case shall be constructed of G90 galvanized, 20-gauge steel, with lapped corners and zinc plated screw fasteners.

.5 Access doors shall provide easy access to blowers, ERV cores, and filters. Doors shall have an airtight compression seal using closed cell foam gaskets. Pressure taps, with captive plugs, shall be provided allowing cross-core pressure measurement allowing for accurate airflow measurement.

.6 Case walls and doors shall be insulated with 1 inch, 4 pound density, foil/scrim faced, high-density fiberglass board insulation, providing a cleanable surface and eliminating the possibility of exposing the fresh air to glass fibers, and with minimum R-value of 4.3 (hr·ft2·°F/BTU).

.7 The ERV cores shall be protected by a MERV-8 rated, 2” nominal, pleated, disposable filter in both airstreams.

.8 Unit shall have single-point power connection and a single-point 24 VAC contactor control connection.

.9 Blower motors shall be Premium Efficiency, EISA compliant for energy efficiency. The blower motors shall be totally enclosed (TEFC) and be shall be supplied with factory installed motor starters. Direct drive models shall be EISA-compliant for energy efficiency with open drip proof design and integral thermal protection.

.10 Blowers shall be quiet running, forward curve type and be either direct drive or belt drive. Belt drive motors shall be provided with adjustable pulleys and motor mounts allowing for blower speed adjustment, proper motor The unit electrical box shall include a factory installed, non-fused disconnect switch and a 24 VAC, Class II transformer/relay package.

.11 Performance characteristics: as scheduled.

.12 Controls:

.1 Interlock ERV with RTU

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 Installation

.1 Install in accordance with manufacturers recommendations.

.2 Support independently of adjacent ductwork with flexible connections.

.3 Install access doors in accordance with Section 23 33 00 - Air Duct Accessories for access to coils, dampers.

.4 Where condensate drain is required, pipe to nearest floor drain by gravity.

.1 If drainage by gravity is not possible, provide condensate lift pump.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

Part 1 General

1.1 Summary

.1 New rooftop to match existing Trane unit as per schedule. Service connections and capacity to same. Existing roof curb to be re-used without the need for transition curbs.

1.2 REFERENCES

.1 American Gas Association (AGA)

.2 American National Standards Institute/Air-Conditioning, Heating and Refrigeration Institute (ANSI/AHRI)

.1 ANSI/AHRI 210/240, Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

.2 ANSI/AHRI 270, Sound Rating of Outdoor Unitary Equipment.

.3 CSA Group

.1 CSA B52, Mechanical Refrigeration Code.

.2 CSA C22.1, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.4 National Fire Protection Association (NFPA)

.1 NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

.5 Underwriters Laboratories (UL)

.1 UL 1995, Standard for Heating and Cooling Equipment.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for outdoor HVAC equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Drawings to indicate project layout and dimensions; indicate:

.1 Equipment, piping, and connections, together with valves, strainers, control assemblies, thermostatic controls, auxiliaries and hardware, and recommended ancillaries which are mounted, wired and piped ready for final connection to building system, its size and recommended bypass connections.

.2 Piping, valves, fitting shipped loose showing final location in assembly.

.3 Control equipment shipped loose, showing final location in assembly.

.4 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, mounting curb details, sizes and location of mounting bolt holes; include mass distribution drawings showing point loads.

.5 Detailed composite wiring diagrams for control systems showing factory installed wiring and equipment on packaged equipment or required for controlling devices of ancillaries, accessories, controllers.

.6 Pump and fan performance curves.

.7 Details of vibration isolation.

.8 Estimate of sound levels to be expected across individual octave bands in dB referred to A rating.

.9 Type of refrigerant used.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.6 Manufacturer's Field Reports:

.1 Submit manufacturer's field reports specified.

1.4 CLOSEOUT SUBMITTALS:

.1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

2.2 Unit(s) furnished and installed shall be gas/electric packaged rooftop (s) as scheduled on contract documents and these specifications. Cooling capacity ratings shall be based on AHRI Standard. Unit(s) shall consist of insulated weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors and unit controls.

2.3 Unit(s) shall be 100% factory run tested and fully charged with R-410A.

2.4 Unit(s) shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.

2.5 Units shall be convertible airflow design as manufactured.

2.6 Wiring internal to the unit shall be colored and numbered for identification.

2.7 UNIT CASING

.1 Cabinet: Galvanized steel, phosphatized, and finished with a pre-applied baked polyurethane enamel. Structural members with access doors and removable panels shall be a minimum 22 gauge.

.2 Unit's cabinet surface shall be tested 672 hours in salt spray test in compliance with ASTM B117.

.3 Cabinet construction shall allow for all service/ maintenance from one side of the unit.

.4 Cabinet top cover shall be one piece construction or where seams exits, it shall be double-hemmed and gasket-sealed.

.5 Access Panels: Water- and air-tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.

.6 Unit's base pan shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.

.7 Provide ½ inch foil faced, fire retardant permanent, odorless glass fiber material. All edges must be captured so that there is no insulation exposed in the air stream.

.8 The base pan shall have no penetrations within the perimeter of the curb other that the raised 1 1/8 inch high down flow supply/return openings to provide and added water integrity precaution.

.9 Provide openings either on side of unit or through the base for power, control, condensate, and gas connections.

.10 The base of the unit shall have 3 sides for forklift provisions. The base of the units shall have rigging/lifting holes for crane maneuvering.

2.8 FANS

.1 Provide evaporator fan section with forward curved, double width, double inlet, centrifugal type fan.

.2 Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.

.3 3 to 5 ton units (high efficiency 3-phase with optional motor) are belt driven, FC centrifugal fans with adjustable motor sheaves. 3 to 5 ton units (standard and high efficiency 3-phase) have multispeed, direct drive motors. All motors shall be thermally protected. All indoor fan motors meet the U.S. Energy Policy Act of 1992 (EPACT).

.4 Outdoor and Indoor Fan shall be permanently lubricated and have internal thermal overload protection.

.5 Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.

.6 Provide shafts constructed of solid hot rolled steel, ground and polished, with key-way, and protectively coated with lubricating oil.

2.9 AIR FILTERS

.1 Air Filters: Factory installed filters shall mount integral within the unit and shall be accessible through access panels. Two-inch thick glass fiber disposable media filters shall be provided.

.2 Two inch MERV 8 and MERV 13 media filters shall be available option.

2.10 GAS HEATER

.1 Completely assembled and factory installed heating system shall be integral to unit, UL or CSA approved specifically for outdoor applications for use downstream from refrigerant cooling coils. Threaded connection with plug or cap provided. Provide capability for gas piping <<CONNECTION>>.

.2 Heating section shall be factory run tested prior to shipment.

.3 Induced draft combustion type with direct spark ignition system, redundant main gas valve, and 2-staged heat (6-10 ton).

.4 Gas Burner Safety Controls: Provide safety controls for the proving of combustion air prior to ignition, and continuous flame supervision. Provide flame rollout switches.

.5 Induced draft blower shall have combustion air proving switches and built-in thermal overload protection on fan motor.

.6 Units shall be suitable for use with natural gas or propane (field-installed kit) and also comply with the California Requirement for low NOx emission (Gas/Electric only).

.7 Through the base gas piping- the units shall include a standard through the base gas provision. This option shall have all piping necessary including black steel, manual gas shut off valve, elbows, and union. The manual shutoff valve shall include a 1/8 NPT pressure tap.

.8 Limit controls: High temperature limit controls will shut off gas flow in the event of excessive temperatures resulting from restricted indoor airflow or loss of indoor airflow.

2.11 EVAPORATOR COIL & SECTION

.1 Microchannel evaporators provide streamlined tubes with small ports, and metallurgical tube-to-fin bond. The Microchannel coil has better heat transfer performance. Compact all-aluminum microchannel coils also help to reduce the unit weight. These all aluminum coils are recyclable, galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection. In addition, flat streamlined tubes also make microchannel coils more dust resistant and easier to clean.

.2 Provide an independent expansion device for each refrigeration circuit. Factory pressure tested at 600 psig and leak tested at 465 psig.

.3 Provide a removable, reversible, cleanable double sloped drain pan for base of evaporator coil constructed of PVC.

2.12 CONDENSER SECTION

.1 Provide vertical discharge, direct drive fans with aluminum blades. Fans shall be statically balanced. Motors shall be permanently lubricated, with integral thermal overload protection in a weather tight casing.

.2 Micro channel coil has flat streamlined tubes with small ports, and metallurgical tube to fin bond. Microchannel coil has better heat transfer performance. Microchannel condenser coil can reduce system refrigerant charge by up to 50% because of smaller internal volume, which reduces the unit weight. These all aluminum coils are recyclable. Galvanic corrosion is also minimized due to all aluminum construction. Strong aluminum brazed structure provides better fin protection and quality. In addition, flat streamlined tubes also make Microchannel coils more dust resistant and easier to clean.

.3 Microchannel condenser coils are standard for all 3 to 10 ton standard efficiency models and 4,5,6, 7½, 8½ ton high efficiency models. The Microchannel type condenser coil is not offered on the 4 and 5 ton dehumidification model.

.4 Provide tool-less factory installed corrosion resistant louvered hail/vandalism guards to protect condenser coils from hail or physical damage.

2.13 REFRIGERATION SYSTEM

.1 All units shall have direct drive hermetic, scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate.

.2 Provide with thermostatic temperature motor winding control for protection against excessive temperatures caused by over/under voltage operation or loss of charge. Also provide high and low pressure switches.

.3 Thermal Expansion valves are standard for all models.

.4 Units shall have cooling capabilities down to 0 degree F as standard with microprocessor controls (40 degrees F with electromechanical controls. For field-installed low ambient accessory, the manufacturer shall provide a factory-authorized service technician that will assure proper installation and operation.

.5 Provide each unit with one refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.

2.14 EXHAUST/RETURN SECTION

.1 Provide barometric relief gravity type dampers to operate in conjunction with economizer to provide exhaust

2.15 OUTDOOR AIR SECTION

.1 Provide economizer with dry bulb control.

.2 Provide adjustable minimum position control located in the economizer section of the unit.

.3 Provide spring return motor for outside air damper closure during unit shut down or power interruption.

.4 Provide Remote Potentiometer for minimum position setting of the economizer

2.16 OPERATING CONTROLS

.1 Provide factory-wired roof top units with 24-volt electro-mechanical control circuit with control transformers, contactors pressure lugs or terminal block for power wiring. Contractor to provide disconnect device. Units shall have single point power connection as standard. Field wiring of zone controls to be NEC Class II.

.2 Economizer Preferred Cooling - Compressor operation is integrated with economizer cycle to allow mechanical cooling when economizer is not adequate to satisfy zone requirements. Compressors are enabled if space temperature is recovering to cooling setpoint at a rate of less than 0.2 degrees per minute. Compressor low ambient lockout overrides this function.

2.17 STAGING CONTROLS

.1 Provide NEC Class II, electronic, adjustable zone control to maintain zone temperature setting.

.2 Provide manual changeover control with (heat-off-cool) temperature controls and fan auto/on switch.

.3 Provide remote temperature sensor capability.

.4 Provide mixed air sensor in supply air to close outside air damper.

2.18 CONTROLS

.1 Single Zone Heat-Cool Unit:

.1 Low voltage, adjustable room thermostat controls to maintain room temperature setting.

.2 Thermostat: include system selector switch heat-cool-off and fan control switch (on-auto).

.3 Automatic changeover thermostat.

.2 Provide 7-day programmable scheduling.

.3 Set fan to run constantly during use.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate.

.2 Inform Consultant of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.2 INSTALLATION

.1 Install as per manufacturers' instructions on roof curbs [provided by manufacturer] [as indicated].

.2 Manufacturer to certify installation, supervise start-up and commission unit.

.3 Run drain line from cooling coil condensate drain pan to discharge [over roof drain].

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Have manufacturer of products supplied under this Section review work involved in handling, installation/application, protection and cleaning of its product, and submit written reports, in acceptable format, to verify compliance of work with Contract.

.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 at stages listed:

.1 After delivery and storage of products, and when preparatory work on which work of this Section depends is complete, but before installation begins.

.2 Twice during progress of work at 25% and 60% complete.

.3 Upon completion of work, after cleaning is carried out.

.2 Obtain reports within 3 days of review and submit immediately to Consultant.

3.4 CLEANING

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

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

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section includes:

.1 Requirements for Halocarbon Management.

1.2 References

.1 Status of Canada 1999 chapter 33: “Canadian Environmental Protection Act 1999:

.1 SOR/2003-289: “Federal Halocarbon Regulations 2003”.

.2 Environmental Code of practice for Eliminations of Fluorocarbon Emissions from Refrigeration and Air conditioning Systems (the Environment Canada “ Refrigeration Code of Practice”, and the Report EPS 1 RA/2 dated March 1996.

1.3 General

.1 Contractors and their personnel shall be familiar with the Section and its requirements.

.2 The Contractor will comply with all Federal, Provincial, and Municipal regulatory requirements and guidelines for environmental protection and natural resources conservation, including the References noted above.

.3 It is the Contractor’s responsibility to be aware of environmental requirements, the best management practices, and pollution control measures necessary to meet them.

1.4 Halocarbons

.1 All work relating to halocarbons to comply with referenced standards outlined above in Paragraph 1.2 – References.

.2 All work related to halocarbon equipment installation, servicing, etc., to be carried out by, or under direct supervision of, a technician licensed by the Province where work is taking place as a refrigeration mechanic.

.3 Technician to provide to DCC Representative:

.1 Copy of Province of Manitoba license.

.2 Certificate issued by the Heating, Refrigeration, and Air Conditioning Institute of Canada; and,

.3 Ozone Depletion Prevention Substance Awareness Card.

.4 The following are the only halocarbons that are acceptable as refrigerants: (non-halocarbon refrigerants are also acceptable)

.1 R-410a

.2 R-407c

□

.5 All work related to halocarbon equipment installation, servicing, decommissioning, leak-testing to be documented.

.6 Immediately report all releases of halocarbons to DCC Representative. Document release on Spill Report form.

.7 Factory-charged halocarbon-containing shall be leak-tested by this Contractor in accordance with the “Refrigeration code of Practice” within one working day after delivery to the site.

.1 No payment for delivery of this equipment to the site will be made until it is documented to be leak-free.

.8 Non-factory-sealed halocarbon-containing equipment shall be leak-tested using “triple evacuation”: evacuate the system to 400 micron or less and break the vacuum with dry nitrogen three times.

.1 No payment for delivery of this equipment to the site will be made until it is documented to be leak-free.

END OF SECTION

□

PART 1 GENERAL

1.1 Related Requirements

.1 This Section covers items common to Sections of Division 26, 27 and 28. These sections supplement requirements of Division 1.

1.2 References

.1 Definitions:

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

.2 Reference Standards:

.1 CSA Group

.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 Action And Informational Submittals

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

.2 Product Data:

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

.3 Submit for review single line electrical diagrams and locate as indicated.

.1 Electrical controls and distribution system.

.4 Submit for review Fire Verification Report.

.5 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.

.2 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.3 Identify on wiring diagrams circuit terminals and indicate internal wiring for each item of equipment and interconnection between each item of equipment.

.4 Indicate of drawings clearances for operation, maintenance, and replacement of operating equipment devices.

.5 If changes are required, notify Departmental Representative and Consultant of these changes before they are made.

.6 Certificates:

.1 Provide CSA certified equipment and materials.

.2 Where CSA certified equipment material are not available, submit such equipment material to authority having jurisdiction or inspection authorities for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative and Consultant.

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

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Print or engrave operating instructions and frame under glass or in approved laminated plastic.

.4 Post instructions where directed.

.5 For operating instructions exposed to weather, provide weather-resistant materials or weatherproof enclosures.

.6 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 Design Requirements

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates for control items in English.

2.2 Materials And Equipment

.1 Provide materials and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Materials and equipment to be CSA certified. Where CSA certified equipment are not available, obtain special approval from authority having jurisdiction or inspection authorities before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 Electric Motors, Equipment And Controls

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

.2 Control wiring and conduit: in accordance with Control Devices except for conduit, wiring and connections below 50 V which are related to control systems specified in mechanical sections or as shown on mechanical drawings.

2.4 Warning Signs

.1 Warning Signs: in accordance with requirements of authority having jurisdiction, inspection authorities and/or Departmental Representative.

Porcelain enamel signs, minimum size 175 x 250 mm.

2.5 Wiring Terminations

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

2.6 Equipment Identification

.1 Identify electrical equipment with labels as follows:

.1 Nameplates: lamacoid 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core mechanically attached with self tapping screws.

.2 Sizes as follows:

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

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on labels to be approved by Departmental Representative and Consultant prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per label.

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

.6 Identify equipment with Size 3 labels engraved "ASSET INVENTORY NO. as directed by Departmental Representative.

.7 Disconnects, starters and contactors: indicate equipment being controlled and voltage.

.8 Terminal cabinets and pull boxes: indicate system and voltage.

.9 Transformers: indicate capacity, primary and secondary voltages.

2.7 Wiring Identification

.1 Identify wiring with permanent indelible identifying markings, numbered, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 Conduit And Cable Identification

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

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15 m intervals.

.3 Colours: 25 mm wide prime colour and [20] mm wide auxiliary colour.

Prime	Auxiliary	
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Telephone	Green	

Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

2.9 Finishes

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

.1 Paint indoor enclosures light gray.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

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

.2 Do overhead and underground systems in accordance with CAN/CSA-C22.3 No.1 except where specified otherwise.

3.3 Nameplates And Labels

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

3.4 Conduit And Cable Installation

.1 Install conduit and sleeves prior to pouring of concrete.

.1 Sleeves through concrete: schedule 40 steel pipe or plastic sized for free passage of conduit, and protruding 50 mm or as indicated.

.2 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.3 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 Location Of Outlets

.1 Locate outlets in accordance with Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.

.3 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.4 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical rooms on latch side of door.

3.6 Mounting Heights

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: 1400 mm.

.2 Wall receptacles:

.1 General: 300 mm.

.2 Above top of continuous baseboard heater: 200 mm.

.3 Above top of counters or counter splash backs: 175 mm.

.4 In mechanical rooms:1400 mm.

.3 Panelboards: as required by Code or as indicated.

.4 Telephone and interphone outlets: 300 mm.

.5 Fire alarm stations: 1200 mm.

.6 Fire alarm bells: 2100 mm.

.7 Door bell pushbuttons: 1500 mm.

3.7 Co-Ordination Of Protective Devices

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

3.8 Field Quality Control

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00 - Quality Control.

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Motors, heaters and associated control equipment including sequenced operation of systems where applicable.

.5 Systems: fire alarm.

.6 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.9 System Startup

.1 Instruct Departmental Representative and operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.10 Cleaning

.1 Progress Cleaning: clean in accordance with building and management guidelines:

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Section 26 05 00.

1.2 References

.1 CSA International

.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors and Aluminum Adapters (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for wire and box connectors and include product characteristics, performance criteria, physical size, finish and limitations.

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect wire and box connectors from [nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 Materials

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to EEMAC 1Y-2 NEMA to consist of:

.1 Connector body and stud clamp for round copper conductors.

.2 Clamp for round copper conductors.

.3 Clamp for ACSR conductors.

.4 Stud clamp bolts.

.5 Bolts for copper conductors.

.6 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, TECK cable, flexible conduit as required to: CAN/CSA-C22.2 No.18.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wire and box connectors installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Remove insulation carefully from ends of conductors and:

.1 Apply coat of zinc joint compound on aluminum conductors prior to installation of connectors.

.2 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.3 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.4 Install bushing stud connectors in accordance with EEMAC 1Y-2/NEMA.

3.3 Cleaning

.1 Progress Cleaning: clean in accordance with general guidelines.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with general guidelines.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specifications for related work.

1.2 References

.1 CSA 22.2 No. 0.3 Test Methods for electrical Wires and Cables

1.3 Product Data

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

PART 2 PRODUCTS

2.1 Building Wires

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE Jacketted.

.3 Copper conductors: size as indicated, with thermoplastic insulation type TWH rated at 600 V.

.4 Neutral supported cable: 1, 2, 3 phase insulated conductors of Copper and one neutral conductor of Copper reinforced, size as indicated. Type: Insulation: Type NSF-2 flame retardant rated 600 V.

2.2 Teck 90 Cable

.1 Cable: in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Conductors:

- .1 Grounding conductor: copper.
- .2 Circuit conductors: copper, size as indicated.

.3 Insulation:

- .1 Ethylene propylene rubber EP.
- .2 Cross-linked polyethylene XLPE.
- .3 Rating: 1000 V.

.4 Inner jacket: polyvinyl chloride material.

.5 Armour: interlocking galvanized steel.

.6 Overall covering: thermoplastic polyvinyl chloride, compliant to applicable Building Code classification for this project.

.7 Fastenings:

- .1 One hole steel straps to secure surface cables 50 mm and smaller. Two hole steel straps for cables larger than 50 mm.
- .2 Channel type supports for two or more cables spaced as per CEC.

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

.8 Connectors:

.1 Watertight approved for TECK cable.

2.3 Armoured Cables

.1 Conductors: insulated, copper size as indicated.

.2 Type: AC90 - lead sheath over cable assembly and under armour.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Type: ACWU90 flame retardant jacket over thermoplastic armour and compliant to applicable Building Code classification for this project.

.5 Connectors: anti short connectors.

2.4 Aluminum Sheathed Cable

.1 Conductors: copper size as indicated.

.2 Insulation: cross linked polyethylene type RA90 rated 600V.

.3 Sheath: aluminum applied to form continuous sheath.

.4 Outer jacket: thermoplastic applied over sheath and to be compliant to applicable Building Code classification for this project.

.5 Fastenings for aluminum sheathed cable:

.1 One hole steel straps to secure surface cables 25 mm and smaller. Two hole steel straps for cables larger than 25 mm. Use aluminum strap only with single conductor cable.

.2 Channel type supports for two or more cables.

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

2.5 Control Cables

.1 Type: LVT: 2 soft annealed copper conductors, sized as indicated:

.1 Insulation: thermoplastic.

.2 Sheath: thermoplastic jacket.

.2 Type: low energy 300 V control cable: solid or stranded (as required) annealed copper conductors sized as indicated LVT: 2 soft annealed copper conductors

.3 Type: 600 V stranded annealed copper conductors, sizes as indicated:

.1 Insulation: TWH butyl rubber insulation type RW90 (x-link)

.2 Shielding: non-magnetic tape conductors.

2.6 Non-Metallic Sheathed Cable

.1 Non-metallic sheathed copper cable type: NMD90XLPE size as indicated.

2.7 VARIABLE FREQUENCY DRIVE CABLE

.1 Cable:

.1 Variable frequency drive cable to CAN/CSA C22.2 No. 131.

.2 Conductors:

.1 Copper power and ground.

.3 Ground conductors:

.1 Three bare ground conductors spaced evenly around circumference of cable (sectored ground).

.4 Insulation:

.1 Cross linked polyethylene, 1000V.

.5 Armour:

.1 Continuous aluminum sheath formed into corrugates seamless heath.

.6 Outer jacket:

.1 PVC, UV resistant.

.7 Fire rating: FT4, HL and AG14.

.8 Connectors:

.1 As for RA90.

.9 Standard of Acceptance: Nexans Drive-RX cable.

PART 3 EXECUTION

3.1 Field Quality Control

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

.2 Perform tests using method appropriate to site conditions and to approval of Departmental Representative and local authority having jurisdiction over installation.

.3 Perform tests before energizing electrical system.

3.2 General Cable Installation

.1 Lay cable in cable trays in accordance with Section 26 05 36 - Cable Trays for Electrical Systems.

.2 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.3 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.4 Conductor length for parallel feeders to be identical.

.5 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.6 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.7 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.8 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 Installation Of Building Wires

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.2 In surface and lighting fixture raceways in accordance with Section 26 09 43.

3.4 Installation Of Teck90 Cable (0 -1000 V)

.1 Group cables wherever possible on channels.

.2 Install cable concealed, securely supported by straps and hangers.

3.5 Installation Of Armoured Cables

.1 Group cables wherever possible on channels.

3.6 Installation Of Aluminum Sheathed Cable

.1 Group cables wherever possible on channels.

3.7 Installation Of Control Cables

.1 Install control cables in conduit.

.2 Ground control cable shield.

3.8 Installation Of Non-Metallic Sheathed Cable

.1 Install cables.

.2 Install straps and box connectors to cables as required.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specifications for related work.

1.2 References

.1 CSA Group

.1 CSA C22.1-12, Canadian Electrical Code, Part 1 (22nd Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.3 Action And Informational Submittals

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

.2 Product Data:

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

.3 Certificates: obtain inspection certificate of compliance covering high voltage stress from Departmental Representative and include it with maintenance manuals.

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect connectors and terminations from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 Connectors And Terminations

.1 Copper long barrel compression connectors to CSA C22.2 No.65 as required sized for conductors.

.2 Contact aid for aluminum cables where applicable.

.3 2, 3, 4 way joint boxes type in accordance with Section 26 05 33 - Raceway and Boxes for Electrical Systems.

.4 2, 3, 4 way junction boxes with respective pothead for conductor cables

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for connectors and terminations installation in accordance with manufacturer's written instructions.

3.2 Installation

.1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 American National Standards Institute /Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE 837-[02], IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding.

.2 CSA International

1.3 Action And Informational Submittals

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

.2 Product Data:

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

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for grounding equipment for incorporation into manual.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect grounding equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 Equipment

.1 Clamps for grounding of conductor: size to electrically conductive underground water pipe.

.2 Copper conductor: minimum 6 m long for each concrete encased electrode, bare, stranded, soft annealed.

.3 Grounding conductors: bare stranded copper, soft annealed.

.4 Insulated grounding conductors: green, copper conductors.

.5 Ground bus: copper, complete with insulated supports, fastenings, connectors.

.6 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 Thermit welded type conductor connectors.

.5 Bonding jumpers, straps.

.6 Pressure wire connectors.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for grounding equipment installation in accordance with manufacturer's written instructions.

.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation General

.1 Install complete permanent, continuous grounding system including, conductors, connectors, accessories. Where EMT is used, run ground wire in conduit.

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

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make buried connections, and connections to conductive water main, electrodes, using copper welding by thermit process.

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

.6 Soldered joints not permitted.

.7 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw. Neatly cleat bonding wire to exterior of flexible conduit.

.8 Install flexible ground straps for bus duct enclosure joints, where such bonding is not inherently provided with equipment.

.9 Avoid loop connections.

.10 Bond single conductor, metallic armoured cables to cabinet at supply end.

.11 Ground secondary service pedestals.

3.3 System And Circuit Grounding

.1 Install system and circuit grounding connections to secondary 120/600 V system.

3.4 Equipment Grounding

.1 Install grounding connections to typical equipment included in, but not necessarily limited to following list. Service equipment, transformers, switchgear, duct systems, frames of motors, motor control centres, starters, control panels, building steel work, generators, distribution panels, cable trays.

3.5 Grounding Bus

.1 Ground items of electrical equipment in electrical room and IT equipment in communication equipment room to ground bus with individual bare stranded copper connections size 2/0AWG.

3.6 Communication Systems

.1 Install grounding connections for sound, fire alarm, security systems, intercommunication systems as follows:

.1 Sound, fire alarm, security systems, intercommunication systems as indicated.

.2 Make connections to pipes on building side of main valves and tanks. Connect jumpers across boilers to supply and return hot water heating pipes.

3.7 Field Quality Control

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for 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 electrical system.

.4 Disconnect ground fault indicator during tests.

3.8 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

PART 2 PRODUCTS

2.1 Support Channels

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

PART 3 EXECUTION

3.1 Installation

.1 Secure equipment to solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Secure equipment to hollow masonry walls or suspended ceilings with toggle bolts.

.4 Secure surface mounted equipment with twist clip fasteners to inverted T bar ceilings. Ensure that T bars are adequately supported to carry weight of equipment specified before installation.

.5 Support equipment, conduit or cables using clips, spring loaded bolts, cable clamps designed as accessories to basic channel members.

.6 Fasten exposed conduit or cables to building construction or support system using straps.

- .1 One-hole steel straps to secure surface conduits and cables 50 mm and smaller.
- .2 Two-hole steel straps for conduits and cables larger than 50 mm.
- .3 Beam clamps to secure conduit to exposed steel work.

.7 Suspended support systems.

- .1 Support individual cable or conduit runs with 6 mm dia threaded rods and spring clips.
- .2 Support 2 or more cables or conduits on channels supported by 6 mm dia threaded rod hangers where direct fastening to building construction is impractical.

.8 For surface mounting of two or more conduits use channels.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Departmental Representative

.13 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, 20th Edition.

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.

.1 Provide drawings stamped and signed by professional engineer registered or licensed in the Province of Manitoba, Canada.

PART 2 PRODUCTS

2.1 Junction And Pull Boxes

.1 Construction: welded steel enclosure.

.2 Covers Flush Mounted: 25 mm minimum extension all around.

.3 Covers Surface Mounted: screw-on turned edge covers.

2.2 Cabinets

.1 Construction: welded sheet steel hinged door, handle, lock 2 keys and catch

.2 Type E Empty: surface return flange mounting as indicated.

.3 Type T Terminal: surface return flange mounting containing sheet steel 19 mm plywood backboard.

PART 3 EXECUTION

3.1 Junction, Pull Boxes And Cabinets Installation

.1 Install pull boxes in inconspicuous but accessible locations.

.2 Mount cabinets with top not higher than 2 m above finished floor except where indicated otherwise.

.3 Install terminal block as indicated in Type T cabinets.

.4 Only main junction and pull boxes are indicated. Install additional pull boxes as required by CSA C22.1.

3.2 Identification

.1 Equipment Identification: to Section 26 05 00 - Common Work Results for Electrical.

.2 Identification Labels: size 2 indicating system name voltage and phase or as indicated.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-12, Canadian Electrical Code, Part 1, 20th Edition.

1.3 Action And Informational Submittals

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

.2 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.

1.4 Delivery, Storage And Handling

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

PART 2 PRODUCTS

2.1 Outlet And Conduit Boxes General

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 347 V outlet boxes for 347 V switching devices.

.6 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 Galvanized Steel Outlet Boxes

.1 One-piece electro-galvanized construction.

.2 Single and multi gang flush device boxes for flush installation, minimum size 76 x 50 x 38 mm or as indicated. 102 mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.

.3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48 mm.

.4 102 mm square or octagonal outlet boxes for lighting fixture outlets.

.5 Extension and plaster rings for flush mounting devices in finished walls.

2.3 Masonry Boxes

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls.

2.4 Concrete Boxes

.1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for [16, 21 and 27] mm conduit. Minimum size: 73 mm deep.

2.5 Conduit Boxes

.1 Cast FS, FD aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.6 Outlet Boxes For Non-Metallic Sheathed Cable

.1 Electro-galvanized, sectional, screw ganging steel boxes, minimum size 76 x 50 x 63 mm with two double clamps to take non-metallic sheathed cables.

2.7 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.

2.8 Service Fittings

.1 'High tension' receptacle fitting made of 2 piece die-cast aluminum with housing finish for 1 single 1 duplex two duplex receptacles. Bottom plate with two knockouts for centered or offset installation. 12 x 102 mm extension piece as indicated.

PART 3 EXECUTION

3.1 Installation

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 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, armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18, Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45, Rigid Metal Conduit.

.3 CSA C22.2 No. 56, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83, Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-[M1984(R2003)], Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3-[05], Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.3 Action And Informational Submittals

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

PART 2 PRODUCTS

2.1 Conduits

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel or hot dipped rigid galvanized steel threaded.

.2 Epoxy coated conduit: to CSA C22.2 No. 45, with zinc coating and corrosion resistant epoxy finish inside and outside.

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

.4 Rigid pvc conduit: to CSA C22.2 No. 211.2.

.5 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

.6 FRE conduit

.7 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal steel.

.8 Flexible pvc conduit: to CAN/CSA-C22.2 No. 227.3

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 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits.

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

2.3 Conduit Fittings

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

2.4 Expansion Fittings For Rigid Conduit

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.5 Fish Cord

.1 Polypropylene.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

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

.2 Conceal conduits except in mechanical and electrical service rooms.

.3 Surface mount conduits in existing walls.

.4 Use rigid galvanized steel threaded conduit except where specified otherwise.

.5 Use epoxy coated conduit in corrosive areas.

.6 Use electrical metallic tubing (EMT) except in cast concrete above 2.4 m not subject to mechanical injury.

.7 Use rigid pvc conduit in corrosive areas.

.8 Use flexible metal conduit for connection to motors in dry areas, connection to recessed incandescent fixtures without prewired outlet box, connection to surface or recessed fluorescent fixtures or work in movable metal partitions.

.9 Use liquid tight flexible metal conduit for connection to motors or vibrating equipment in damp, wet or corrosive locations.

.10 Minimum conduit size for lighting and power circuits: 21 mm.

.11 Install EMT conduit from computer room branch circuit panel to outlet boxes.

.12 Bend conduit cold:

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

.13 Mechanically bend steel conduit over 19 mm diameter.

.14 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.15 Install fish cord in empty conduits.

.16 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.17 Dry conduits out before installing wire.

3.3 Surface Conduits

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended or surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 Concealed Conduits

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.1 No.126.1-02, Metal Cable Tray Systems.

.2 CAN/CSA C22.1 No.126.2-02, Non Metallic Cable Tray Systems.

.2 National Electrical Manufacturers Association (NEMA)

.1 NEMA FG 1-1993, Fibreglass and Cable Tray Systems.

.2 NEMA VE 1-2002, Metal Cable Tray Systems.

.3 NEMA VE 2-2001, Cable Tray Installation Guidelines.

1.3 Action And Informational Submittals

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

.2 Product Data: submit manufacturer's product data sheets for cable tray indicating dimensions, materials, and finishes, including classifications and certifications.

.3 Shop Drawings: submit shop drawings showing materials, finish, dimensions, accessories, layout, and installation details.

.4 Identify types of cabletroughs used.

.5 Show actual cabletrough installation details and suspension system.

PART 2 PRODUCTS

2.1 Cabletrough

.1 Cabletroughs and fittings: to CAN/CSA C22.1 No. 126.1

.2 Trays: extruded aluminum 150, 300, 450, 600, 750 mm wide as required with depth of 150 mm.

.3 Fittings: horizontal elbows, end plates, drop outs, vertical risers and drops, tees, wyes, expansion joints and reducers where required, manufactured accessories for cabletrough supplied.

.1 Radii on fittings: to meet CEC.

.4 Solid covers for complete cabletrough system including fittings.

.5 Barriers where different voltage systems are in same cabletrough.

.6 Ground cable trays with #2 AWG bare copper conductor attached to each tray section in accordance with CEC requirements.

.7 Provide fire stop material at firewall penetrations.

2.2 Supports

.1 Provide splices, supports for a continuously grounded system as required.

PART 3 EXECUTION

3.1 Installation

.1 Install complete cabletrough system in accordance with NEMA VE 2.

.2 Support cabletrough on both sides.

.3 Remove sharp burrs or projections to prevent damage to cables or injury to personnel.

3.2 Cables In Cabletrough

.1 Install cables individually.

.2 Lay cables into cabletrough. Use rollers when necessary to pull cables.

.3 Secure cables in cabletrough at 6 m centres, with nylon ties.

.4 Identify cables every 30 m with size 2 nameplates.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No. 100-04, Motors and Generators.

.2 CSA C22.2 No. 145-M1986 (R2004), Motors and Generators for Use in Hazardous Locations.

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC M1-7-1992, Standard for Motors and Generators.

1.3 Action And Informational Submittals

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

.2 Shop drawings:

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

.2 Indicate dimensions, recommended installation procedure, wiring diagrams, sizes and location of mounting bolt holes and recommended support method.

.3 Quality Assurance Submittals:

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions.

.4 Closeout Submittals:

.1 Provide maintenance data for fractional horsepower motors for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

PART 2 PRODUCTS

2.1 Fractional Horsepower Motor

.1 Non-hazardous locations: to CSA C22.2 No. 100, EEMAC M1-7.

.2 Motor with inherent overheating protectors.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Install wiring, flexible connections and grounding.

.2 Check rotation before coupling to driven equipment.

3.3 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 Summary

.1 Section Includes:

.1 Materials and installation for low voltage control system designed to provide remote switching of lighting loads by use of:

.1 Low voltage momentary contact switches.

.2 Manual switch control.

.2 Sustainable requirements for construction and verification.

.2 Related Requirements

.1 Section 26 09 43.

1.2 References

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

.1 Material Safety Data Sheets (MSDS).

1.3 Action And Informational Submittals

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 - Submittal Procedures. Include product characteristics, performance criteria, and limitations.

.2 Shop Drawings:

.1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in the Province of Manitoba, Canada.

.3 Closeout Submittals:

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

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

.1 Test reports:

.1 Submit certified test reports indicating compliance with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

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

.4 Manufacturer's Field Reports: manufacturer's field reports specified.

1.4 Quality Assurance

.1 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - 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 61 00 - Common Product Requirements.

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

PART 2 PRODUCTS

2.1 Materials

.1 Control system: by one manufacturer and assembled from compatible components.

2.2 Remote Control Switches

.1 Single pole, double throw, momentary contact, heavy duty, rated 20A, 25 V, double push-button action with pilot lights.

2.3 Low Voltage Relays

.1 Electrically operated by momentary impulse, mechanically latched until activated.

.2 Two coil solenoid type with one coil to close relay contacts and one coil to open relay contacts.

.3 Operating voltage: 24 V, AC.

.4 Load contacts: 20 A, 120 V, AC.

.5 Auxiliary contacts for pilot light.

.6 Coloured pre-stripped leads.

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 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.

3.3 Field Quality Control

.1 Site Tests:

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

.2 Actuate control units in presence of Departmental Representative to demonstrate lighting circuits are controlled as designated.

.3 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.4 Verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification, include:

.1 Materials and resources.

.2 Storage and collection of recyclables.

.3 Construction waste management.

.4 Resource reuse.

.5 Recycled content.

.6 Local/regional materials.

.7 Low-emitting materials.

3.4 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

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

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Section 26 05 00.

1.2 References

.1 CSA International

.1 CSA C22.2 No.42-[10], General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55-M1986(R2008), Special Use Switches.

.4 CSA C22.2 No.111-10, General-Use Snap Switches (Bi-national standard, with UL 20).

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for [wiring devices] and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

.1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 Switches

.1 20 A, 120 V, single pole, three-way where indicated switches to: CSA C22.2 No.55 CSA C22.2 No.111.

.2 Manually-operated general purpose AC switches with following features:

- .1 Terminal holes approved for No. 10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine moulding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 Ivory toggle.

.3 Switches of one manufacturer throughout project.

2.2 Receptacles

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:

- .1 Ivory urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Triple wipe contacts and rivetted grounding contacts.

.2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:

- .1 Ivory urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Four back wired entrances, 2 side wiring screws.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

2.3 Special Wiring Devices

.1 Special wiring devices:

- .1 Pilot lights as indicated, with neon type 0.04 W, 125 V lamp and red plastic lense flush type.

2.4 Cover Plates

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Stainless steel, 1 mm thick cover plates cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

.4 Cast cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes.

.5 Weatherproof double lift spring-loaded cast aluminum cover plates, complete with gaskets for duplex receptacles as indicated.

.6 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for single receptacles or switches.

2.5 Source Quality Control

.1 Cover plates from one manufacturer throughout project.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for wiring devices installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform [Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height in accordance with Section 26 05 00 - Common Work Results for Electrical.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Install GFI type receptacles as indicated.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 Protection

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

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Section 26 05 00.

1.2 References

.1 American National Standards Institute (ANSI)

.1 ANSI C82.1-04, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.

.2 American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE)

.1 ANSI/IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.3 ASTM International Inc.

.1 ASTM F1137-00(2006), Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.4 Canadian Standards Association (CSA International)

.5 ICES-005-07, Radio Frequency Lighting Devices.

.6 Underwriters' Laboratories of Canada (ULC)

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires, for approval by Departmental Representative.

.3 Samples:

.1 Provide samples when indicated.

.4 Quality assurance submittals: provide following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence and cleaning procedures.

1.4 Delivery, Storage And Handling

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

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

PART 2 PRODUCTS

2.1 Lamps

LED Linear

.1 LEDs provide 83 CRI at 4000 K or 4100 K.

.2 Lumen output ranges from 2100 to 6000 lumens. Beam angle is 110 FWHM (full width at half maximum).

.3 Lumen output up to 1,300 lumens per foot. In 86°F (30°C) ambient environments, L70 is predicted to be 100,000+ hours, L85 at 44,000 hours.

LED downlight:

.4 LAMP: LED: Monochromatic LED to 64 watts.

.5 VOLTAGE: MVOLT

.6 REFLECTORS: Precision formed single piece aluminum reflector with Alanod MIRO® finish to meet beam spread requirements.

.7 LENS: Flat tempered glass for maximum resistance to impact.

.8 GLARE CONTROL: Internal glare control and external glare control available.

2.2 Drivers

.1 LED Drivers

.2 Reliable and consistent operation

.3 High efficiency >90%

.4 Greater than 0.9 PF and Less than 20% THD

.5 Greater that 50,000 hrs life time

.6 5-year limited warranty

.7 ROHS compliance

.8 Safety approbations (UL, CSA, CE, ENEC,

.9 PSE, SELV or CQC)

.10 Dimmable and Programmable.

.11 Designed to meet the needs of LED lighting

.12 Available in either dedicated input voltage or Intellivolt options

.13 Dimmable

.14 The Adjustable Output Current (AOC) feature

.15 Specific dimmable versions to enable use of lighting controls to help increase energy saving through a wide variety of protocols, such as 0-10V

2.3 Finishes

.1 Light fixture finish and construction to meet ULC listings and CSA certifications related to intended installation.

2.4 Luminaires

.1 As indicated in luminaire schedule.

PART 3 EXECUTION

3.1 Installation

.1 Locate and install luminaires as indicated.

.2 Provide adequate support to suit ceiling system.

3.2 Wiring

.1 Connect luminaires to lighting circuits:

.1 Install flexible or rigid conduit for luminaires as indicated.

3.3 Luminaire Supports

.1 For suspended ceiling installations support luminaires independently of ceiling support luminaires from ceiling grid in accordance with local inspection requirements.

3.4 Luminaire Alignment

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.5 Cleaning

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Section 26 05 00.

1.2 References

.1 CSA International

.1 CSA C22.2 No.141-10, Emergency Lighting Equipment.

1.3 Action And Informational Submittals

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

.2 Product Data:

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

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for emergency lighting for incorporation into manual.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect emergency lighting from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 Warranty

.1 Emergency Lighting, 12 months warranty period is extended to 120 months.

PART 2 PRODUCTS

2.1 Equipment

.1 Supply voltage: 120/347 V, AC.

.2 Output voltage: 120 V DC.

.3 Operating time: 60 minutes.

.4 Emergency and specialty lighting products for LED and Fluorescent lighting.

.5 CSA Certified emergency “built-in within luminaires” drivers and ballasts to provide instant backup lighting when normal power fails.

.6 Generator-compatible products.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for emergency lighting installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative. Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Install unit equipment and remote mounted fixtures.

.2 Direct heads.

.3 Connect exit lights to unit equipment.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.4 Protection

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

.2 Repair damage to adjacent materials caused by emergency lighting installation.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.141-02, Unit Equipment for Emergency Lighting.

.2 CSA C860-01(December 2002), Performance of Internally-Lighted Exit Signs.

.2 National Fire Protection Association (NFPA)

.1 NFPA 101-2006, Life Safety Code.

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

PART 2 PRODUCTS

2.1 Standard Units

.1 Exit lights: to CSA C22.2 No.141 and CSA C860.

.2 Housing: Fully Gasketted Polymeric enclosure

.3 Face plates: Heavy Duty Vandal resistant polycarbonate

.4 Lamps: 2.5W LED

.5 Green pictogram type.

PART 3 EXECUTION

3.1 Manufacturer's Instructions

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

3.2 Installation

.1 Install exit lights to manufacturer's recommendations, listing requirements, NFPA standard and local regulatory requirements.

.2 Connect fixtures to exit light circuits.

.3 Connect emergency lamp sockets to emergency circuits.

.4 Ensure that exit light circuit breaker is locked in on position.

3.3 Cleaning

.1 Proceed in accordance with Section 01 74 11 - Cleaning.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 American National Standards Institute

.1 ANSI J-STD-607-A-(2002), Joint Standard - Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

.2 Telecommunications Industries Association (TIA)/Electronic Industries Alliance (EIA)

.1 TIA/EIA-606B-(2012), Administration Standard for Telecommunications Infrastructure.

.2 TIA-607-C (2015), Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

.3 U.S. Department of Labor/Occupational Safety and Health Administration (OSHA)

.1 Nationally Recognized Testing Laboratory (NRTL).

1.2 System Description

.1 Telecommunications grounding and bonding system consist of grounding busbars, bonding backbones, and other bonding conductors.

.2 Provides ground reference for telecommunications systems within building and bonding to it of telecommunications rooms.

.3 Metallic pathways, cable shields, conductors, and hardware within telecommunications spaces are bonded to telecommunications grounding and bonding system.

1.3 Definitions

.1 PBB (Primary Bonding Busbar). A Copper Ground reference busbar, typically installed in the entrance facility or entrance room, and is bonded to the service equipment ground (power) ground by the interconnecting bonding conductor.

.2 BBC (Backbone Bonding Conductor). The Conductor that interconnects elements of the Telecommunications Grounding Infrastructure.

.3 SBB (Secondary Bonding Busbar). A Copper Ground Reference Busbar, typically installed in Telecommunications Rooms(TR) and is bonded to the PBB by the TBB. The SBB references metallic entities in the TR space to ground.

.4 TBB (Telecommunications Bonding Backbone) An insulated copper conductor that interconnects the PBB to SBB's.

.5 TBC (Telecommunications Bonding Conductor): A conductor that interconnects the telecommunications bonding infrastructure to the buildings service equipment ground.

.6 TEBC (Telecommunications Equipment Bonding Conductor) A insulated copper conductor that bonds metallic items and equipment to the PBB and SBB.

.7 RBC (Raceway Bonding Conductor) A insulated copper conductor that provided a separate bond for the Cable tray System.

.8 RBB's (Rack Grounding Busbars) A copper ground reference ground installed horizontal or vertical on the rack with a minimum cross-sectional area equivalent to #6AWG.

1.4 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.5 Delivery, Storage And Handling

.1 Waste Management and Disposal:

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

PART 2 PRODUCTS

2.1 Secondary Bonding Busbar (SBB)

.1 Predrilled copper busbar, approved, listed by NRTL, electro plated with holes 8 mm diameter for use with standard-sized lugs to: ANSI J-STD-607-A.

.2 Shall be sized accordance with the immediate connection requirements with a minimum of 4 extra sets of holes.

.3 Shall be a minimum size of 6mm thick, 53mm high and variable in length.

.4 Shall include Insulated supports with a minimum of 50mm separation from mount.

.5 Shall be listed by a nationally recognized testing laboratory.

.6 Acceptable Products: Cable-Talk CT-BIBB 2X10-12, Panduit GB2B0306TPI-1, Erico SBB-A14L06PT

2.2 Telecommunications Bonding Conductor (TBC)

.1 #6 AWG stranded insulated copper conductor, sheath colour green, Plenum rated marked to: ANSI J-STD-607-A.

2.3 Bonding Conductor Terminations

.1 Two-Hole compression lugs, long barrel type, sized as per AWG of cable.

.2 High conductivity wrought copper.

.3 Electro tin plated

.4 Hole spacing as per PBB and SBB.

2.4 Bonding And Grounding Clamps

.1 All ground wires originating at the PBB or SBB shall be clamped to the plywood backboard "B" ground wire clamps.

.2 Shall be mechanically galvanized ASTM B695

.3 7/32 hole diameter

2.5 Cable Tray Bonding Clamps

.1 Shall be constructed of malleable iron

.2 Zinc plated

.3 Shall allow for clamping of ground wire of multiple gauges.

2.6 Warning Labels

.1 Non-metallic warning labels in English and French to: ANSI J-STD-607-A.

.2 Identify labels with wording "If this connector is loose or must be removed, please call the building telecommunications manager".

PART 3 EXECUTION

3.1 Secondary Bonding Busbar (SBB)

.1 Install SBB in existing Electrical Mechanical room.

.2 Install #6 AWG copper BBC from existing main electrical grounding busbar in existing main electrical room to new SBB.

.3 Install #6 AWG copper bonding conductor from SBB to new equipment rack in .

.4 Use approved 2 hole compression lugs for connection to SBB.

3.2 Bonding Conductors General

.1 When placed in ferrous metallic conduit or EMT longer than 1 m, bond to each end of conduit or EMT using grounding bushing with 6 AWG copper conductor.

3.3 Bonding Conductor For Telecommunications

.1 Install bonding conductor for telecommunications from SBB to service equipment (power) ground.

.2 Use approved 2 hole compression lugs for connection to SBB.

3.4 Telecommunications Bonding Backbone (TBB)

.1 Install TBBs from existing SBB in room 4120 to SBB in room 483 as indicated.

.2 Use approved 2 hole compression lugs for connection to PBB and SBBs.

3.5 Backbone Bonding Conductor (BBC)

.1 Install BBC between SBBs in multi-storey building by bonding SBBs with BBC on top floor and every third floor in between top and bottom floors.

3.6 Bonding To SBB

.1 Bond metallic raceways in Server room 483 to SBB using #6 AWG green insulated copper conductor.

.2 For cables within Server equipment room having shield or metallic member, bond shield or metallic member to SBB using #6 AWG green insulated copper conductor.

.3 Bond equipment rack and cabinet located in Server equipment room to SBB using #6 AWG green insulated copper conductor.

3.7 Labelling

.1 Apply warning labels to telecommunications bonding and grounding conductors.

.2 Apply additional administrative labels to: TIA/EIA-606B.

END OF SECTION

PART 1 GENERAL

1.1 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Reduction Workplan and Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75 % of construction wastes were recycled or salvaged.

1.2 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect communication raceway systems from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, packaging materials, crates, padding, as specified in Waste Reduction Workplan and Construction Waste Management Plan in accordance with 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 System Description

.1 Telecommunications and Security raceways system consists of outlet boxes, cover plates, conduits, pull boxes, sleeves and caps, fish wires, fittings and etc.

2.2 Material

2.3 Hangers And Supports For Communications Systems

.1 Hangers and Supports

.1 Conduits entering a room shall be appropriately racked on a trapeze support suspended from the structure.

.2 Conduits shall be independently supported, free from any other mechanical system.

.3 Conduit support systems shall be securely and adequately installed to preclude movement of conduit and cable tray during pulling operations.

.4 J-hooks are not authorized for Telecommunications and security Distribution.

2.4 Conduit, Pull Boxes And Outlet Boxes For Communications Systems

.1 Metallic Conduit

.1 EMT, reamed and bushed at both ends.

.2 Minimum Size for Telecommunications is 27mm outside diameter.

.3 Minimum Size for Access Control 21mm outside diameter.

.4 Minimum Size for Intrusion Alarm system 21mm outside diameter.

.5 Minimum Size for Video Surveillance system 21mm outside diameter.

.6 Installed above ceilings, in crawl space and in walls only, not acceptable for concrete in floor use.

.2 PVC Conduit

.1 Is not acceptable.

.3 Flexible Metal Conduit

.1 Not acceptable.

.4 Pull Boxes

.1 Shall be made of code gauge steel and shall have a rust resistant finish.

.2 Shall be constructed in accordance with Canadian Standards Association.

.3 Shall be sized in accordance with charts as identified on the drawings.

.5 Outlet Boxes for Telecommunications systems

.1 Double gang, minimum 100mm x 100mm x 65mm deep and flush mounted in all areas.

.2 Outlet boxes shall be installed in locations identified The outlet box shall be installed at 400mm AFF or at the same height and within 300mm of the adjacent electrical duplex receptacles, unless otherwise noted on the building plans. Wherever possible, the face of the plaster ring should be installed flush with the finished wall.

.3 Back to back outlet boxes shall not be used.

.4 Outlet boxes must be equipped with a plaster ring to accommodate the installation of telecommunication face plates.

.5 Plaster rings will be specified as single gang.

.6 Plaster rings or raised adapter plates shall not reduce the size of the outlet.,

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communication raceway systems installation in accordance with manufacturer's written instructions.

- .1 Visually inspect substrate in presence of Departmental Representative
- .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
- .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Install empty raceway system, including underfloor, overhead distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves and caps, cable tray, service poles, miscellaneous and positioning material to constitute complete system.

3.3 General Installation Requirements

.1 Install all systems as per the CEC and manufacturers recommended installation procedures.

.2 Ground and bond all conduits and cable tray in accordance with section 27 05 26.

.3 Provide separate conduit/cable tray system for all Telecommunications Systems.

.4 Provide the following separation from Electrical Power systems installed in conduits:

- .1 50mm from circuits of 300Volt and less.
- .2 600mm from circuits 300Volt and higher.
- .3 2 Metres from Circuits between 600V and 15KV.
- .4 3 Metres for circuits above 15KV.
- .5 300mm clear above cable trays.
- .6 Electrical systems cannot share the same cable tray.
- .7 150 mm below cable trays.

.5 Heights of Communications system Outlet Boxes:

- .1 Cell Alarm button 1400 mm AFF
- .2 Voice Data outlet 400mm AFF unless otherwise noted
- .3 Alarm Keypad 1400mm AFF
- .4 Motion Sensor 2400mm AFF
- .5 Video Surveillance camera dome type wall mounted 2400mm AFF

3.4 Installation Of Hangers And Supports For Communications Systems.

.1 Conduits and equipment shall be independently supported, free from any other mechanical system.

.2 Conduit support systems shall be securely and adequately installed to preclude movement of conduit and cable tray during pulling operations.

.3 Telecommunications outlet boxes shall not be placed back to back with another telecommunications outlet box or any other box.

.4 Maximum Height for installed telecommunications systems is 11ft.

.5 Only Communications system can be attached to the trapeze supports of the cable tray.

.6 Power or mechanical controls shall not be attached to Telecommunications Racking.

3.5 Installation Of Conduit, Pull Boxes And Outlet Boxes For Communications Systems.

.1 Conduit Installation Requirements

- .1 All Communications systems shall be installed in conduit or cable tray unless otherwise indicated.
- .2 The inside radius of a bend in conduit shall be not less than 10 times the internal diameter of the conduit.
- .3 All Conduits shall be identified and labelled at both ends. Tags shall identify start and finish of conduit.
- .4 A Maximum of one Telecommunications outlet per 27mm conduit run.
- .5 Back to back or offset outlets shall not be used.
- .6 All Conduits shall originate in the Telecommunications room, pull box or cable tray.
- .7 Conduits shall be rigidly and adequately fastened to withstand pulling tensions as per manufacturer's recommendations.
- .8 Conduits must follow building lines.
- .9 90-degree LB,LL,LR, or condulets shall not be used in any instance for telecommunications cabling.
- .10 A pull box shall be installed in conduit runs where:
  - .1 The length of conduit is over 30 metres
  - .2 There are more than two 90-degree bends
- .11 Offsets or kicks are to be considered 90 degree bend for telecommunications
- .12 Conduits protruding through the floor shall be terminated 25-50 mm(1-2") above the finished floor.
- .13 Riser sleeves protruding through the floor shall be terminated 25-75mm(1-2") above the finished floor, including sleeve and bonding bushing.
- .14 Conduits entering and exiting through the ceiling of a Telecommunications Room (TR) shall protrude into the room 25-50mm (1-2") above the 2400mm (8ft) level.

.15 All zone conduits entering a TR (unless otherwise stipulated will protrude into the TR from 25-50 mm (1-2") without a bend.

.16 The maximum fill rate authorized for conduits is 40 percent.

.17 Pull boxes shall not be installed higher than 11 ft above finished floor. Acceptance of this deviation is on a case by case basis.

.18 Telecommunications conduits shall NEVER be run over:

.1 Boilers

.2 Incinerators

.3 Hot Water lines

.4 Steam lines

.5 Electrical rooms and Closets

.6 Washrooms

.19 All Conduits shall be bonded in accordance with section 27 05 26 and the CEC.

.20 All Conduits shall use the trapeze hanger method to support the conduits, shall us threaded rod not less than 3/8" diameter.

.21 Install pull string in all conduits and cable tray tied at both ends for installation by Voice data system contractor.

.2 Pull Box Installation requirements

.1 In all instances pull boxes shall be placed in straight sections of a conduit run and shall NOT be used in lieu of a bend. Corresponding ends of the conduit are to be aligned with each other. Conduit fittings shall not be used in place of pull boxes. Conduits shall always protrude in the direction of pull. Conduits shall not exit the sides bottom or back of the pull box.

.2 All Communications system conduits including Public Address and Electronic Security and Safety Systems shall follow the requirements of this section.

.3 Pull boxes shall be placed in an exposed location, and readily accessible. Pull boxes shall not be placed in a fixed false ceiling space, unless immediately above a suitably marked and hinged panel. If the pull box is installed above a suspended type ceiling a green indicator dot shall be placed on ceiling t-rail to indicate the location of pull box.

.4 All Boxes shall be adequately secured. They shall not be supported by the conduits entering the box.

.5 Riser cables and Telecommunications outlet cannot share the same conduit system or pull boxes.

.3 Outlet Box installation requirements

.1 Install Telecommunications Outlet boxes for voice data systems same level as adjacent receptacles and flush to the wall wherever possible.

.2 Where Telecommunications Outlets are installed in steel stud type systems, provide additional cross bracing and or straps to make the installation completely rigid prior to the application of the wall facing material.

.3 Back to back and offset outlets shall not be used.

.4 Apply appropriate acoustic sealing as necessary on back of telecommunications outlet boxes to ensure the STC rating is maintained.

.5 Ensure conduits are installed not to de-rate the STC rating of the wall.

.6 Ensure Outlet Box is mechanically bonded to the Conduit system.

.7 Conduits must enter the outlet box from the top or bottom.

3.6 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for recycling, reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

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

3.7 Protection

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

.2 Repair damage to adjacent materials caused by pathways for communications systems installation.

END OF SECTION

PART 1 GENERAL

1.1 System Description

.1 Communications Labeling consists of the unique identifiers attached to all telecommunications systems.

1.2 Submittals

.1 Refer to Section 27 05 00 for references Submittal procedures to this project.

1.3 Definitions

.1 Backbone Pathway: The portion of the pathway system that permits the placing of main and high-volume cables between the entrance location and all cross-connect points within the building and between buildings.

.2 EMT: Electrical Metallic Tubing, Thin wall metal tubing that does not have threaded ends, which is widely used in electrical distribution systems and as a pathway for telecommunications cabling.

.3 Space: An Area used for housing the installation and termination of telecommunications equipment and cable.

.4 Utility Column: An enclosed pathway extending from the ceiling to furniture or to the floor that forms a pathway for telecommunications cable.

.5 Telecommunications Outlet Box. A housing used to hold telecommunications outlet/connectors.

PART 2 PRODUCTS

2.1 Pathway Systems Labels

.1 CABLE TRAY LABELS
- .1 Shall be Machine printed labels 50mm high x 75mm long
- .2 White Colour, Adhesive backed, Polyester type

.2 CONDUIT LABELS
- .1 Shall be Machine printed labels 25mm high x 50mm long
- .2 White Colour, Adhesive backed, Polyester type

.3 GROUND SAFETY LABELS
- .1 Shall be pre-manufactured labels 50mm high x 75mm long
- .2 Yellow Colour, Green writing, non Adhesive backed, Rigid Plastic Tag

.3 Printed with the following text in BOLD " IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CONTACT THE BUILDING TELECOMMUNICATIONS MANAGER"

.4 GROUNDING BUSBAR LABELS

.1 Shall be Machine printed labels 50mm high x 75mm long

.2 White Colour, Adhesive backed, Polyester type

.5 GROUNDING CABLE RISER LABELS

.1 Shall be Machine printable labels 12.7mm high x 50mm long

.2 white Colour, non Adhesive backed, polyester polycarbonate data plate

.6 COPPER RISER LABELS

.1 Shall be Machine printable labels 12.7mm high x 50mm long

.2 white Colour, non Adhesive backed, polyester polycarbonate data plate

.7 OPTICAL FIBRE RISER LABELS

.1 Shall be Machine printable labels 12.7mm high x 50mm long

.2 white Colour, non Adhesive backed, polyester polycarbonate data plate

.8 HORIZONTAL CABLE LABELS

.1 Shall be Machine printed labels 19mm high x 12.7mm long 6.35mm print area

.2 White Colour, Adhesive backed, Polyester type wraparound text.

.9 OUTLET IDENTIFICATION LABELS

.1 Shall be Machine printed labels 73mm high x 75mm long.

.2 White Colour, Adhesive backed, Polyolefin type Laser Printed.

.10 RACK IDENTIFICATION LABELS

.1 Lamacoid 50mm high x 100mm long

.2 BLACK in Colour, with white Text 25mm high.

.11 SYSTEM IDENTIFICATION LABELS

.1 Primary system colour label 50mm Vinyl Tape

.2 Secondary system colour label 12.7mm Vinyl Tape

PART 3 EXECUTION

3.1 General Installation Requirements

.1 Install all labels to ensure Machine printing does not rub off under normal wear

.2 Label conduit/cable tray system for the following systems:

.1 Telecommunications System.

.3 Primary/Secondary Colour for Communications Systems:

.1 Telecommunications System conduits and cable tray: Green

.4 Label all conduits at point where visibly where conduit enters wall, at all pull boxes and couplings for each system in the colours indicated.

.5 Label all Cable tray at 50mm from each connection and transition in the colours indicated for each system

.6 Wall Mount IDC Colour for Communications Risers and Voice services:

.1 Demarcation Point from Service Provider: Orange
.2 Owner network connection from Service Provider: Green
.3 Termination point from PBX, LAN or MUX: White
.4 First Level Backbone: Purple
.5 Second Level Backbone: Grey
.6 Horizontal Cable: Blue
.7 Interbuilding: Brown
.8 Auxiliary Circuits, alarms, maintenance, security and misc: Yellow
.9 Key Telephone systems: Red

3.2 Conduit Labeling

.1 Label conduits where they penetrate the wall to the telecom outlet. The label shall indicate the pull box or cable tray and the outlet IE: TRXXX 2E01 – PBTRXXX-01 or TRXXX 2E01 – CTTRXXX-XX.

3.3 Pull Box Labeling

.1 Label All Pull Boxes on the visible exterior with the PB number IE: PBTRXXX-XX.

3.4 Cable Tray Labeling

.1 Label Cable Trays at each connection and transition with the cable tray label IE: CT-TR-XXX-XX

3.5 Sbb/Pbb Labeling

.1 Label PBB/SBB IE: SBB TR-XXX.

3.6 Bonding Conductors For Telecommunications

.1 Label Bonding conductors at each connection to Equipment, Cable tray and the PBB/SBB. IE: SBB-MTR-XXX – SBB-TR-XXX.

3.7 Copper Backbone Labeling

.1 Label Copper Backbone Cables at point where cable enters the Telecom Room or Main Telecom Room. IE: CR MTR-XXX 1-XXX – CR TR-XXX 1A-XX – 1XXX.

3.8 Multi Mode Fibre Backbone Labeling

.1 Label Multi Mode Backbone Cables at point where cable enters the Telecom Room or Telecommunications Entrance Facility. IE: MTR - TEF-XXX 1-XXX – FOM - TR-XXX 1A-XX – 1XXX.

3.9 Single Mode Fibre Backbone Labeling

.1 Label Single Mode Backbone Cables at point where cable enters the Telecom Room or Main Telecom Room. IE: FOS - MTR-XXX 1-XXX – FOS - TR-XXX 1A-XX – 1XXX.

3.10 Rack Labeling

.1 Label Racks in Each Telecom Room or Main Telecom Room. IE: TR-XXX R1, R2, R3.

3.11 Patch Panel Labeling

.1 Label patch panels Each Telecom Room or Main Telecom Room. IE: A, B, C, D etc.

3.12 Patch Panel Port Labeling

.1 Label all ports in patch panel for each Telecom Room or Main Telecom Room. 1-X.

3.13 Horizontal Cabling Labeling

.1 Label all horizontal cables 25mm from each end with the patch panel and telecom room designation each Telecom Room or Main Telecom Room. IE: TR-XXX 2E01.

3.14 Telecom Outlet Faceplate Labeling

.1 Label all faceplates with TR Designator and label each port with Rack/Patch panel Designator patch panel. IE: TR-XXX, Ports 2E01, 2E02, 2E03, 2E04.

3.15 Ground Safety Labeling

.1 Label all Bonding conductor connections to either the TGB or TMGB with Bonding conductor safety label.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Not Used

1.2 References

.1 Canadian Standards Association (CSA International)

- .1 CSA-C22.2 No. 214-02, Communications Cables (Bi-National standard with UL 444).
- .2 CSA-C22.2 No. 232-M1988(R2004), Optical Fiber Cables.

.2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)

- .1 TIA/EIA-568-C.1-2011, Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements.
- .2 TIA/EIA-568-C.2-(2011), Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
- .3 TIA/EIA-568-C.3-(2011), Optical Fiber Cabling Components Standard.
- .4 TIA/EIA-606-A-(2008), Administration Standard for the Commercial Telecommunications Infrastructure.
- .5 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.
- .6 TIA-598-D-(2014), Optical Fiber Cable Color Coding.

1.3 Definitions

.1 Refer to TIA/EIA-598-D, Annex A for definitions of terms: optical-fiber interconnect, distribution, and breakout cables.

1.4 System Description

.1 Structured telecommunications wiring system consist of unshielded-twisted-pair category 6 cable to be supplied and installed by the contractor.

.2 Shared Services Canada (SSC) is responsible for the termination of copper horizontal cable.

.3 Contractor will provide all cat 6 cables, pathway infrastructure for horizontal cabling installation, device box, pull box, equipment rack.

.4 Contractor will supply and install institutional telephone as specified.

PART 2 PRODUCTS

2.1 Institutional Telephone

.1 Shall be16 AWG steel, zinc dichromate plated and powder coated

.2 Faceplate shall be secured with vandal resistant security screws

.3 Shall have vandal resistant metal keypad, standard 3 x 4 matrix keypad

.4 Shall have high impact ABS handset with lock on caps

.5 Built in Surge arrestor and fuse prevents damage to the electronic circuits in the event of a high voltage spike on the telephone line

.6 Shall have noise reducing microphone aids in clarity of transmission in noisy areas

.7 Factory set to tone (DTMF) dialing

.8 Pulse dialing can be ordered or configured in the field

.9 Armored handset cord withstands vandalism and severe use

.10 Hearing-aid compatible with inductively coupled hearing-aid devices

.11 Shall have a reduced handset cord length

.12 ELECTRICAL PERFORMANCE

.1 Audio Range Frequency Response 300 - 3400 Hz
.2 Dialing Method – CIT-40 DTMF or 40/60 Pulse @10 PPS
.3 Connection Method – CIR-41 Hotline Operation
.4 Transmit Objective Loudness Rating (TOLR) -40 +/ - 3 dB
.5 Receiver Objective Loudness Rating (ROLR) Typical 47 +/- 3 dB
.6 Side Tone Objective Loudness Rating (SOLR) Typical 10 +/- 4 dB
.7 Ringer Output (CIR-41 only) >85 dB
.8 FCC Ringer Equivalence 0.8 B
.9 Set Impedance 600 Ohms Nominal
.10 Maximum Loop 15Kft (~4,600m) of 22 AWG Wire

.13 ELECTRICAL REQUIREMENTS

.1 Ringer Sensitivity 40 -100 V, 16 - 25 Hz
.2 Line Voltage 24 - 56 VDC
.3 Loop Current 20 - 120 mA
.4 Connection Method Terminal Strip or RJ Connectors

.14 ENVIRONMENTAL

.1 Waterproof Enclosure CSA Type 3R
.2 Temperature -76˚ to +176˚F (-60˚ to +80˚C)
.3 Humidity 0 - 100% RH
.4 Dust & Corrosion Resistant Full Gasket Faceplate

.15 MECHANICAL SPECIFICATIONS

.1 Hook Switch (Cradle Switch) Life >1 000 000 Operations
.2 Construction 16 Ga Steel
.3 Finish Zinc Dichromate Plated & Powder Coated

.4 Net Weight 4 lbs (1.8 kg)

.5 Shipping Weight 5.5 lbs (2.5 kg)

.6 Shipping Dimensions (L x W x D) 15.0” x 5.0” x 11.5” (381 x 127 x 293 mm)

.7 Hand Set Construction High Impact ABS

.8 Mounting Vertical Wall

.9 Microphone Noise Reducing Electret

.10 Microphone (Optional) Noise Canceling Dynamic

.11 Receiver Hearing Aid Compatible

.12 Hardware Material Stainless Steel

.13 Wiring Access Rear Opening 1.5” x 1.5” (38 x 38 mm)

.16 Acceptable Product: Guardian Telecom CIT-40

2.2 Horizontal Cabling

.1 Cabling shall meet or exceed category 6 requirement as per ANSI/TIA/EIA-568.2-C.

.2 Shall be Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT6 to: CSA-C22.2 No. 214, Category 6 (Cat 6)

.3 Colour Green for Security Systems.

.4 Acceptable Manufacturers:

.1 Commscope/AMP 219567-4

.2 Belden 2413 005 A1000

.3 Panduit PUP6504GRUY

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for Institutional telephone installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

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

.2 Install cable, boxes, mounting hardware, brackets, institutional telephone and system components in accordance with manufacturer's written installation instructions.

.3 Install components secure, properly aligned and in locations shown on reviewed shop drawings.

.4 Connect institutional telephone to cabling in accordance with installation instructions.

.5 Install ULC labels where required.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written reports from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product.

.2 Submit manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.

.2 Twice during progress of Work at 60% (before closing walls) and 90% (Substantial Completion) complete.

.3 Upon completion of Work, after cleaning is carried out.

3.4 SYSTEM STARTUP

.1 Perform verification inspections and test in the presence of Departmental Representative.

.1 Provide all necessary tools, ladders and equipment.

.2 Ensure appropriate subcontractors and manufacturer's representatives and security specialists are present for verification.

.2 Visual verification: objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:

.1 Sturdiness of equipment fastening.

.2 Non-existence of installation related damages.

.3 Compliance of device locations with reviewed shop drawings.

.4 Compatibility of equipment installation with physical environment.

.5 Inclusion of all accessories.

.6 Device and cabling identification.

.7 Application and location of ULC approval decals.

.3 Technical verification: purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:

.1 Measurements of tension and power.

.2 Connecting joints and equipment fastening.

.3 Measurements of signals (dB, lux, baud rate, etc).

.4 Compliance with manufacturer's specification, product literature and installation instructions.

.4 Operational verification: purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:

.1 Operation of each device individually and within its environment.

.2 Operation of each device in relation with programmable schedule and or/specific functions.

3.5 CLEANING

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Institutional telephone housing and handset free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

.3 Waste Management: separate waste materials for recycling, reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.6 PROTECTION

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

.2 Repair damage to adjacent materials caused by institutional telephone installation.

END OF SECTION

PART 1 GENERAL

1.1 References

.1

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit Construction/Demolition Waste Management and Disposal in accordance with Section 01 74 21.

1.3 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect communication raceway systems from [nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 Equipment Rack

.1 EIA compliant 19” equipment rack shall have a minimum of 24 useable rack spaces and a useable depth of 550mm.

.2 Overall dimensions of rack shall be 1274mm H x 584mm W x 600mm D

.3 Features:

.1 14-gauge steel (body)

.2 16-gauge steel (doors and side panels)

.3 10-gauge steel (tapped mounting rails)

.4 12-gauge steel (square hole mounting rails)

.4 Finished in a rugged, textured powder paint finish.

.5 Complies with Seismic IBC 2012 Zone-4 standards.

.6 Tested to nearly double the suggested load rating of 1,500 lbs (680 kg).

.7 RoHS Compliant.

.8 Shall include the following:

.1 One (1) Welded C2 Cabinet Frame

.2 Two (2) Removable Side Panels (with 1/4 turn latches)

.3 Four (4) Leveling Feet

.4 Eight (8) Keys

.5 Starter pack of 10-32 Screws (and cage nuts when applicable)

.6 Four (4) Infinitely Adjustable - Tapped 10-32 Combination Mounting Rails

.7 One (1) Solid Locking Door (Can be used as either front or rear door)

.8 One (1) Solid Top Panel

.9 Perforated door, grounding and bonding, keylock

.6 Acceptable Product: Hammond C2RR194223BK1, StarTech RK2536BKF, Middle Atlantic. Complete with minimum 4 duplex receptacle power bar/ surge protector mounted horizontal at the back of the rack, grommets, bonding kit, rear rail, casters and fan.

2.2 9-Ru Equipment Rack

.1 EIA compliant 19” equipment rack shall have a minimum of 9 useable rack spaces and a useable depth of 570mm.

.2 Overall dimensions of rack shall be 425mm H x 609mm W x 622mm.

.3 Shall be heavy duty, 16-gauge steel, 19” rack mount cabinet body.

.4 Shall include two (2) pairs of EIA mounting rails.

.1 Rails are round hole punched for 10-32 clip-nuts.

.2 Mounting rails slots allow for adjustable depth rails and fan kits.

.3 Mounting rails are easily removed for non-rack mounting equipment.

.4 Includes a starter pack of clip nuts & matching black screws.

.5 Removable cover panel installs in seconds.

.6 Includes four (4) cutouts perfect for mounting over an electrical receptacle and/or for cable entry.

.7 Interior cable management lances.

.8 Removable plastic handles for side mounting storage.

.9 Optional doors and panel provides additional options for various applications.

.10 Rugged powder paint finish. RoHS Compliant.

.11 Load Ratings

.1 Wall Mount (Rack Mounted) - up to 150 lbs.

.2 Wall Mount (Rails removed) - up to 50 lbs.

.3 Ceiling/ Under Desk Mount - up to 150 lbs.

.4 Freestanding (with or without casters) - up to 800 lbs

.12 Perforated door, grounding and bonding, keylock

.13 Acceptable Product: Hammond SDC249U24BK, StarTech RK960CP, Middle Atlantic. Complete with minimum 4 duplex receptacle power bar/ surge protector mounted horizontally at the back of the rack, grommets, bonding kit, rear rail, casters if floor mounted and fan.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communication raceway systems installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Installation of termination and cross-connect hardware

.1 Install termination and cross-connect hardware on wall and in rack as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-A.

.2 Install consolidation points, as indicated according to manufacturer's instructions. Identify and label as indicated to: TIA/EIA-606-A.

.2 Rack

.1 Install rack as per rack manufacturer’s recommendation.

.2 Ensure working space at the front and back of rack is as per CEC Part 1.

.3 Secure rack on the floor.

Provide grounding and bonding as per CEC.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.4 Protection

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

.2 Repair damage to adjacent materials caused by pathways for communications systems installation.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Canadian Standards Association (CSA International)

.1 CSA-C22.2 No. 214-17, Communications Cables (Bi-National standard with UL 444).

.2 CSA-C22.2 No. 232-17, Optical Fiber Cables.

.2 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA)

.1 TIA-568.0-D (2015), Generic Telecommunications Cabling for Customer Premises

.2 TIA-568.1-D (2015), Commercial Building Telecommunications Infrastructure Standard

.3 TIA-568.2-C (2009), Balanced Twisted Pair Telecommunications Cabling and Components Standards

.4 TIA-568.3-D (2016), Optical Fiber Cabling and Components Standard

.5 TIA- 606-B (2012), Administration Standard for Telecommunications Infrastructure

.6 TIA TSB-140-2004, Telecommunications Systems Bulletin - Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems.

.7 TIA-598-D-2014, Optical Fiber Cable Colour Coding.

1.2 Definitions

.1 Refer to TIA/EIA-598-D, Annex A for definitions of terms: optical-fiber interconnect, distribution, and breakout cables.

1.3 System Description

.1 Structured Security wiring system consist of unshielded-twisted-pair and coaxial cables, terminations, connectors, cross-connection hardware and related equipment installed inside the building for occupant's radio and Video Surveillance system.

.2 Installed in physical star configuration with separate horizontal and backbone sub-systems.

.1 Horizontal cables link security device wiring inside the building to existing LAN room (General Storage Room).

.2 Use category 6 cables for radio and video surveillance connections.

1.4 Action And Informational Submittals

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

.2 As-built Records and Drawings:

.1 Provide Microsoft Excel spread sheet reflecting cable installation and cross-connections.

.2 Provide electronic drawings in AutoCAD 2015 format depicting all construction.

.3 Provide two (2) bound complete hard-copy sets of as-built records to the Departmental Representative.

.1 Provide and place one hard copy of as-built records for each telecommunications room in plan holder in each telecommunications room.

1.5 Quality Assurance

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 Delivery, Storage And Handling

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

PART 2 PRODUCTS

2.1 Horizontal Cabling

.1 Cabling shall meet or exceed category 6 requirement as per ANSI/TIA/EIA-568.2-C.

.2 Shall be Four-pair, 100 ohm balanced unshielded-twisted-pair (UTP) cable, flame test classification FT6 to: CSA-C22.2 No. 214, Category 6 (Cat 6)

.3 Colour Green for Security Systems.

.4 Acceptable Manufacturers:

.1 Commscope/AMP 219567-4

.2 Belden 2413 005 A1000

.3 Panduit PUP6504GRUY

PART 3 EXECUTION

3.1 General Installation Requirements

.1 Install all systems as per the CEC and manufacturers recommended installation procedures.

.2 Label all faceplates cables and connectors in accordance with section 27 05 53.

.3 Test cable in accordance with section 27 08 00.

.4 Provide the following separation from Electrical Power systems installed in conduits:

.1 50mm from circuits of 300Volt and less.

.2 600mm from circuits 300Volt and higher.

.3 2 Metres from Circuits between 300V and 15KV.

.4 3 Metres for circuits above 15KV.

.5 Electrical systems cannot share the same pathway.

3.2 Unshielded Twisted Pair Cabling Installation

.1 In order for unshielded twisted-pair cabling infrastructure to deliver high-speed performance, it is manufactured to very tight specifications. Consequently, to maintain the unshielded twisted-pair cabling system performance proper installation practices must be followed. Listed below are some requirements that shall be followed:

.2 Never crush the cable, velcro ties shall be used as per manufacturer's recommendation.

.3 Use of Velcro cable ties throughout the installation and in the telecom rooms is required.

.4 Do not kink, knot or snag the cable while pulling, this will cause damage under the jacket and may alter cable performance.

.5 Do not to exceed the recommended pulling tension.

.6 Do not exceed the minimum bend of 4 x Outside Diameter (OD) for 4 pair UTP, 10 x OD for multi pair (more than 4 pair) UTP.

.7 Per TIA/EIA 568-A never untwist the pairs of cable beyond the absolute minimum required for termination.

.8 The cable jacket on UTP shall only be stripped back the minimum required to terminate to connecting hardware.

.9 Cable management panels shall be used when terminating cable.

.10 Use the same performance criteria for both cable and connecting hardware through the entire horizontal run.

.11 Maximum cable lengths shall not be exceeded.

.12 A maximum 40% fill ratio for all conduit runs.

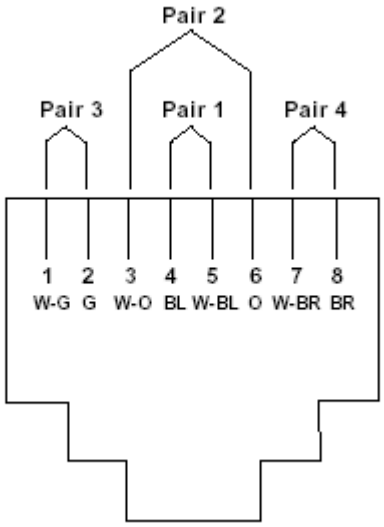
.13 All horizontal runs, moves, adds, and changes must be documented.

.14 A single shared sheath at the outlet is not acceptable.

.15 A cable radius drop out shall be installed from the ladder rack to the equipment rack or wall mounted BIX when transitioning category 6 cables to the patch panels or BIX.

.16 Only one pin-out (Diagram 1) throughout the total installation (T568A) is allowed.

Diagram 1
T568A PINOUT



.17 Install all cables through primary and secondary pathways. Unless otherwise specified, installation methods and techniques shall satisfy ANSI/EIA/TIA-569, Commercial Building Standard for Telecommunications Pathways and Spaces.

.18 Where cables are supported from building structure they shall be adequately supported such that the cable will not be damaged by normal building use.

.19 Horizontal station cables shall be home-run from the communication outlet box at the work area to the distribution frame serving the area as shown on the Drawings.

.20 Cables shall not be installed or routed in any manner that violates the manufacturer's specifications. Manufacturer's minimum bend radius for static (post installation) cables is 10 times the cable diameter. Manufacturer's minimum bend radius for cables under strain (pulling tension) is 20 times the cable diameter.

.21 Unless otherwise specified, terminate cables in accordance with ANSI/TIA/EIA-568-A, Commercial Building Telecommunications Cabling Standard, observing the industry standards for terminating colour-coded cables for premises and campus environments.

.22 Do not install damaged or defective cable.

.23 Installed damaged cable will not be accepted. Unless otherwise allowed by the Departmental Representative, damaged cable shall be removed and new cable installed at the expense of the Contractor. Damage includes physical damage to the cable and damage that may affect performance. THE DEPARTMENTAL REPRESENTATIVE WILL NOT ACCEPT CABLE OF ANY TYPE UNTIL AFTER IT IS INSTALLED AND PASSES A PHYSICAL INSPECTION AND ALL PERFORMANCE TESTS.

.24 The Contractor shall field survey and review with the Departmental Representative similar installations on campus that contain the same type of materials that are used for this Project to gain the desired routing and layout, installation techniques, and finished-look prior to start of construction and as often as necessary during the construction process.

.25 Cable Support Along Primary Pathway

.1 Primary pathways include major pathways for cable routed floor-to-floor, through corridors, and pathways that carry cables feeding multiple areas which are likely to be used to support growth in those areas. Primary pathways carry cable to secondary pathways.

.2 Cables shall be routed to avoid cable crossover between cable continuing vertically floor-to-floor and cable routed horizontally.

.3 Cable installation and cable routes shall be planned and cables shall be installed such that the capacity of the conduit, sleeves, and cable tray is used most efficiently.

.4 Bundle and route cables throughout the building to maintain neat, uniform, and combed bundles. Where cable is exposed in vertical runs, such as utility shafts, provide reusable cable straps to neatly contain cable bundles.

.5 Provide strain relief for cables routed vertically using mechanical fasteners such as conduit, C-channel, reusable cable straps, other necessary devices to support cables.

.26 Cable Support Along Secondary Pathway

.1 Secondary pathways extend from the primary pathway to the communication outlet box. Secondary pathways carry cable from the primary pathway to the communication outlet box.

.2 Cable shall be routed parallel and perpendicular to walls and floor from the primary pathway to the outlet box. WHERE MULTIPLE ROUTES ARE POSSIBLE ROUTE CABLE ALONG THE SHORTEST ROUTE TO MINIMIZE CABLE LENGTH AS PRACTICABLE.

.3 Do not use suspended ceiling support hangers (wires) to support station cables.

.4 Do not support cable from other mechanical, electrical, or plumbing, systems.

.5 Station cables shall be supported such that they do not rest on the suspended ceiling system.

.6 Cables and cable pathways shall be supported from the building structure. Superstructure designed and intended to support multiple utilities may be used as a superstructure for communications cables if the superstructure can physically support the additional load and if the support mechanism for the cable works for supporting the cable from the superstructure.

.27 Cable Bundling Hardware

.1 Cable bundling hardware shall be rated for the environment and application in which used. Applications include, but are not limited to, general purpose, outdoor, chemical resistant, flame retardant, high temperature, and vibration.

.2 Provide reusable cable management straps for bundling and securing horizontal station cables and equipment jumper cables within entrance facilities and telecommunication closets. Do not use nylon cable ties.

.3 Provide reusable cable management straps for bundling and securing horizontal station cables at primary vertical pathways. Do not use nylon cable ties.

.4 Do NOT strap horizontal station cable to cable tray and ladder rack.

3.3 Installation Of Termination And Cross-Connect Hardware

.1 Install termination and cross-connect hardware on wall as indicated and according to manufacturers' instructions. Identify and label as indicated to: TIA/EIA-606-B.

.2 Install consolidation points, as indicated according to manufacturer's instructions. Identify and label as indicated to: TIA/EIA-606-B.

3.4 Installation Of Horizontal Distribution Cables

.1 Install horizontal cables as indicated in conduits and cable trays from telecommunication rooms to individual work-area jacks. Identify and label as indicated to: TIA/EIA-606-B.

.2 Support horizontal cables at intervals not exceeding 1.5 metres.

.1 Where raceways are used to distribute cables to each zone, provide supplementary "J" hooks to support cables at intervals not exceeding 1.5 metres.

3.5 Installation Of Backbone Cables

.1 Install backbone cables as indicated and according to manufacturers' instructions.

.1 Identify and label as indicated to: TIA/EIA-606-B.

3.6 Installation Of Equipment Cables

.1 Install equipment cables from equipment patch panel, terminal strips as indicated.

.1 Identify and label as indicated to: TIA/EIA-606-B.

3.7 Implement Cross-Connections

.1 Implement cross-connections using jumper wires, patch cords as specified.

3.8 Field Quality Control

.1 Test horizontal UTP cables as specified below and correct deficiencies provide record of results as hard copy, electronic record on CD.

.1 Perform tests for Permanent Link on installed cables, including spares:

.1 Category 6 using certified level III tester to: TIA/EIA-568.2-C.

.2 Perform tests for Channel on 20 % of cross-connected data horizontal cabling installed from each telecommunications room, including shortest and longest drops from each telecommunications room: should more than 5 % of tested cables fail, test remaining cross-connected data cables.

.1 Category 6 using certified level III tester to: TIA/EIA-568.2-C.

.2 Test backbone UTP cables as specified below and correct deficiencies: provide record of results as hard copy, electronic record on CD.

.1 Perform tests for Permanent Link on 4-pair cables:

.1 Category 6 using certified level III tester to: TIA/EIA-568.2-C.

.2 Perform Wire Map tests on multi-pair UTP cables to: TIA/EIA-568.1-D.

.3 Test Optical-fiber strands for attenuation to: TIA/EIA-568.1-D and correct deficiencies: provide record of results as hard copy, electronic record on CD.

.1 Test horizontal links need at only one wavelength (850 nm or 1300 nm) and in one direction.

.1 Attenuation to be less than 2.0 dB, unless consolidation point is used.

.2 If consolidation point is used, attenuation test result to be less than 2.75 dB when testing between horizontal cross-connect and telecommunications outlet/connector.

.2 Test backbone links in both directions. Backbone links:

.1 Test multi-mode fibre at both applicable wavelengths (850 nm and 1300 nm).

.2 Test single-mode fibre at both applicable wavelengths (1550 nm and 1310 m).

.3 Maximum attenuation: Cable attenuation + Connector loss + Splice loss.

.1 Multi-mode-fiber attenuation coefficients:

.1 3.5 db/km @ 850 nm; and

.2 1.5 db km @ 1300 nm

.2 Single-mode fibre attenuation coefficients at both 1310 nm and 1550 nm:

.1 1.0 db/km for inside plant cable; and

.2 0.5 db/km for outside plant cables.

.3 Maximum connector insertion loss: 0.75 db per pair and maximum splice insertion loss: 0.3 db.

.4 Perform additional Tier 2 tests using optical time domain reflectometer (OTDR) on horizontal and backbone fibre pairs to: TSB-140.

.1 Correct deficiencies.

.2 Provide record of results as described in SUBMITTALS.

.5 Provide record of results as hard copy, electronic record on CD to: TIA/TSB-140.

END OF SECTION

PART 1 GENERAL

1.1 System Description

.1 The penetrating fire stop devices are required for wall penetrations for telecommunications cable tray penetrations through walls throughout the project.

.2 All firestopping for entire project shall be from a single contractor experienced in firestopping and holding a membership with the Firestop Contractor International Association (FCIA).

.3 All firestopping products shall be from a single manufacturer.

1.2 Submittals

.1 Submit to the Departmental Representative shop drawings, product data (including cut sheets and catalog information). Submit shop drawings, product data, and samples with such promptness and in such sequence as to cause no delay in the work or in the activities of separate contractors. The Departmental Representative will indicate approval of shop drawings, and product data.

.2 Product Data: Provide manufacturer's standard catalog data for specified products demonstrating compliance with referenced standards and listing numbers of systems in which each product is to be used.

.3 Shop Drawings: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.

.4 Certificates: Product certificates signed by firestop system manufacturer certifying material compliance with applicable code and specified performance characteristics.

.5 Installation Instructions: Submit manufacturer's printed installation instructions.

1.3 Quality Assurance

.1 Products/Systems: Provide firestopping systems that comply with the following requirements.

- .1 Firestopping products bear the classification marking of qualified testing and inspection agency.
- .2 Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop system acceptable to Departmental Representative.

.2 Installer Qualifications: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.

1.4 Project Conditions

.1 Do not install firestopping products when ambient or substrate temperatures are outside limitations recommended by manufacturer.

.2 Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.

.3 Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.

.4 Do not use materials that contain flammable solvents.

.5 Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.

.6 Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.

.7 Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 PRODUCTS

2.1 Fire Stop Sealants And Puttys

.1 General: Use only firestopping products that have been tested for specific fire resistance rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

.2 Firestop Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture.

.3 Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.

.4 Acceptable Manufacturers: Specified Technologies and 3M

PART 3 EXECUTION

3.1 Fire Stopping Device Installation

.1 Install all systems as per the CEC and manufacturers recommended installation procedures.

.2 Provide all grounding from cable tray and connections to TMGB. Connect Raceway bonding conductor separately fire stopped through room with sleeve and attach to cable tray as per section 27 05 26

.3 Label all fire stop penetrations with provided labels indicated date installed and contractor information.

.4 Prior to and during installation, refer to the system layout or approval drawings containing all elements of the system. Installer shall comply with complete system instruction sheets.

.5 The fire stop device shall be installed in accordance with the UL Fire Resistance Directory, as well as any applicable codes and standards for general building, electrical and fire stopping installation practices

.6 Provide a minimum of four Fire stop devices at wall penetration of each cable tray that originates each telecom room. Provide a minimum of two Fire stop devices at each wall that the cable tray penetrates, regardless of fire rating of wall. Additional Fire stop devices shall be provided to ensure a maximum of 40% cable fill through walls a maximum of 68 Category 6 Cables per penetration is authorized.

.7 All penetrations shall be installed rigidly in wall opening with no air-gaps in penetration, the penetrations shall be installed to ensure maximum use of the cable tray and to ensure the cabling bend radius is not exceeded when installed.

.8 Electronic and printed Digital pictures of each penetration clearly showing completed labeling and annotated with the As-built drawings and a chart with all UL and assembly information/ MSDS sheets shall be submitted to the Departmental Representative for approval.

END OF SECTION

PART 1 GENERAL

1.1 References

.1 Telecommunications Industry Association (TIA)/Electronic Industries Alliance (EIA) ANSI/TIA/EIA 606-B (2012), Administration Standard for Telecommunications Infrastructure.

.1 J-STD-607-C (2015), Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.

.2 ANSI/TIA/EIA 568.1-D (2015) Commercial Building Telecommunications Infrastructure Standard

.3 ANSI/TIA/EIA 569-D (2015), Telecommunications Pathways and Spaces

.2 Canadian Standards Association (CSA International)

.1 CSA C22.1 15, Canadian Electrical Code.

.3 Building Industry Consulting Services International (BICSI)

.1 BICSI Telecommunications Distribution Methods Manual Latest Edition

.2 BISCI Information Transport Systems Installation Manual Latest Edition

.3 ANSI/NECA/BICSI 568-2001 Installing Commercial Telecommunications Cabling

.4 BICSI Electronic Safety and Security Design Manual Latest Edition

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for communication raceway systems and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit Construction/Demolition Waste Management and Disposal in accordance with Section 01 74 21.

1.3 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect communication raceway systems from [nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.5 Packaging Waste Management: remove for reuse and return of pallets, crates, padding, packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 PRODUCTS

2.1 System Description

.1 Electronic Safety and Security Labeling consists of the unique identifiers attached to all Electronic Safety and Security systems.

2.2 Pathway Systems Labels

.1 CONDUIT LABELS

.1 Shall be Machine printed labels 25mm high x 50mm long

.2 White Colour, Adhesive backed, Polyester type

.2 GROUND SAFETY LABELS

.1 Shall be pre-manufactured labels 50mm high x 75mm long

.2 Yellow Colour, Green writing, non-adhesive backed, Rigid Plastic Tag

.3 Printed with the following text in BOLD " IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CONTACT THE BUILDING ELECTRONIC SAFETY AND SECURITY MANAGER"

.3 GROUNDING BUSBAR LABELS

.1 Shall be Machine printed labels 50mm high x 75mm long

.2 White Colour, Adhesive backed, Polyester type

.4 GROUNDING CABLE RISER LABELS

.1 Shall be Machine printable labels 12.7mm high x 50mm long

.2 white Colour, non-adhesive backed, polyester polycarbonate data plate

.5 HORIZONTAL CABLE LABELS

.1 Shall be Machine printed labels 19mm high x 12.7mm long 6.35mm print area

.2 White Colour, Adhesive backed, Polyester type wraparound text.

.6 OUTLET IDENTIFICATION LABELS

.1 Shall be Machine printed labels 73mm high x 75mm long.

.2 White Colour, Adhesive backed, Polyolefin type Laser Printed.

.7 CABINET IDENTIFICATION LABELS

.1 Lamacoid 50mm high x 100mm long

.2 BLACK in Colour, with white Text 25mm high.

.8 SYSTEM IDENTIFICATION LABELS

.1 Primary system colour label 50mm Vinyl Tape

.2 Secondary system colour label 12.7mm Vinyl Tape

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for communication raceway systems installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Install all labels to ensure Machine printing does not rub off under normal wear

.2 Label conduit/cable tray system for the following systems:

.1 Voice/Data Systems.

.2 Backbone and Horizontal Cabling for Security Systems

.3 Sound Masking System

.4 Intercom System

.5 Access Control System

.6 Video Surveillance System

.3 Primary/Secondary Colour for Communications Systems:

.1 Access Control System: Green/Brown

.2 Video Surveillance System: Green/Black

.3 Intercom System: Green/Grey

.4 Label all conduits at point where visibly where conduit enters wall, at all pull boxes and couplings for each system in the colours indicated.

.5 Label all Cable tray at 50mm from each connection and transition in the colours indicated for each system.

3.3 Conduit Labeling

.1 Label conduits where they penetrate the wall to the telecom outlet. The label shall indicate the pull box or cable tray and the outlet from LAN Room IE: LANXXX 1A01 – PBLANXXX-01 or LANXXX 1E01

3.4 Pull Box Labeling

.1 Label All Pull Boxes on the visible exterior with the PB number IE: PBTRXXX-XX.

3.5 SBB/PBB Labeling

.1 Label PBB/SBB IE: PBB LAN-XXX.

3.6 Bonding Conductors For Telecommunications

.1 Label Bonding conductors at each connection to Equipment, Cable tray and the PBB/SBB. IE: PBB-LAN-XXX – SBB-LAN-XXX.

3.7 Cabinet Labeling

.1 Label Cabinet in Each space. IE: CCTV-XXX C1, C2, C3 or ACCESS CTRL-XXX-C1,C2,C3, or INT ALARM XXX C1,C2,C3, etc.

3.8 Patch Panel Labeling

.1 Label patch panels Each Cabinet. IE: 2A, 2B, 2C, 2D etc.

3.9 Patch Panel Port Labeling

.1 Label all ports in patch panel for each Cabinet IE:. 2A-01, 2A-48

3.10 Patch Panel Port Labeling

.1 Label all ports in patch panel for each Electronic Safety and Security Cabinet. 1-X.

3.11 Horizontal Cabling Labeling

.1 Label all horizontal cables 25mm from each end with the patch panel and cabinet designation each Electronic Safety and Security Cabinet. IE: ACCESS CONTROL-XXX 2E01.

3.12 Electronic Safety And Security Outlet Faceplate Labeling

.1 Label all faceplates with Electronic Safety and Security Designator and label each port with Rack/Patch panel Designator patch panel. IE: ACCESS CONTROL -XXX, Ports 2E01, 2E02, 2E03, 2E04.

3.13 Ground Safety Labeling

.1 Label all Bonding conductor connections to either the TGB or TMGB with Bonding conductor safety label.

3.14 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse, recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.15 Protection

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

.2 Repair damage to adjacent materials caused by pathways for communications systems installation.

END OF SECTION

PART 1 GENERAL

1.1 Abbreviations And Acronyms

.1 Electronic Access Control (EAC): control of people through entrances and exits of controlled area. Security utilizing hardware systems and specialized procedures to control and monitor movements within a controlled area.

.2 CPVX: Central Station Burglar Alarm Systems.

.3 CVSG: Mercantile Burglar Alarm Systems.

.4 CVWX: Proprietary Burglar Alarm Systems.

.5 DRS:. Door Release System.

.6 PIN: Personal Identification Number.

1.2 Reference Standards

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

.1 Material Safety Data Sheets (MSDS).

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S301-09, Standard for Signal Receiving Centre Burglar Alarm System and Operations

.2 CAN/ULC-S302-14, Standard the Installation, Inspection and Testing of Intrusion Alarm Systems.

.3 CAN/ULC-S304:2016, Standard for Control Units, Accessories and Receiving Equipment for Intrusion Alarm Systems

.4 ULC-S318:1996-R2016, Standard for Power Supplies for Burglar Alarm Systems.

.5 ULC/ORD-C634:2016 Connectors and Switches for use with Burglar Alarm Systems.

.3 Underwriters' Laboratories (UL)

.1 UL 294-2015, Access Control System Units.

.2 UL 603-2013, Power Supplies for Use with Burglar Alarm Systems.

.3 UL 681-2014, Installation and Classification of Burglar and Holdup Alarm Systems.

.4 UL 827-2016, Central-Station Alarm Services.

.5 UL 1023-2017, Household Burglar Alarm System Units.

.6 UL 1076-2015, Safety for Proprietary Burglar Alarm Units and Systems.

.7 UL 1641-2015, Safety for Installation and Classification of Residential Burglar Alarm Systems.

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for access controls and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements 01 35 43 - Environmental Procedures.

.3 Submit:

.1 Functional description of equipment.

.2 Technical data for all devices.

.3 Device location plans and cable lists.

.4 Devices mounting location detail drawings.

.5 Typical devices connection detail drawings.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.

.2 Shop drawings to indicate project layout, including details.

.1 Shop drawings to indicate, mounting heights and locations, wiring diagrams.

.2 Submit zone layout drawing indicating number and location of zones and areas covered.

.3 Submit wiring diagrams.

.4 Submit complete equipment list.

.4 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit 1 sample of each component proposed for inclusion into system. Components will be returned for incorporation into work.

.5 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.1 Submit ULC/UL Product Safety Certificates.

.2 Submit verification Certificate that service company is ULC/UL List alarm service company.

.3 Submit verification Certificate that monitoring facility is ULC/UL "Listed central station".

.4 Submit verification Certificate that security access system is "Certified alarm system".

.6 Test and Evaluation Reports:

.1 Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.7 Manufacturer's Instructions: submit manufacturer's installation instructions.

.8 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

.9 Sustainable Design Submittals:

.1 Construction Waste Management:

.1 Submit project Waste Reduction Workplan and Waste Management Plan highlighting recycling and salvage requirements.

.2 Submit calculations on end-of-project recycling rates, salvage rates, and landfill rates demonstrating that 75 % of construction wastes were recycled or salvaged.

.2 Regional Materials: submit evidence that project incorporates required percentage 10 % of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for access controls and equipment for incorporation into manual.

.1 Include:

.1 System configuration and equipment physical layout.

.2 Functional description of equipment.

.3 Instructions of operation of equipment.

.4 Illustrations and diagrams to supplement procedures.

.5 Operation instructions provided by manufacturer.

.6 Cleaning instructions.

1.5 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect access controls and equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Packaging Waste Management: remove for reuse and return by manufacturer of packaging materials, padding, pallets, crates, as specified in Waste Reduction Workplan and Construction Waste Management Plan in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal

1.6 Warranty

.1 For access control materials the 12 month warranty period prescribed in subsection GC 32.1 of General Conditions is extended to 60 months.

.2 Project Warranty: refer to CCDC for project warranty provisions.

.3 Extended warranty period must include warranty against all defects meeting specified performance requirements, for specified time period.

.4 Manufacturer's Warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.

PART 2 PRODUCTS

.1 All Equipment and devices to be supplied and Installed by Departmental Representative and is outside the scope of contractor’s work.

.2 Contractor will provide conduit and wiring.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access control system installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation: Burglar Alarm System

.1 Install burglar alarm system units and components in accordance with CAN/ULC-S310, UL 1641.

.2 Provide tamperproof unobtrusive dual gang receptacle back box with stainless steel cover plate where door release items installed in areas with suspended ceiling, fixed tile, plaster, or concrete walls, and/or metal door frames.

.3 Fully enclose external cables in conduit or flexible protective armor, from activating unit location's enclosure receptacle back box to and above ceiling wall mounted junction boxes.

.4 Provide tamperproof attachments for each activation unit cover plate to receptacle back box.

.5 Enclose in conduit or flexible protective armor external cables for associated junction box to remaining system locations, from junction box to above ceiling mounted cable conduit routes.

.6 Securely fasten all components to wall, ceiling, or other substrate or structure.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Remove protective coverings from accessories and components.

.2 Clean housings and system components, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

.3 Clean components free from dirt and fingerprints.

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

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

3.4 Protection

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

.2 Repair damage to adjacent materials caused by access controls and equipment installation.

END OF SECTION

PART 1 GENERAL

1.1 Reference Standards

.1 Underwriters Laboratories of Canada (ULC)

.1 ULC-S317-1996, Installation and Classification of Closed Circuit Video Equipment (CCVC) Systems for Institutional and Commercial Security Systems.

1.2 Action And Informational Submittals

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

.2 Product Data:

.1 Submit:

.1 Device location plans and cable lists.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Manitoba, Canada.

.2 Submit shop drawings to indicate project layout, camera locations, point-to-point diagrams, cable schematics, risers, mounting details and identification labeling scheme.

.3 Submit zone layout drawings indicating number and location of zones and areas covered.

1.3 Closeout Submittals

.1 Operation and Maintenance Data: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals. Include following:

.1 System configuration and equipment physical layout.

.2 Functional description of equipment.

.3 Manufacturer's Instructions for operation, adjustment and cleaning.

.4 Illustrations and diagrams to supplement procedures.

1.4 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

1.5 Warranty

.1 Project Warranty: refer to front spec. for project warranty provisions.

.2 Manufacturer's Warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official.

PART 2 PRODUCTS

.1 All video surveillance camera, recording device, network switch and etc. will be supplied and installed by Departmental Representative and is outside the contractor’s scope of work. Contractor to provide conduit, device box, pull box and cabling.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for video surveillance installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

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

.2 Install video surveillance equipment and components in accordance with ULC-S317.

.3 Install cable, boxes, mounting hardware, brackets, video cameras and system components in accordance with manufacturer's written installation instructions.

.4 Install components secure, properly aligned and in locations shown on reviewed shop drawings.

.5 Connect cameras to cabling in accordance with installation instructions.

.6 Install ULC labels where required.

3.3 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.1 Clean camera housing, system components and lens, free from marks, packing tape, and finger prints, in accordance with manufacturer's written cleaning recommendations.

.3 Waste Management: separate waste materials for recycling, reuse in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

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

3.4 Protection

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

.2 Repair damage to adjacent materials caused by video surveillance installation.

END OF SECTION

PART 1 GENERAL

1.1 Related Requirements

.1 Refer to all sections of the specification for related work.

1.2 References

.1 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH)

.1 Fire Protection Standard-[10].

.2 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-14, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S526-07, Visible Signal Devices for Fire Alarm Systems, Including Accessories.

.3 CAN/ULC-S527-99, Standard for Control Units for Fire Alarm Systems.

.4 CAN/ULC-S528-05, Manual Stations for Fire Alarm Systems, Including Accessories.

.5 CAN/ULC-S529-09, Smoke Detectors for Fire Alarm Systems.

.6 CAN/ULC-S530-91(R1999), Heat Actuated Fire Detectors for Fire Alarm Systems.

.7 CAN/ULC-S537-13, Standard for the Verification of Fire Alarm Systems.

1.3 Action And Informational Submittals

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for fire alarm system devices and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.2 Indicate on shop drawings:

.1 Detail assembly and wiring diagrams

.2 Details for devices.

.3 Clear selection of components and devices.

1.4 Closeout Submittals

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

.2 Operation and Maintenance Data: submit operation and maintenance data for fire alarm system for incorporation into manual.

.3 Include:

.1 Technical data - illustrated parts lists with parts catalogue numbers.

.2 Copy of approved shop drawings with corrections completed and marks removed except review stamps.

.3 List of recommended spare parts for system.

1.5 Maintenance Material Submittals

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

1.6 Delivery, Storage And Handling

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 Description

.1 Existing Fire Alarm Panel is Edwards

.2 System to include but not limited to the following:

.1 All corresponding hardware and software modifications to make the system fully operational.

.2 Initiating/input circuits.

.3 Output circuits.

.4 Auxiliary circuits.

.5 Wiring FAS 105.

.6 Manual and automatic initiating devices.

.7 Audible and visual signaling devices.

.8 End-of-line resistors.

.3 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.

.4 Audible signal devices: to CAN/ULC-S524.

.5 Visual signal devices: to CAN/ULC-S526.

.6 Manual pull stations: to CAN/ULC-S528.

.7 Thermal detectors: to CAN/ULC-S530.

.8 Smoke detectors: to CAN/ULC-S529.

.9 Regulatory Requirements:

.1 To Fire Protection Standard.

.2 Subject to Fire Commissioner of Canada (FC) approval.

.3 Subject to FC inspection for final acceptance.

.4 System components: listed by ULC and comply with applicable provisions of NBC, Local, Provincial Building Code and meet requirements of local authority having jurisdiction.

2.2 System Operation: (Existing)

.1 Actuation of any alarm initiating device on first stage to:

.1 Cause electronic latch to lock-in alarm state at central control unit and data gathering panel/transponder.

.2 Indicate zone of alarm at central control unit and at remote annunciator display.

.3 For low rise buildings:

.1 Cause audible devices throughout building to sound at 20 strokes per minute.

.2 Cause audible devices in zone of alarm to sound continuously while other audible devices throughout building sound at 20 strokes per minute.

.2 Actuation of any alarm initiating device on second stage to:

.1 Cause audible signaling devices to sound in alarm tone throughout building.

.3 If first stage alarm is not acknowledged within 5 minutes, ensure system automatically goes into second stage.

.4 Acknowledging alarm: indicated at central control unit.

.5 Ensure that it is possible to silence signals by "alarm silence" switch at central control unit, after 60 seconds period of operation.

.6 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.

.7 Actuation of any supervisory device to:

.1 Cause electronic latch to lock-in supervisory state at central control unit and data gathering panel/transponder.

.2 Indicate respective supervisory zone at central control unit and remote annunciator display.

.3 Cause audible signal at central control unit to sound.

.4 Activate common supervisory sequence.

.8 Trouble on system to:

.1 Indicate circuit in trouble at central control unit.

.2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; visual indication to remain until trouble is cleared and system is back to normal.

.9 Troubles on system: suppressed during course of alarm.

.10 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 Control Panel (Existing)

2.4 Initiating/Input Circuits (To Match Existing)

2.5 Auxiliary Circuits (To Match Existing)

2.6 Wiring

.1 Twisted copper conductors: FAS 105, rated 300V.

.2 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.

.3 To signal circuits: 16 AWG minimum, and in accordance with manufacturer's requirements.

.4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

2.7 Manual Alarm Stations

.1 Manual alarm stations: pull lever, wall mounted semi-flush or surface type, and general alarm key switch for two stage system bilingual English French signage.

2.8 Automatic Alarm Initiating Devices

.1 Heat detectors, fixed temperature, non- restorable, rated 57 degrees C.

.2 Thermal fire detectors, combination fixed temperature and rate of rise, non-restorable fixed temperature element, self-restoring rate of rise, fixed temperature 57 degrees C, rate of rise 8.3 degrees C per minute.

.3 Smoke detector: ionization type air duct type with sampling tubes with protective housing.

.1 Twistlock Plug-in type with fixed base.

.2 Wire-in base assembly with integral red alarm LED, and terminals for remote relay alarm LED.

.4 Addressable smoke detector.

.1 Ionization type.

.2 Electronics to communicate detector's status to addressable module/transponder.

.3 Detector address to be set on detector base head in field.

2.9 Audible Signal Devices

.1 Bells: surface mounted, single stroke, polarized, 24 V dc, 150 mm, 98db.

.2 Bells: to match existing type, gongs of special alloy steel, 24 V dc, 150mm, 98db.

2.10 Visual Alarm Signal Devices

.1 Strobe type: to match existing, red, 24 V dc.

.2 Designed for surface mounting on walls

2.11 End-Of-Line Devices

.1 End-of-line devices to control supervisory current in alarm circuits and signaling circuits, sized to ensure correct supervisory current for each circuit. Open short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel and remotely.

2.12 Smoke Detector Protective Cage

.1 Smoke detector cages to be manufactured by one of the following

.1 Simplex Grinnell – Guard Model 2098-9829C

.2 Edwards – Guard Model 6255-004

.3 Notifier – Guard Model – G1A-2

.2 All protective cages are to be stamped with manufacturer and model number on the face plate.

2.13 As-Built Riser Diagram

.1 Provide Fire alarm system riser diagram for the renovation area

2.14 Ancillary Devices

.1 Remote relay unit to initiate fan shutdown.

PART 3 EXECUTION

3.1 Examination

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for fire alarm installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 Installation

.1 Install systems in accordance with CAN/ULC-S524.

.2 Install manual alarm stations and connect to alarm circuit wiring.

.3 Locate and install detectors and connect to alarm circuit wiring. Mount detectors more than 1 m from air outlets. Maintain at least 600 mm radius clear space on ceiling, below and around detectors. Locate duct type detectors in straight portions of ducts.

.4 Connect alarm circuits to main control panel.

.5 Install signal bells and visual signal devices and connect to signaling circuits.

.6 Connect signaling circuits to main control panel.

.7 Install end-of-line devices at end of alarm and signaling circuits.

.8 Install remote relay units to control fan shut down.

.9 Sprinkler system: wire alarm and supervisory switches and connect to control panel.

.10 Room detection system.

.1 Install detectors. Make necessary connections between room detection panel and main fire alarm panel.

.2 Locate and install audible signals, visual alarms.

.11 Splices are not permitted.

.12 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.

.13 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

.14 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.

3.3 Smoke Detector Protective Cage Installation

.1 The following will be followed when installing protective cages

.1 Simplex Grinnell

.1 Rotate guard so that conduit port is blocked by the perforated tab on the mounting plate.

.2 Edwards

.1 Rotate conduit entrance cover 90 degrees to ensure no opening exists when installed.

.2 During installation, use high yield grout material to fill any space between the back of the mounting plate and the ceiling surface.

.3 Surface mount conduit not approved.

3.4 Field Quality Control

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system:

.1 Test such device and alarm circuit to ensure manual stations, thermal, smoke detectors, sprinkler system transmit alarm to control panel and actuate first stage alarm general alarm ancillary devices.

.2 Check annunciator panels to ensure zones are shown correctly.

.3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of systems.

.4 Addressable circuits system style DCLA:

.1 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals on each side of single open-circuit fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.2 Test each conductor on all DCLA addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near midmost point of each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.5 Addressable circuits system style DCLB:

.1 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals on line side of single open-circuit fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.2 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.3 Provide final PROM program re-burn for system Departmental Representative incorporating program changes made during construction.

3.5 Cleaning

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

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

3.6 Protection

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

.2 Repair damage to adjacent materials caused by fire alarm system installation.

3.7 Closeout Activities

.1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

END OF SECTION