

Set No. _____

SPECIFICATIONS

RENOVATIONS TO GOVERNMENT OF CANADA BUILDING St. Paul, Alberta

ISSUED FOR TENDER



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SKAL Project Number: 12-107

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PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

- .1 Work of this Contract comprises general interior renovations and modifications to the existing RCMP Detachment building in St. Paul, located at 4806 - 55 Street, St. Paul, Alberta.

1.2 CONTRACT METHOD

- .1 Construct Work under stipulated price contract.
- .2 Employ RCMP approved subcontractors for:
 - .1 Division 27: Telecommunications work.
 - .1 Belden IBDN certified vendors.
- .3 Relations and responsibilities between Contractor and subcontractors and suppliers assigned by Owner are as defined in Conditions of Contract. Assigned Subcontractors must, in addition:
 - .1 Furnish to Contractor, bonds covering faithful performance of subcontracted work and payment of obligations thereunder when Contractor is required to furnish such bonds to Owner.
 - .2 Purchase and maintain liability insurance to protect Contractor from claims for not less than limits of liability which Contractor is required to provide to Owner.

1.3 WORK BY OTHERS

- .1 Co-operate with other Contractors in carrying out their respective works and carry out instructions from.
- .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, in writing, any defects which may interfere with proper execution of Work.

1.4 CONTRACTOR USE OF PREMISES

- .1 Restricted use of site until Interim Acceptance/Substantial Performance.
 - .2 The Contractor, sub-trades and all personnel requiring access to the secure work site, must arrange access to the building
-

with the Detachment Commander at least 48hrs in advance of wanting to gain entry.

1.5 SECURITY CLEARANCE

- .1 All contractor personnel, and sub-contractor personnel carrying out work at the site must be in possession of current RCMP Security Clearance.

1.6 OWNER FURNISHED ITEMS

- .1 Owner 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 Owner; record shortages, and damaged or defective items.
 - .5 Handle products at site, including uncrating and storage.
 - .6 Protect products from damage, and from exposure to elements.
 - .7 Assemble, install, connect, adjust, and finish products.
 - .8 Provide installation inspections required by public authorities.
 - .9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).
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1.7 EXISTING SERVICES

- .1 Where Work involves breaking into or connecting to existing services, carry out work at times as directed by governing authorities with minimum disturbance to pedestrian and vehicular traffic.
- .2 Establish location and extent of service lines in area of work before starting Work.
- .3 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .4 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .5 Record locations of maintained, re-routed and abandoned service lines.
- .6 Construct barriers in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.

1.8 DOCUMENTS REQUIRED

- .1 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.
-

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

.2 Not used.

PART 1 - GENERAL

1.1 ACCESS AND SECURITY CLEARANCE

- .1 All contractor and sub-contractor personnel on site must obtain a current RCMP Security Clearance certificate.

1.2 USE OF SITE AND FACILITIES

- .1 Contractor has restricted use of the site.

1.3 EXISTING SERVICES

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

1.4 SPECIAL REQUIREMENTS

- .1 Submit schedule in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANNT) Chart.
- .2 Ensure that Contractor 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.

1.5 BUILDING SMOKING ENVIRONMENT

- .1 Comply with smoking restrictions. Smoking is not allowed.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.
-

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WORK RESTRICTIONS

Section 01 14 00
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PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- .1 Particular requirements for inspection and testing to be carried out by testing laboratory designated by Owner are specified under various sections.

1.2 APPOINTMENT AND PAYMENT

- .1 Owner will appoint and pay for services of testing laboratory except as follows:
 - .1 Inspection and testing required by laws, ordinances, rules, regulations or orders of public authorities.
 - .2 Inspection and testing performed exclusively for Contractor's convenience.
 - .3 Testing, adjustment and balancing of mechanical and electrical equipment and systems.
 - .4 Mill tests and certificates of compliance.
 - .5 Tests specified to be carried out by Contractor under the supervision of Departmental Representative.
 - .6 Tests specified to be carried out by Contractor in various specifications sections.
 - .7 Acoustic testing of sound rated rooms. The contractor shall engage and pay for an acoustic testing agency, approved by the Departmental Representative, for acoustic testing of wall assemblies and door assemblies of sound rated rooms to confirm compliance with the specified STC rating.
 - .8 Additional tests required as follows:
 - .1 Where tests or inspections by designated testing laboratory reveal Work not in accordance with contract requirements, pay costs for additional tests or inspections as required by Departmental Representative to verify acceptability of corrected work.

1.3 CONTRACTOR'S RESPONSIBILITIES

- .1 Provide labour, equipment and facilities to:
 - .1 Provide access to Work for inspection and testing.
 - .2 Facilitate inspections and tests.
 - .3 Make good Work disturbed by inspection and test.
 - .4 Provide storage on site for laboratory's exclusive use to store equipment and cure test samples.
 - .2 Notify Departmental Representative sufficiently in advance of operations to allow for assignment of laboratory personnel and scheduling of test.
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PAYMENT PROCEDURES:
TESTING LABORATORY
SERVICES

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- .3 Where materials are specified to be tested, deliver representative samples in required quantity to testing laboratory.
- .4 Pay costs for uncovering and making good Work that is covered before required inspection or testing is completed and reviewed by Departmental Representative.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Departmental Representative will schedule and administer project meetings on a bi-weekly basis throughout the progress of the work. Additional meetings may be required, at the discretion of the Departmental Representative.
- .2 Departmental Representative will prepare agenda for meetings.
- .3 Departmental Representative will provide notice to sub-consultants of meeting dates. Contractor will provide notice to subtrades of meeting dates.
- .4 Contractor to provide physical space and make arrangements for meetings.
- .5 Departmental Representative will preside at meetings.
- .6 Departmental Representative will record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Departmental Representative will reproduce and distribute copies of minutes within four days after meetings and transmit to Contractor and Owner. Contractor will distribute meeting minutes to all subtrades.
- .8 Representative 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 clarify administrative procedures and responsibilities.
 - .2 Senior representatives of Owner, 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 5 days before meeting.
 - .4 Agenda to include:
 - .1 Appointment of official representative of participants in the Work.
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- .2 Schedule of Work: in accordance with Section 01 32 16.07 - 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 Delivery schedule of specified equipment in accordance with Section 01 32 16.07 - Construction Progress Schedules.
- .6 Site security in accordance with Section 01 56 00 - Temporary Barriers and Enclosures.
- .7 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .8 Owner provided products.
- .9 Record drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .10 Maintenance manuals in accordance with Section 01 78 00 - Closeout Submittals.
- .11 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00 - Closeout Submittals.
- .12 Monthly progress claims, administrative procedures, photographs, hold backs.
- .13 Appointment of inspection and testing agencies or firms.
- .14 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 During course of Work and two (2) weeks prior to project completion, schedule monthly progress meetings. Additional progress meetings may be required, at the discretion of the Departmental Representative.
 - .2 Contractor, major Subcontractors involved in Work and Owner and Departmental Representative are to be in attendance.
 - .3 Notify parties minimum three (3) days prior to meetings.
 - .4 Departmental Representative will record minutes of meetings and circulate to Contractor, Departmental Representatives and Owner within four (4) days after meeting. Contractor to distribute meeting minutes to subtrades.
 - .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 which impede construction schedule.
 - .5 Review of off-site fabrication delivery schedules.
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- .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: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for affect on construction schedule and on completion date.
- .12 Other business.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 DEFINITIONS

- .1 Activity: element of Work performed during course of Project. Activity normally has expected duration, and expected cost and expected resource requirements. Activities can be subdivided into tasks.
 - .2 Bar Chart (GANTT Chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars. Generally Bar Chart should be derived from commercially available computerized project management system.
 - .3 Baseline: original approved plan (for project, work package, or activity), plus or minus approved scope changes.
 - .4 Construction Work Week: Monday to Friday, inclusive, will provide five day work week and define schedule calendar working days as part of Bar (GANTT) Chart submission.
 - .5 Duration: number of work periods (not including holidays or other nonworking periods) required to complete activity or other project element. Usually expressed as workdays or workweeks.
 - .6 Master Plan: summary-level schedule that identifies major activities and key milestones.
 - .7 Milestone: significant event in project, usually completion of major deliverable.
 - .8 Project Schedule: planned dates for performing activities and the planned dates for meeting milestones. Dynamic, detailed record of tasks or activities that must be accomplished to satisfy Project objectives. Monitoring and control process involves using Project Schedule in executing and controlling activities and is used as basis for decision making throughout project life cycle.
 - .9 Project Planning, Monitoring and Control System: overall system operated by Departmental Representative to enable monitoring of project work in relation to established milestones.
-

1.2 REQUIREMENTS

- .1 Ensure Master Plan and Detail Schedules are practical and remain within specified Contract duration.
- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Acceptance and Final Acceptance 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 Demolition.
 - .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 Paving.
 - .17 Supplied equipment long delivery items.
 - .18 Engineer supplied equipment required dates.

1.6 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on a monthly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.

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.
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CONSTRUCTION PROGRESS
SCHEDULE - BAR (GANTT)
CHART

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PART 2 - PRODUCTS

2.1 NOT USED

.1 Not used.

PART 3 - EXECUTION

.2 Not used.

PART 1 - GENERAL

1.1 ADMINISTRATIVE

- .1 Submit to Departmental Representative submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
 - .2 Do not proceed with Work affected by submittal until review is complete.
 - .3 Present shop drawings, product data, samples and mock-ups in SI Metric units.
 - .4 Where items or information is not produced in SI Metric units converted values are acceptable.
 - .5 Review submittals prior to submission to Departmental Representative. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has been checked and co-ordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.
 - .6 Notify Departmental Representative, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
 - .7 Verify field measurements and affected adjacent Work are co-ordinated.
 - .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
 - .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review.
 - .10 Keep one reviewed copy of each submission on site.
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1.2 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
 - .2 Submit shop drawings bearing stamp and signature of qualified professional engineer registered or licensed in Province of Alberta, Canada.
 - .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
 - .4 Allow 15 working days for Departmental Representative's review of each submission.
 - .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
 - .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
 - .7 Accompany submissions with transmittal letter, in duplicate, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .8 Submissions 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 review of submissions,
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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 shop drawings electronically for each requirement requested in specification Sections and as Departmental Representative may reasonably request. If drawings are submitted to the General Contractor as hard copy the General Contractor will scan them and submit them electronically to the Departmental Representative.

 - .11 Submit product data sheets or brochures electronically 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. Delete information not applicable to project. Where hard copies are submitted to the General Contractor, the General Contractor will scan them and submit them electronically to the Departmental Representative.

 - .12 Submit test reports for requirements requested in specification Sections and as requested by Departmental Representative. Where hard copies are submitted to the General Contractor, the General Contractor will scan them and submit them electronically to the 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 certificates for requirements requested in specification Sections and as requested by Departmental Representative. Where hard copies are submitted to the General Contractor, the General Contractor will scan them and submit them electronically to the Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of
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- 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 manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative. Where hard copies are submitted to the General Contractor, the General Contractor will scan them and submit them electronically to the 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 Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative. Where hard copies are submitted to the General Contractor, the General Contractor will scan them and submit them electronically to the 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 2 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.

 - .20 The review of shop drawings by the Departmental Representative is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that the 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.
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- .2 Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for co-ordination of Work of sub-trades.

1.3 SAMPLES

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

1.4 PROGRESS PHOTOGRAPHS

- .1 In addition to the progress photographs required to be submitted monthly with each progress claim, the contractor is required to have a digital camera on site at all times and to submit photographs electronically, on a weekly basis, as follows:
 - .1 Interior viewpoints in sufficient number to describe the general progress of the work.
 - .2 At completion of framing and services installation, prior to concealment.
 - .2 Post all photographs electronically and provide a CD with all photographs turned over to the Departmental Representative prior to Substantial Performance of the Work.
-

1.5 CERTIFICATES AND TRANSCRIPTS

- .1 Immediately after award of Contract, submit Workers' Compensation Board status.
- .2 Submit transcription of Insurance immediately after award of Contract.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canada Labour Code, Part 2, Canada Occupational Safety and Health Regulations
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Province of Alberta
 - .1 Occupational Health and Safety Act, R.S.A. 2000.

1.2 SUBMITTALS

- .1 Make submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Prepare site-specific Health and Safety Plan, within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
 - .3 If requested, submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to Consultant.
 - .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 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 Consultant.
 - .8 On-site Contingency and Emergency Response Plan: address standard operating procedures to be implemented during emergency situations.
-

1.3 SAFETY ASSESSMENT

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

1.4 REGULATORY REQUIREMENTS

- .1 Do Work in accordance with Section 01 41 00 - Regulatory Requirements.

1.5 GENERAL REQUIREMENTS

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

1.6 RESPONSIBILITY

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial, territorial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.

1.7 COMPLIANCE REQUIREMENTS

- .1 Comply with Occupational Health and Safety Act, General Safety Regulation, Alberta Reg.
- .2 Comply with Canada Labour Code, Canada Occupational Safety and Health Regulations.

1.8 UNFORSEEN HAZARDS

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occurs during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Consultant verbally and in writing.
-

1.9 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.

1.10 CORRECTION OF NON-COMPLIANCE

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction.
- .2 Provide Consultant with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Consultant may stop Work if non-compliance of health and safety regulations is not corrected.

1.11 BLASTING

- .1 Blasting or other use of explosives is not permitted.

1.12 POWDER ACTUATED DEVICES

- .1 Use of powder actuated devices is not permitted.

1.13 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.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not used.
-

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7181418

HEALTH AND SAFETY
REQUIREMENTS

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Page 4

PART 3 - EXECUTION

.2 Not used.

PART 1 - GENERAL

1.1 DEFINITIONS

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction. Control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Prior to commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review by Departmental Representative. Environmental Protection Plan is to present comprehensive overview of known or potential environmental issues which must be addressed during construction.
 - .3 Address topics at level of detail commensurate with environmental issue and required construction tasks.
 - .4 Environmental protection plan: include:
 - .1 Names of persons responsible for ensuring adherence to Environmental Protection Plan.
 - .2 Names and qualifications of persons responsible for manifesting hazardous waste to be removed from site.
 - .3 Names and qualifications of persons responsible for training site personnel.
 - .4 Descriptions of environmental protection personnel training program.
 - .5 Drawings showing locations of proposed temporary excavations or embankments for material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on site.
 - .6 Plans showing measures to minimize amount of mud transported onto paved public roads by vehicles or runoff.
-

- .7 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use. Plan to include measures for marking limits of use areas including methods for protection of features to be preserved within authorized work areas.
- .8 Spill Control Plan: including procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.
- .9 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.
- .10 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, do not become air borne and travel off project site.
- .11 Contaminant prevention plan that: identifies potentially hazardous substances to be used on job site; identifies intended actions to prevent introduction of such materials into air, water, or ground; and details provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.
- .12 Waste water management plan that identifies methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines.
- .13 Historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands.
- .14 Pesticide treatment plan: to be included and updated, as required.

1.3 FIRES

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

1.4 DISPOSAL OF WASTES

- .1 Do not bury rubbish and waste materials on site.
 - .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.
-

1.5 DRAINAGE

- .1 Provide erosion and sediment control plan that identifies type and location of erosion and sediment controls to be provided. Plan: include monitoring and reporting requirements to assure that control measures are in compliance with erosion and sediment control plan, Federal, Provincial, and Municipal laws and regulations.
- .2 Storm Water Pollution Prevention Plan (SWPPP) to be substituted for erosion and sedimentations control plan.
- .3 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .4 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .5 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 WORK ADJACENT TO WATERWAYS

- .1 Do not operate construction equipment in waterways.
- .2 Do not use waterway beds for borrow material without Departmental Representative's approval.
- .3 Do not dump excavated fill, waste material or debris in waterways.

1.7 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this contract.
 - .2 Control emissions from equipment and plant to local authorities' emission requirements.
 - .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area, by providing temporary enclosures.
 - .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.
-

1.8 NOTIFICATION

- .1 Authority having Jurisdiction will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.
- .2 Contractor: after receipt of such notice, inform Authority having Jurisdiction and Departmental Representative of proposed corrective action and take such action for approval by Authority having Jurisdiction.
- .3 Departmental Representative may issue stop order of work until satisfactory corrective action has been taken.
- .4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 REFERENCES AND CODES

- .1 Perform Work in accordance with Alberta Building Code (ABC) and the National Building Code of Canada (NBC), including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.

1.2 Authority Having Jurisdiction

- .1 For this project the Authority having Jurisdiction is the Fire Commissioner of Canada.

1.3 BUILDING SMOKING ENVIRONMENT

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

1.4 BUILDING AND DEVELOPMENT PERMITS

- .1 The Contractor shall, within one month from the date of the Contract, tender to the municipal authority an amount equal to all fees and charges which would be payable to the municipal authority in respect to building permits if the Work were being constructed for a person other than Canada.
 - .2 The Contractor shall notify the Owner within ten (10) days of the tender, the amount of, and whether or not the municipal authority accepted the tendered amount.
 - .3 If the municipal authority did not accept the tendered amount, the Contractor will deliver to the Owner within the time limited by subsection 2, the amount of the tender.
 - .4 For the purposes of this section, "municipal authority" means the authority which would have jurisdiction respecting permission to contract the Work if the Owner of the Work were not Canada.
-

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REGULATORY REQUIREMENTS

Section 01 41 00
Page 2

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 INSPECTION

- .1 Allow Owner and Departmental Representative access to Work. If part of Work is in preparation at locations other than Place of Work, allow access to such Work whenever it is in progress.
- .2 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Departmental Representative, or instructions, or law of Place of Work.
- .3 If Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have inspections or tests satisfactorily completed and make good such Work, at no additional cost to the Owner.
- .4 Departmental Representative may 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 such Work and pay cost of examination and correction. If such Work is found in accordance with Contract Documents, Owner shall pay cost of examination and replacement.

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by Owner for purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by Owner except as noted otherwise within individual specifications sections, and as noted in Section 01 29 83 Payment Procedures: Testing Laboratory Services.
 - .2 Provide equipment required for executing inspection and testing by appointed agencies.
 - .3 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
 - .4 If defects are revealed during inspection and/or testing, appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Departmental Representative. Pay costs for additional testing, retesting and reinspection.
-

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 and/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 Immediately 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 and Owner 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 inspection and test reports to Departmental Representative. Where hard copies are submitted to the General Contractor, the General Contractor will scan them and submit them electronically to the Departmental Representative.
-

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

1.7 TESTS AND MIX DESIGNS

- .1 Furnish test results and mix designs to Departmental Representative.
- .2 Cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work may be authorized by Departmental Representative. Costs for such additional tests will be authorized as recoverable.

1.8 MILL TESTS

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

1.9 EQUIPMENT AND SYSTEMS

- .1 Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to Section 01 91 13 General Commissioning Requirements for definitive requirements.

1.10 ACOUSTIC

- .1 Acoustic testing of the STC rated assemblies is to be conducted by the Contractor prior to Interim Acceptance. Satisfactory performance of the acoustic assemblies is a prerequisite to Interim Acceptance. A field test acoustic rating of at least STC 46 must be achieved for each component.
 - .2 If acoustic testing reveals failure to achieve the specified minimum STC rating, the cost of the remedial work and of re-testing to verify the effectiveness of the remedial work will be borne by the contractor.
-

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QUALITY CONTROL

Section 01 45 00
Page 4

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 TEMPORARY POWER AND WATER

- .1 Power and water are available from the existing building and will be provided at no cost to the General Contractor. Any construction requirement for power or water beyond the capacity of the existing services to provide such utilities shall be provided and paid for by the Contractor.
- .2 If additional power and water utilities are required, remove from site all such work after use.

1.2 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
 - .2 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
 - .3 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
 - .4 Subject to prior approval from the Departmental Representative, the permanent heating system of building, may be used when available, provided guarantees are not effected. Be responsible for damage to heating system if use is permitted.
-

- .5 On completion of Work for which permanent heating system is used, clean entire system and replace all filters, immediately prior to Interim Acceptance inspection. Cleaning the system and replacing filters is a pre-requisite of Interim Acceptance.
- .6 Ensure warranties for heating system do not commence until Date of Interim Acceptance.
- .7 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.
 - .5 Vent direct-fired combustion units to outside.
- .8 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.3 TEMPORARY POWER AND LIGHT

- .1 Temporary power during construction for temporary lighting and operating of power tools is available from the existing building at no cost to the Contractor.
- .2 Power for equipment requiring in excess of above is responsibility of Contractor.
- .3 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors is not less than 162 lx.
- .4 Subject to prior approval of the departmental Representative, electrical power and lighting systems installed under this Contract may be used for construction requirements provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace all lamps prior to Interim Acceptance.

1.4 USE OF EXISTING WASHROOM FACILITIES

- .1 Existing washrooms within the building are not available for use by the Contractor. Provide temporary washroom facilities and locate on site in a location agreed by the Detachment Commander and the Departmental Representative.
-

1.5 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone, fax and data hook up, lines and equipment necessary for own use and use of Departmental Representative.

1.6 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
 - .2 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
 - .2 CSA-0121-M1978(R2003), Douglas Fir Plywood.
 - .3 CAN/CSA-S269.2-M1987(R2003), Access Scaffolding for Construction Purposes.
 - .4 CAN/CSA-Z321-96(R2001), Signs and Symbols for the Occupational Environment.

1.2 SUBMITTALS

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

1.3 INSTALLATION AND REMOVAL

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

1.4 SCAFFOLDING

- .1 Scaffolding in accordance with CAN/CSA-S269.2.
- .2 Provide and maintain scaffolding, ramps, ladders, swing staging, platforms temporary stairs, as required to perform the Work.

1.5 HOISTING

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

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 AND SITE ACCESS

- .1 Parking will NOT be permitted on site.
- .2 Provide and maintain adequate access to project site.
- .3 Existing roads and pedestrian accesses to be maintained free of mud and snow and in a safe condition.

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 purpose built site office heated to 22 degrees C, lighted to 750 lx and ventilated, minimum size 3000mm wide x 9750mm long to accommodate site meetings and furnished with drawing laydown table and a separate meeting table with chairs. The site office must be large enough to adequately seat 12 people around the meeting table.
- .2 Provide marked and fully stocked first-aid case in a readily available location, as required by Occupational Health and Safety.
- .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.
- .3 Permanent facilities may not be used.

1.12 PROJECT SIGNAGE

- .1 Provide one project identification signboard, fabricated and lettered as detailed.
- .2 Set project identification sign plumb and level, at location approved by Consultant.
- .3 Maintain sign for duration of contract.
- .4 Remove sign from site immediately prior to Substantial Performance or when otherwise directed by Departmental Representative.

1.13 CONSTRUCTION SIGNAGE

- .1 Direct requests for approval to erect Contractor signboard to Departmental Representative.
- .2 Signs and notices for safety and instruction in English. Graphic symbols to CAN/CSA-Z321.
- .3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.14 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.
-

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CONSTRUCTION FACILITIES

Section 01 52 00
Page 4

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CGSB 1.59-97, Alkyd Exterior Gloss Enamel.
 - .2 CAN/CGSB 1.189-00, Exterior Alkyd Primer for Wood.
- .2 Canadian Standards Association (CSA International)
 - .1 CSA-O121-M1978(R2003), Douglas Fir Plywood.

1.2 INSTALLATION AND REMOVAL

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

1.3 HOARDING

- .1 Erect temporary site enclosures using panelized chain link or weld-mesh fence to a minimum height of 2100mm around the perimeter of the construction compound.
- .2 Provide one lockable truck entrance gate and at least one pedestrian door as directed and conforming to applicable traffic restrictions on adjacent streets. Equip gates with locks and keys.
- .3 Maintain interior and exterior of enclosure in clean condition.
- .4 Maintain fence in good repair.

1.4 GUARD RAILS AND BARRICADES

- .1 Provide as required by governing authorities.

1.5 DUST TIGHT SCREENS

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

1.6 ACCESS TO SITE

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

1.7 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.

1.8 FIRE ROUTES

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

1.9 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.

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

1.11 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste material in accordance with all regulations and local bylaws, and in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
-

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TEMPORARY BARRIERS AND
ENCLOSURES

Section 01 56 00
Page 3

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Within text of each specifications section, reference may be made to reference standards.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 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.
- .4 Cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality (consistent with specifications) for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
 - .2 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous site reviews. Site reviews do not relieve Contractor of responsibility, but is a precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
 - .3 Acceptable Products/Materials means those items named and specified by manufacturer's reference, meet the specifications in all respects and are acceptable to the Departmental Representative.
 - .4 No Substitutions: all products listed as "no substitutions" in various sections shall be supplied as specified.
 - .5 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
 - .6 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
-

- .7 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.
- .8 Only security and detention equipment approved by RCMP is to be used. No exceptions allowed. Written confirmation of RCMP approval of product or material is to be provided with respective shop drawings and/or on the request of the Departmental Representative.
- .9 Conflicting product/material information in the drawings and specifications is to be brought to the Departmental Representative's attention for clarification during the tender period, otherwise the most stringent product/material requirements as determined by the Departmental Representative, will apply.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.
- .2 In event of failure to notify Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract 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, lumber and gypsum board on flat, solid supports and keep clear of ground. Slope to shed moisture.
- .7 Store and mix paints in heated and ventilated room. Remove oily rags and other combustible debris from site daily. Take every precaution necessary to prevent spontaneous combustion.
- .8 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .9 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Transportation cost of products supplied by Owner will be paid for by Owner. 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 Immediately 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.
- .2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
 - .2 Inform 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 any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
- .7 All exposed fasteners in the detention area to be RCMP approved Torx head security fasteners. Supply compatible tools complete with fasteners in accordance with Section 01 78 00.

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.
 - .5 All exposed fasteners in the detention area to be RCMP approved Torx head security fasteners. Supply compatible tools complete with fasteners in accordance with Section 01 78 00.
-

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

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 EXISTING SERVICES

- .1 Before commencing work, establish location and extent of service lines in area of Work and notify Departmental Representative of findings.
- .2 Remove abandoned service lines within 2 m of structures. Cap or otherwise seal lines at cut-off points as directed by Departmental Representative.

1.2 LOCATION OF EQUIPMENT AND FIXTURES

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

1.3 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundations and major site services, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of maintained, re-routed and abandoned service lines.

1.4 SUBMITTALS

- .1 Submit documentation to verify accuracy of field engineering work.
-

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EXAMINATION AND
PREPARATION

Section 01 71 00
Page 2

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 SUBMITTALS

- .1 Submittals: 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 Required for original installation.
- .2 Change in Materials: Only specified products and materials, or products and materials approved by the Departmental Representative during the tender period will be accepted on this project.

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.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching to complete Work.
 - .2 Fit several parts together, to integrate with other Work.
 - .3 Uncover Work to install ill-timed Work.
 - .4 Remove and replace defective and non-conforming Work.
 - .5 Remove samples of installed Work for testing if directed by Departmental Representative.
 - .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 which will provide proper surfaces to receive patching and finishing.
 - .8 Employ original installer to perform cutting and patching for sight-exposed surfaces.
 - .9 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
 - .10 Restore work with new products in accordance with requirements of Contract Documents.
 - .11 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
 - .12 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.
 - .13 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
 - .14 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.
-

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste material 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

- .2 Not Used.

PART 1 - GENERAL

1.1 PROJECT CLEANLINESS

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including 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.
 - .3 Clear snow and ice from access to building, bank/pile snow in designated areas only or remove from site.
 - .4 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
 - .5 Provide on-site containers for collection of waste materials and debris.
 - .6 Refer to Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
 - .7 Remove waste materials and debris from site and deposit in waste container at end of each working day.
 - .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 Prior to Interim Acceptance 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 including that caused by Owner or other Contractors.
 - .5 Remove waste materials from 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 and ceilings.
 - .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.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

- .2 Not Used.

PART 1 - GENERAL

1.1 DISPOSAL OF WASTES

- .1 Dispose of all construction waste material in accordance with Provincial regulations and local bylaws.
- .2 Do not bury rubbish or waste materials.
- .3 Do not dispose of waste, volatile materials, mineral spirits, oil, paint thinner into waterways, storm, or sanitary sewers.

1.2 SCHEDULING

- .1 Co-ordinate Work with other activities at site to ensure timely and orderly progress of Work.

1.3 CLEANING

- .1 Remove tools and waste materials on completion of work each day, and leave work area in clean and orderly condition.
- .2 Clean up work area as work progresses.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.

PART 3 - EXECUTION

3.1 NOT USED

- .1 Not Used.

PART 1 - GENERAL

1.1 GENERAL

- .1 Interim Acceptance/Occupancy Acceptance is achieved when there are no interior construction deficiencies and all items noted below have been completed to the satisfaction of the Departmental Representative.
- .2 Release of Project Holdback: the date of Substantial Performance of the Work shall be the date when Interim Acceptance/Occupancy Acceptance has been achieved. The Project Holdback shall be released on the 46th day after the date of Substantial Performance and upon receipt of an invoice requesting payment, accompanied by a Statutory Declaration indicating all subtrades and suppliers have been paid in full.

1.2 CONTRACTOR'S INSPECTION OF WORK

- .1 The Contractor and all Subcontractors shall conduct an inspection of the Work, identify deficiencies and defects, and submit list of deficiencies and defects to Departmental Representative.
- .2 Prior to requesting an Interim Acceptance inspection by the Departmental Representative, the Contractor will verify in writing that all the deficiencies and defects noted in the Contractor's inspection of the Work have been rectified.

1.3 PREREQUISITES TO INTERIM ACCEPTANCE/ OCCUPANCY ACCEPTANCE

- .1 Prior to requesting Departmental Representative's inspection for Interim Acceptance (Occupancy Acceptance) the Contractor shall confirm in writing that the following items have been completed:
 - .1 Review the Contract Documents and inspect the Work to confirm that prerequisites for Interim Acceptance (Occupancy Acceptance) have been fulfilled and that the Work is ready for inspection for Interim Acceptance.
 - .2 Obtain and submit evidence of compliance with regulatory requirements, including Occupancy Permit(s) (subject to provision of "C" Schedules by Departmental Representative) and inspection/operating certificates.
 - .3 Remove from project site temporary facilities along with construction tools, equipment, mock-ups and all similar items.
 - .4 Systems testing and verification has been completed and documentation submitted to Departmental Representative.
-

- .5 Component testing and verification has been completed and documentation submitted to Departmental Representative.
- .6 Mechanical and electrical systems commissioning has been completed as specified and documentation has been submitted to Departmental Representative.
- .7 Testing, adjusting and balancing of systems and equipment has been completed as specified and documentation submitted to Departmental Representative.
- .8 Integrated systems testing has been completed as specified and documentation submitted to Departmental Representative.
- .9 Final cleaning has been completed.
- .10 Project record documents have been completed and submitted to Departmental Representative.
- .11 Operations and maintenance data manuals have been completed and submitted to Departmental Representative.
- .12 Spare parts and maintenance materials have been provided to the Owner and confirmation documentation submitted to the Departmental Representative.
- .13 Installation of all architectural items and finishes is complete, as well as all mechanical and electrical covers, trims and identifications.
- .14 All finish hardware is installed and adjusted.
- .15 Radio antenna conduit is installed.
- .16 Acoustic requirements are complete and have been verified and tested, and acceptable to the testing agent. Test results have been submitted to the Departmental Representative.
- .17 Cylinders previously turned over to the RCMP for keying have been installed.

1.4 CONSULTANT INSPECTION FOR INTERIM ACCEPTANCE/OCCUPANCY ACCEPTANCE

- .1 When prerequisites are complete and written confirmation of such has been submitted to Departmental Representative, Contractor is to submit a written request to Departmental Representative for Interim Acceptance / Occupancy Acceptance. Departmental Representative will, within 10 days of the request:
 - .1 Proceed with an inspection of the Work, or:
 - .2 Advise the Contractor that the prerequisites have not been adequately fulfilled.
 - .2 If Departmental Representative inspection determines that the work is not complete, Contractor to immediately complete outstanding items and request a re-inspection. All Departmental Representative and Owner costs for re-inspection to be borne by the Contractor.
-

1.5 DECLARATION OF INTERIM ACCEPTANCE/ OCCUPANCY ACCEPTANCE

- .1 When the Owner and Departmental Representative determine that all deficiencies and incomplete work have been corrected and the requirements of the Contract have been substantially performed, Owner and Departmental Representative will declare that Interim Acceptance/Occupancy Acceptance has been achieved and the Contractor may post notice of Substantial Performance in accordance with Lien Legislation.
- .2 Upon issuance of the Certificate of Substantial Performance, the Owner will assume responsibility for care, custody and control of the Work, including responsibility for:
 - .1 Facility operation, including all systems and equipment
 - .2 Maintenance
 - .3 Security
 - .4 Property and liability insurance
 - .5 Utility costs
- .3 NOTE: the Contractor will not be allowed access to the interior of the building after the issuance of the Certificate of Substantial Performance except with written approval from the Detachment Commander for the specific warranty work requiring attention, and the duration of that work.

1.6 WARRANTY

- .1 Prior to end of the warranty period, Departmental Representative will conduct an inspection of the Work.
 - .2 Following the inspection, Departmental Representative will advise the Contractor of items which are to be corrected.
 - .3 On receipt of the inspection report, immediately make access arrangements with the Detachment Commander to correct the items noted.
 - .4 On completion of warranty work, submit written confirmation to Departmental Representative that all warranty items noted in the inspection report have been corrected.
-

PART 2 - PRODUCTS

2.1 NOT USED

.1 Not Used.

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.
- .3 Four weeks prior to Interim Acceptance/Occupancy Acceptance of the Work, submit one review copy, in English, of completed Operations and Maintenance Manuals to the Departmental Representative.
- .4 Copy will be returned with Departmental Representative's comments.
- .5 Revise content of documents as required prior to final submittal.
- .6 Two weeks prior to Interim Acceptance/Occupancy Acceptance of the Work, submit to the Departmental Representative, three final copies of operating and maintenance manuals in English, and one scanned electronic copy of the final operating and maintenance manuals.
- .7 NOTE: submission of complete Operations and Maintenance Manuals is a prerequisite to Interim Acceptance/Occupancy Acceptance.
- .8 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.
- .9 Furnish evidence, if requested, for type, source and quality of products provided.
- .10 Defective products will be rejected, regardless of previous inspections. Replace products at own expense.
- .11 Pay costs of transportation.

1.2 FORMAT

- .1 Organize data as instructional manual, separate binders are required for architectural/structural (black); mechanical/civil (green); and electrical (blue).
-

- .2 Binders: commercial quality, fabric coated, hard covered, 3 post extension type, attached to spine with metal piano hinges. Acco 05436-0, Expanding Barlock Catalogue Binder, available from Grand & Toy.
- .3 When multiple binders are used correlate data into related consistent groupings. Identify contents of each binder on spine.
- .4 Cover: identify each binder embossed title as per detail at end of this section.
- .5 Arrange content by systems, under Specification Section numbers and sequence of Table of Contents.
- .6 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- .7 Text: manufacturer's printed data, or typewritten data.
- .8 Drawings: fold larger drawings and place in a punched plastic sleeve or scan and reduce to size of text pages.
- .9 Place one copy of shop drawings for non-operational components such as rebar, joists, siding etc. in a separate plastic expandable file.
- .10 Electronic Copy: The contractor shall provide one electronic copy of the completed Manuals in the form of a DVD with the information provided in PDF Format.

1.3 CONTENTS - EACH VOLUME

- .1 Table of Contents: provide title of project;
 - .1 Date of submission.
 - .2 Addresses, and telephone numbers of Departmental Representative and Contractor with name of responsible parties.
 - .3 Schedule of products and systems, indexed to content of volume.
 - .2 For each product or system:
 - .1 List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
 - .3 Product Data: mark each sheet to identify specific products and component parts, and data applicable to installation; delete inapplicable information.
-

- .4 Drawings: supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.
- .5 Typewritten Text: as required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00 - Quality Control.
- .6 Training: refer to Section 01 79 00 - Demonstration and Training.

1.4 RECORD 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 record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.
- .3 Label record documents and file in accordance with Section number listings in List of Contents of this Project Manual. Label each document "PROJECT RECORD" in neat, large, printed letters.
- .4 Maintain record documents in clean, dry and legible condition. Do not use record documents for construction purposes.
- .5 Keep record documents and samples available for inspection by Departmental Representative.

1.5 RECORDING ACTUAL SITE CONDITIONS

- .1 Record information on set of black line opaque drawings, provided by Departmental Representative.
 - .2 Provide felt tip marking pens, maintaining separate colours for each major system, for recording information.
 - .3 Record information concurrently with construction progress. Do not conceal Work until required information is recorded.
-

- .4 Contract Drawings and shop drawings: legibly mark each item to record actual construction, including:
 - .1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
 - .2 Field changes of dimension and detail.
 - .3 Changes made by change orders.
 - .4 Details not on original Contract Documents.
 - .5 References to related shop drawings and modifications.
- .5 Specifications: legibly 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.
- .6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.
- .7 NOTE: submission of accurate and complete Record Documents is a prerequisite to Interim Acceptance/Occupancy Acceptance.

1.6 EQUIPMENT AND SYSTEMS

- .1 Each Item of Equipment and Each System: include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
 - .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
 - .3 Include installed colour coded wiring diagrams.
 - .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
 - .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 - .6 Provide servicing and lubrication schedule, and list of lubricants required.
-

- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control and 01 91 13 - General Commissioning Requirements.
- .15 Additional requirements: as specified in individual specification sections.

1.7 MATERIALS AND FINISHES

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

1.8 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. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.9 MAINTENANCE MATERIALS

- .1 Provide maintenance and extra materials, in quantities specified in individual specification sections.
- .2 Provide items of same manufacture and quality as items in Work.
- .3 Deliver to site; place and store.
- .4 Receive and catalogue items. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered products and submit prior to final payment.

1.10 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. Submit inventory listing to Departmental Representative. Include approved listings in Maintenance Manual.
- .5 Obtain receipt for delivered special tools and submit prior to final payment.

1.11 STORAGE, HANDLING AND PROTECTION

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
 - .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
-

- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.

1.12 WARRANTIES AND BONDS

- .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 10 days after completion of applicable items of work.
- .4 Warranty start date to be the date of Substantial Performance of the Work.
- .5 Verify that warranty documents are in proper form, contain full information, are for the warranty period specified, and are notarized.
- .6 Co-execute submittals where required.
- .7 Retain warranties and bonds until time specified for submittal.
- .8 Respond in a timely manner to oral or written notification of required construction warranty repair work.

PART 2 - PRODUCTS

2.1 NOT USED

- .1 Not Used.
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CLOSEOUT SUBMITTALS

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Page 8

PART 3 - EXECUTION

.2 Not Used.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA S350-M1980(R1998), Code of Practice for Safety in Demolition of Structures.

1.2 SUBMITTALS

- .1 Submit shop drawings in accordance with Sections 01 33 00 - Submittal Procedures
- .2 Before proceeding with demolition of load bearing walls, provide shoring and underpinning drawings prepared by qualified professional engineer registered or licensed in the Province of Alberta, showing proposed method.
- .3 Prior to beginning of Work on site submit detailed Waste Reduction Workplan in accordance with Sections 01 74 19 - Construction/Demolition Waste Management and Disposal and indicate:
 - .1 Descriptions of materials to be salvaged reused, recycled and landfilled.
 - .2 Schedule of selective demolition.
 - .3 Number and location of dumpsters.
 - .4 Anticipated frequency of tippage.
 - .5 Name and address of waste receiving organizations.

1.3 WASTE MANAGEMENT AND DISPOSAL

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

1.4 SITE CONDITIONS

- .1 Should material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Departmental Representative immediately.
 - .1 Do not proceed until written instructions have been received from Departmental Representative.
- .2 Notify Departmental Representative before disrupting building access or services.

ART 2 - PRODUCTS

- .3 Not used.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Inspect building and site 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 Immediately notify Departmental Representative and utility company concerned in case of damage to any utility or service, designated to remain in place.
 - .1 Immediately notify the Departmental Representative should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PROTECTION

- .1 Prevent movement, settlement, or damage to adjacent structures, utilities, and landscaping features and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

3.3 SALVAGE

- .1 Refer to demolition drawings and specifications for items to be salvaged for reuse.
 - .2 Remove items to be reused, and re-install in locations indicated.
-

3.4 DEMOLITION

- .1 Remove parts of existing building to permit new construction. Sort materials into appropriate piles for reuse and recycling.
- .2 Trim edges of partially demolished building elements to tolerances as defined by to suit future use.

3.5 DISPOSAL

- .1 Dispose of removed materials, to appropriate recycling facilities except where specified otherwise, in accordance with authority having jurisdiction.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA-A165 Series-94(R2000), Standards on Concrete Masonry Units.
 - .2 CSA A179-04(updated 2006), Mortar and Grout for Unit Masonry.
 - .3 CSA-A371-04 (updated 2007), Masonry Construction for Buildings.

1.2 SUBMITTALS

- .1 Product Data.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples.
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit samples.
 - .1 Two of each type of masonry unit specified.
 - .2 One of each type of masonry accessory specified.
 - .3 One of each type of masonry reinforcement, tie and connector proposed for use.
 - .4 As required for testing purposes.
 - .3 Submit samples tested to laboratories employing technicians certified/trained in procedures for testing masonry units.
- .3 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

- .1 Test Reports.
 - .1 Certified test reports showing compliance with specified performance characteristics and physical properties.
 - .2 Submit laboratory test reports in accordance Section 01 29 83 - Payment Procedures: Testing Laboratory Services.
 - .3 Submit laboratory test reports certifying compliance of masonry units and mortar ingredients with specification requirements.
-

- .2 Certificates: 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, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Deliver materials to job site in dry condition.
- .3 Storage and Protection.
 - .1 Keep materials dry until use.
 - .2 Store under waterproof cover on pallets or plank platforms held off ground by means of plank or timber skids.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Masonry materials are specified in Related Sections.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

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

3.3 INSTALLATION

- .1 Do masonry work in accordance with CSA-A371 except where specified otherwise.
- .2 Build masonry plumb, level, and true to line, with vertical joints in alignment.
- .3 Layout coursing and bond to achieve correct coursing heights, and continuity of bond above and below openings, with minimum of cutting.

3.4 CONSTRUCTION

- .1 Exposed masonry.
 - .1 Remove chipped, cracked, and otherwise damaged units in exposed masonry and replace with undamaged units.
 - .2 Jointing.
 - .1 Allow joints to set just enough to remove excess water, then tool with round jointer to provide smooth, joints true to line, compressed, uniformly concave joints where concave joints are indicated.
 - .2 Allow joints to set just enough to remove excess water, then rake joints uniformly to 6 mm depth and compress with square tool to provide smooth, compressed, raked joints of uniform depth where raked joints are indicated.
 - .3 Strike flush joints concealed in cavity walls and joints in walls to receive air/vapour membrane, plaster, tile, insulation, or other applied material except paint or similar thin finish coating.
 - .3 Cutting.
 - .1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.
 - .2 Make cuts straight, clean, and free from uneven edges.
 - .4 Building-In.
 - .1 Build in items required to be built into masonry.
 - .2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.
 - .3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.
 - .5 Support of loads.
 - .1 Use high yield grout to CSA A179 where grout is used in lieu of solid units.
 - .2 Install building paper below voids to be filled with concrete or grout; keep paper 25 mm back from faces of units.
-

- .6 Provision for movement.
 - .1 Leave 3 mm space below shelf angles.
 - .2 Leave 6 mm space between top of non-load bearing walls and partitions and structural elements. Do not use wedges.
 - .3 Built masonry to tie in with stabilizers, with provision for vertical movement.
- .7 Loose steel lintels.
 - .1 Install loose steel lintels. Centre over opening width.
- .8 Expansion joints.
 - .1 Build-in continuous expansion joints as indicated.

3.5 SITE TOLERANCES

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

3.6 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.7 PROTECTION

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

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CSA A179-04(updated 2006), Mortar and Grout for Unit Masonry.
 - .2 CSA A371-04 (updated 2007), Masonry Construction for Buildings.

1.2 SUBMITTALS

- .1 Product Data.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's mortar, grout, parging, colour additives and admixtures.
- .2 Samples.
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two 100 mm long samples of coloured mortar.
- .3 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.
- .4 Mix Design.
 - .1 Submit mix design for high yield grout.
- .5 Mortar Strength.
 - .1 Submit field test reports for high yield grout strength verifying 25MPa . Cost of test to be borne by contractor.

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

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Use same brands of materials and source of aggregate for entire project.
 - .2 Mortar and grout: CSA A179.
 - .3 Use aggregate passing 1.18 mm sieve where 6 mm thick joints are indicated.
 - .4 Colour: ground coloured natural aggregates or metallic oxide pigments.
 - .5 Mortar for exterior masonry above grade:
 - .1 Loadbearing: type S based on Proportion specifications.
 - .2 Non-Loadbearing: type N based on Proportion specifications.
 - .6 Mortar for foundation walls, manholes, sewers, pavements, walks, patios and other exterior masonry at or below grade: type M based on Proportion specifications.
 - .7 Mortar for interior masonry.
 - .1 Loadbearing: type S based on Proportion specifications.
 - .2 Non-Loadbearing: type N based on Proportion specifications.
 - .8 Following applies regardless of mortar types and uses specified above:
 - .1 Mortar for grouted reinforced masonry: type S based on Proportion specifications.
 - .2 Mortar for pointing: type K based on Proportion specifications.
 - .3 Mortar for glass block: 1 part Portland cement, 1 part hydrated lime, 4 parts aggregate by volume.
 - .9 White mortar: use white masonry cement to produce mortar type specified.
 - .10 Coloured mortar: use colouring admixture not exceeding 10% of cement content by mass, or integrally coloured masonry cement, to produce coloured mortar to match approved sample. The colour of mortar will be selected by the Departmental Representative
-

from the full mortar range manufactured by Solomon Colors Inc. or approved equivalent. Allow for up to three mortar colours. Provide Departmental Representative with samples of selected mortar colours for approval.

- .11 Non-Staining mortar: use non-staining masonry cement for cementitious portion of specified mortar type.
- .12 Grout: to CSA A179, Table 3.
- .13 Parging mortar: type S to CSA A179.

2.2 MIXES

- .1 Colour and admixtures: mix grout to semi-fluid consistency.
- .2 Coloured mortars: incorporate colour and admixtures into mixes in accordance with manufacturer's instructions.
 - .1 Use clean mixer for coloured mortar.
- .3 Pointing mortar: prehydrate pointing mortar by mixing ingredients dry, then mix again adding just enough water to produce damp unworkable mix that will retain its form when pressed into ball. Allow to stand for not less than 1 hour nor more than 2 hours then remix with sufficient water to produce mortar of proper consistency for pointing.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 CONSTRUCTION

- .1 Do masonry mortar and grout work in accordance with CSA A179 except where specified otherwise.
 - .2 Apply parging on metal lath in uniform coating not less than 12 mm thick ,where indicated.
-

3.3 CLEANING

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

3.4 SCHEDULE

- .1 Use white mortar for glass block.
- .2 Use coloured mortar for exterior exposed masonry.

3.5 SECURITY PROVISIONS

- .1 Fully grout walls for a distance of 450 mm around the perimeter of the cell door opening with a high yield 30 MPa mortar. High yield mortar must also be used to fill any voids containing reinforcement bars.
- .2 Fill the wall voids adjacent to the lintel and directly behind the hanger track assembly of the sliding cell doors with 30 MPa high yield mortar.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International).
 - .1 CAN/CSA-A23.1/A23.2-R2004, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.
 - .2 CSA-A370-94(R1999), Connectors for Masonry.
 - .3 CSA-A371-04(updated 2007), Masonry Construction for Buildings.
 - .4 CSA G30.14-M1983(R1998), Deformed Steel Wire For Concrete Reinforcement.
 - .5 CAN/CSA G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement.
 - .6 CSA-S304.1-94(R2004), Masonry Design for Buildings.
 - .7 CSA W186-M1990(R2007), Welding of Reinforcing Bars in Reinforced Concrete Construction.
 - .8 CSA A179-04 (updated 2006), Mortar and Grout For Unit Masonry.

1.2 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for epoxy coatings and galvanized protective coatings and touch-up products.
 - .2 Samples:
 - .1 Submit samples in accordance with 01 33 00 - Submittal Procedures
 - .2 Submit sample of each type of reinforcement and connector.
 - .3 Shop Drawings :
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Shop drawings consist of bar bending details, lists and placing drawings.
 - .3 On placing drawings, indicate sizes, spacing, location and quantities of reinforcement.
 - .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
-

1.3 QUALITY ASSURANCE

- .1 Upon request, provide Departmental Representative with certified copies of mill test reports of reinforcement steel, showing physical and chemical analysis, minimum 5 weeks prior to commencing masonry reinforcement work.
- .2 Upon request, provide Departmental Representative with information of proposed source of material to be supplied.
- .3 Pre-Installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Bar reinforcement: to CSA-A371 and CAN/CSA G30.18, Grade 400.
- .2 Wire reinforcement: to CSA-A371 and CSA G30.14, ladder type.
- .3 Corrosion protection: to CSA-S304, galvanized.

2.2 FABRICATION

- .1 Fabricate reinforcing in accordance with CAN/CSA-A23.1 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Ontario.
 - .2 Obtain Departmental Representative's approval for locations of reinforcement splices other than shown on placing drawings.
 - .3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.
 - .4 Ship reinforcement clearly identified in accordance with drawings.
-

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

- .1 Supply and install masonry reinforcement in accordance with CSA-A370, CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.
- .2 Prior to placing grout, obtain Departmental Representative's approval of placement of reinforcement.
- .3 Supply and install additional reinforcement to masonry as indicated.

3.3 REINFORCED LINTELS AND BOND BEAMS

- .1 Reinforce masonry lintels and bond beams as indicated.
- .2 Place and grout reinforcement in accordance with CSA-S304.1, CSA-A371, and CSA-A179.

3.4 GROUTING

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

3.5 SECURITY REINFORCEMENT

- .1 Refer to Section 04 20 00 - Concrete Unit Masonry for security reinforcing and grouting at exhibit rooms.

3.6 ANCHORS

- .1 Supply and install metal anchors as indicated.
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3.7 LATERAL SUPPORT AND ANCHORAGE

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

3.8 MOVEMENT JOINTS

- .1 Reinforcement will not be continuous across movement joints unless otherwise indicated. Terminate 25mm short of each side of joint.

3.9 FIELD BENDING

- .1 Do not field bend reinforcement except where indicated or authorized by Departmental Representative.
- .2 When field bending is authorized, bend without heat, applying a slow and steady pressure.
- .3 Replace bars which develop cracks or splits.

3.10 FIELD TOUCH-UP

- .1 Touch up damaged and cut ends of epoxy coated or galvanized reinforcement steel with compatible finish to provide continuous coating.

3.11 CLEANING

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

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CAN3 A165 SERIES-94(R2004), CSA Standards on Concrete Masonry Units covers: A165.1, A165.2, A165.3.

1.2 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Standard concrete block units: to CAN3-A165.1M94 (R2004) smooth face.
 - .1 Classification: H/15/A/M
 - .2 Size: modular 200 x 400 x 200 mm nominal size.
 - .3 Special shapes: provide bull-nosed units for all exposed corners. Provide purpose-made shapes with bull-nosed bottom edges for all lintels and purpose made shapes for bond beams.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Standard concrete block units.
 - .1 Bond: running.
 - .2 Coursing height: 200 mm for one block and one joint.
 - .3 Jointing: concave where exposed or where paint or other finish coating is specified.
 - .2 Concrete block lintels.
 - .1 Install reinforced concrete block lintels over openings in masonry where steel or reinforced concrete lintels are not indicated.
 - .2 End bearing: not less than 200 mm.
-

3.2 ACOUSTIC WALL CONSTRUCTION

- .1 STC 50 rated concrete block walls: fill block cavities with grout for full height of walls

3.3 CONSTRUCTION OF SECURE EXHIBIT ROOMS:

- .1 Use Type S, 12.5 MPa mortar.
- .2 Reinforce with one No. 10 rebar grouted in each vertical core. Anchor to floor slab and ceiling slab.

3.4 CLEANING

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

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/NPA A208.1-1999, Particleboard, Mat Formed Wood.

 - .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-07, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - .2 ASTM C 36/C 36M-03, Standard Specification for Gypsum Wallboard.
 - .3 ASTM C 578-07, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .4 ASTM C 1289-07, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .5 ASTM D 1761-06, Standard Test Methods for Mechanical Fasteners in Wood.
 - .6 ASTM D 5055-05, Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
 - .7 ASTM D 5456-07, Standard Specification for Evaluation of Structural Composite Lumber Products.

 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-M87, Hardboard.
 - .2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type.
 - .3 CAN/CGSB-51.34-M86 AMEND, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .4 CAN/CGSB-71.26-M88, Adhesive for Field-Gluing Plywood to Lumber Framing for Floor Systems.

 - .4 Canadian Standards Association (CSA International)
 - .1 CSA A123.2-03, Asphalt Coated Roofing Sheets.
 - .2 CAN/CSA-A247-M86(R1996), Insulating Fiberboard.
 - .3 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .4 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .5 CSA O112 Series-M1977(R2006), CSA Standards for Wood Adhesives.
 - .6 CSA O121-M1978(R2003), Douglas Fir Plywood.
 - .7 CSA O122-06, Structural Glued-Laminated Timber.
 - .8 CSA O141-05, Softwood Lumber.
 - .9 CSA O151-04, Canadian Softwood Plywood.
 - .10 CSA O153-M1980(R2003), Poplar Plywood.
 - .11 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
 - .12 CSA O437 Series-93(R2006), Standards on OSB and Waferboard.
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- .5 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .2 FSC-STD-20-002-2004, Structure and Content of Forest Stewardship Standards V2-1
 - .3 FSC Accredited Certified Bodies.
- .6 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2005.
- .7 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S706-02, Mineral Fibre Thermal Insulation for Buildings.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

- .1 Lumber identification by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.
- .2 Plywood, particleboard, OSB and wood based composite panel construction sheathing identification: by grademark and in accordance with CSA and ANSI standards.

1.4 WASTE, MANAGEMENT DISPOSAL

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Dimension Lumber: graded in accordance with NLGA Standard Grading Rules. Maximum moisture content of 19% for exterior work, 12% for interior work. S4S for members receiving finishes, S2S or S4S for members not receiving finishes.
 - .2 Schedule of Dimensioned Lumber uses:
 - .1 Structural wall components: Spruce-Pine-Fir (species group A or D) No. 2 or better.
 - .2 Non-structural wall components: Spruce-Pine-Fir (species group D) construction grade.
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.3 Other components not listed above: Spruce-Pine-Fir construction grade.

- .3 Furring, blocking, nailing strips, grounds, rough bucks, curbs, fascia backing and sleepers:
- .1 S2S is acceptable for concealed members.
 - .2 Board sizes: "Standard" or better grade.
 - .3 Dimension sizes: "Standard" light framing or better grade.
 - .4 Post and timber sizes: "Standard" or better grade.

2.2 PANEL MATERIALS

- .1 Douglas Fir plywood (DFP): to CSA 0121, standard construction.
- .2 Canadian softwood plywood: to CSA 0151, standard construction.
- .3 Plywood, OSB and wood based composite panels: to CAN/CSA-0323.
- .4 Interior mat-formed wood particleboard: to ANSI 208.1.
- .5 Mat-formed structural panelboards (OSB Wafer): to CAN3-0437.0.
- .6 Oriented Strand Board: to CSA 04370.

2.3 FASTENER FINISHES

- .1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for exterior work and pressure-preservative treated lumber.

PART 3 - EXECUTION

3.1 PREPARATION

- .1 Treat surfaces of material with wood preservative, before installation.
 - .2 Apply preservative by dipping, or by brush to completely saturate and maintain wet film on surface for a minimum 3 minute soak on lumber, and a 1 minute soak on plywood.
 - .3 Re-treat surfaces exposed by cutting, trimming or boring, with liberal brush application of preservative before installation.
 - .4 Treat the following material:
 - .1 Wood cants, curbs, nailers, sleepers on roof deck.
 - .2 Wood furring for signage on outside surface of exterior masonry and concrete walls.
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- .3 Wood sleepers supporting wood subflooring over concrete slabs in contact with ground or fill.
- .4 Fascia backing.
- .5 Sole lates to wood stud walls.

3.2 INSTALLATION

- .1 Comply with requirements of NBC 2005 supplemented by following paragraphs.
 - .2 Install members true to line, levels and elevations, square and plumb.
 - .3 Construct continuous members from pieces of longest practical length.
 - .4 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.
 - .5 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.
 - .1 Align and plumb faces of furring and blocking to tolerance of 1:600.
 - .6 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
 - .7 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
 - .8 Install sleepers as indicated.
 - .9 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.
 - .10 Provide electrical equipment backboards for mounting electrical equipment as indicated. Use 19 mm thick plywood on 19 mm x 38 mm furring around perimeter, and at a maximum 300 mm o.c. intermediate spacing.
 - .11 Install wood backing, dressed, tapered and recessed slightly below top surface of roof insulation for roof hopper.
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3.3 CARPENTRY IN CONNECTION WITH ROOFING

- .1 Construct wood curbs for roof mounted equipment, anchors and roof penetrations, except drains.
 - .1 Curb heights measured from highest point of roof adjacent to curb shall be a minimum 200 mm.
 - .2 Mechanically fasten panel sheathing to parapets and walls at roof/wall parapet junctions.
 - .3 Support edges of plywood backslope sheets. Bevel edge of sheets that meet structural deck.
 - .4 Attach curbs, control joint boxes, blocking and framing directly to structure.

3.4 ERECTION

- .1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .2 Countersink bolts where necessary to provide clearance for other work.
- .3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-99, Particleboard.
 - .2 ANSI A208.2-02, Medium Density Fibreboard (MDF).
 - .3 ANSI/HPVA HP-1-2004, Standard for Hardwood and Decorative Plywood.
 - .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM E 1333-96(2002), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emissions Rates from Wood Products Using a Large Chamber.
 - .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
 - .1 Architectural Woodwork Quality Standards Illustrated, 8th edition, Version 1.0 2003.
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-11.3-M87, Hardboard.
 - .5 Canadian Plywood Association (CanPly)
 - .1 The Plywood Handbook 2005.
 - .6 Canadian Standards Association (CSA International)
 - .1 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA O121-M89(R2003), Douglas Fir Plywood.
 - .4 CAN/CSA O141-05, Softwood Lumber.
 - .5 CSA O151-04, Canadian Softwood Plywood.
 - .6 CSA O153-M1980(R2003), Poplar Plywood.
 - .7 CSA Z760-94 (R2005), Life Cycle Assessment.
 - .7 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001-2004, FSC Principle and Criteria for Forest Stewardship.
 - .8 National Hardwood Lumber Association (NHLA)
 - .1 Rules for the Measurement and Inspection of Hardwood and Cypress 1998.
 - .9 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2005.
 - .10 Underwriters Laboratories of Canada (ULC)
 - .1 CAN4-S104-80(R1985), Standard Method for Fire Tests of Door Assemblies.
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- .2 CAN4-S105-85(R1992), Standard Specification for Fire Door Frames, meeting the Performance Required by CAN4-S104.

1.2 SUBMITTALS

- .1 Shop Drawings Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .2 Indicate materials, thicknesses, finishes and hardware.
- .2 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit duplicate samples: sample size 300 x 300 mm of wood products.

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 REGULATORY REQUIREMENTS

- .1 Wood fire rated frames and panels: listed and labelled by an organization accredited by Standards Council of Canada in conformance with CAN4-S104 and CAN4-S105 for ratings specified or indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .1 Protect materials against dampness during and after delivery.
 - .2 Store materials in ventilated areas, protected from extreme changes of temperature or humidity.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with 01 74 21 - Construction/Demolition Waste Management and Disposal.
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PART 2 - PRODUCTS

2.1 LUMBER MATERIAL

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 19% or less in accordance with following standards:
 - .1 CAN/CSA-0141.
 - .2 NLGA Standard Grading Rules for Canadian Lumber.
 - .3 AWMAC custom grade, moisture content as specified.
- .2 Machine stress-rated lumber is acceptable.
- .3 Hardwood lumber: moisture content 7% or less in accordance with following standards:
 - .1 National Hardwood Lumber Association (NHLA).
 - .2 AWMAC custom grade, moisture content as specified.

2.2 PANEL MATERIAL

- .1 Douglas fir plywood (DFP): to CSA 0121, standard construction.
 - .2 Canadian softwood plywood (CSP): to CSA 0151, standard construction.
 - .3 Hardwood plywood: to CSA 0115.
 - .4 Poplar plywood (PP): to CSA 0153, standard construction.
 - .5 Particleboard: to ANSI A208.1.
 - .6 Hardboard: to CAN/CGSB-11.3, minimum density of 496 kg/cu.m. (31 lb/ft.). Type 2 - tempered, 6 mm nominal thickness unless noted otherwise, smooth one side.
 - .7 Medium density fibreboard (MDF): to ANSI A208.2, density 640-800 kg/m³.
 - .1 Medium density fibreboard must be manufactured such that formaldehyde emissions do not exceed 0.30 ppm (0.260 m²/m³) when tested in accordance with ASTM E 1333.
 - .8 Low density fibreboard: to CSA-A247M.
 - .1 Urea-formaldehyde free.
 - .9 Decorative overlaid composite panels.
 - .1 Decorative overlay, heat and pressure laminated with suitable resin to thickness indicated MDF urea-formaldehyde free core.
 - .2 Overlay bonded to both faces where exposed two sides, and when panel material require surface on one side only,
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reverse side to be overlaid with a plain (buff) balancing sheet.

- .3 Furniture finish: solid colour selected by Departmental Representative.
 - .4 Edge finishing: matching melamine and polyester overlay edge strip with self-adhesive.
- .10 Manufacturing process must adhere to Lifecycle Assessment Standards as ISO 14040/14041 LCA Standards, CSA Z760 LCA Standards.

2.3 ACCESSORIES

- .1 Nails and staples: to CSA B111; galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain finish elsewhere.
- .2 Wood screws: plain steel, type and size to suit application.
- .3 Splines: wood.
- .4 Adhesive: recommended by manufacturer.
- .5 Use least toxic sealants, adhesives, sealers, and finishes necessary to comply with the requirements of this section.
- .6 Coat rods: triple chrome-plated 2.34 mm thick, 32 mm o.d. steel tube; screwed end brackets, include rod support at centre.
- .7 Coat hooks: Number as indicated. Standard of acceptance: Richelieu BP6506-140.
- .8 Key hooks: Number as indicated. Standard of acceptance: Onward 2735, 38 mm cornice hooks.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Do finish carpentry to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
 - .2 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
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- .3 Form joints to conceal shrinkage.

3.2 CONSTRUCTION

- .1 Fastening:
 - .1 Position items of finished carpentry work accurately, level, plumb, true and fasten or anchor securely.
 - .2 Design and select fasteners to suit size and nature of components being joined. Use proprietary devices as recommended by manufacturer.
 - .3 Set finishing nails to receive filler. Where screws are used to secure members, countersink screw in round smooth cut hole and plug with wood plug to match material being secured.
 - .4 Replace items of finish carpentry with damage to wood surfaces including hammer and other bruises.
- .2 Standing and running trim:
 - .1 Butt and cope internal joints of baseboards to make snug, tight, joint. Cut right angle joints of casing and base with mitred joints.
 - .2 Fit backs of baseboards and casing snugly to wall surfaces to eliminate cracks at junction of base and casing with walls.
 - .3 Make joints in baseboard, where necessary using a 45 degrees scarf type joint.
 - .4 Install door and window trim in single lengths without splicing.
- .3 Interior and exterior frames:
 - .1 Set frames with plumb sides and level heads and sills and secure.
- .4 Hardware: install as noted.

3.3 SCHEDULES

- .1 Sills: MDF grade, minimum 19 mm thick or as noted, bullnose edge. Provide trim under cover gypsum board edge.
- .2 Provide 19 mm thick, preservative treated G1S plywood telephone backboard at main entry.
- .3 Provide 19mm thick, painted, G1S plywood backboards for equipment in LAN room and telephone room, and as indicated.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1-99, Particleboard.
 - .2 ANSI A208.2-94, Medium Density Fiberboard (MDF).

 - .2 American Society for Testing and Materials (ASTM)
 - .1 ASTM E 1333-96 (2002), Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates From Wood Products Using a Large Chamber.
 - .2 ASTM D 2832-92(2005), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .3 ASTM D 5116-06, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

 - .3 Architectural Woodwork Manufacturers Association of Canada (AWMAC)
 - .1 AWMAC Quality Standards for Architectural Woodwork , 2003.

 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.
 - .2 CAN/CGSB-11.3-M87, Hardboard.

 - .5 Canadian Standards Association (CSA)
 - .1 CAN/CSA A 247-M86(R1996), Insulating Fibreboard.
 - .2 CSA B111-74(R2003), Wire Nails, Spikes and Staples.
 - .3 CAN/CSA G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .4 CSA O112.4-M1977(R1999), Standards for Wood Adhesives.
 - .5 CSA O112.5-Series-M-1977(R1999), Urea Resin Adhesives for Wood (Room- and High-Temperature Curing).
 - .6 CSA O112.7-Series M-1977(R1999), Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room-and Intermediate-Temperature Curing).
 - .7 CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
 - .8 CSA O121-M89(R2003), Douglas Fir Plywood.
 - .9 CAN/CSA O141-05, Softwood Lumber.
 - .10 CSA O151-04, Softwood Plywood.
 - .11 CSA O153-M1980(R2003), Poplar Plywood.
 - .12 CSA Z760-94(R2004), Life Cycle Assessment.
 - .13 CAN3-0188.1-M78, Interior Mat-Formed Wood Particleboard.

 - .6 Environmental Choice Program (EPC)
 - .1 ECP-44-92, Adhesives.
 - .2 ECP-45-92, Sealants and Caulking Compounds.
 - .3 ECP-76-98, Surface Coatings.
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- .7 International Organization for Standardization (ISO)
 - .1 ISO 14040-97, Environmental Management-Life Cycle Assessment - Principles and Framework.
 - .2 ISO 14041-98, Environmental Management-Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis.
- .8 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA LD-3-2005.
- .9 National Hardwood Lumber Association (NHLA)
 - .1 Rules for the Measurement and Inspection of Hardwood and Cypress , January 1996.
- .10 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber , 2000.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .1 Scales: profiles full size, details ½ full size.
- .3 Indicate materials, thicknesses, finishes and hardware.
- .4 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

1.3 SAMPLES

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit duplicate samples: sample size 300 x 300 mm unless specified otherwise of wood products.
 - .3 Submit duplicate 150 x 150 mm colour samples of laminated plastic for colour selection.
 - .4 Submit duplicate samples of laminated plastic joints, edging, cutouts and postformed profiles.
 - .5 Submit duplicate samples of PVC edging.
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1.4 MOCK-UPS

- .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .2 Shop prepare one base cabinet unit wall cabinet, counter top, complete with hardware and shop applied finishes, and install on project in designated location.
- .3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with this work.
- .4 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, handle, store and protect materials of this section in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Protect millwork against dampness and damage during and after delivery.
- .3 Store millwork in ventilated areas, protected from extreme changes of temperature or humidity.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management.

1.7 GUARANTEE AND INSPECTION

- .1 Architectural woodwork shall be manufactured and installed to the specified AWMAC Quality Standards and shall be subject to an inspection at the plant and/or site by an appointed inspector, approved by the local AWMAC Chapter. Inspection costs shall be included in the tender price for this project.
 - .2 Submit shop drawings to the AWMAC Chapter office for review before the work commences.
 - .3 Work that does not meet AWMAC Quality Standards, or as specified, shall be replaced, reworked and/or refinished by the architectural woodworker at no additional cost to the Contract, and to the satisfaction of AWMAC and the Departmental Representative.
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- .4 The architectural woodwork contractor shall provide Maintenance Bond, dated as per the date of Substantial Performance of the Work, and valid for a two year period. The Maintenance Bond shall cover the full cost of replacing, reworking and/or refinishing to make good defects in architectural woodwork due to faulty workmanship or defective materials supplied by the architectural woodworker. "Full cost" includes the removal of defective work and materials, shipping costs, installation and making good adjacent finishes and materials, and inspection costs incurred by the Owner and Departmental Representative to verify acceptance of the remedial work.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Softwood lumber: unless specified otherwise, S4S, moisture content 15% or less in accordance with following standards:
- .1 CAN/CSA-0141.
 - .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 The manufacturing process must adhere to Lifecycle Assessment (LCA) Standards as per ISO 14040/14041 LCA Standards, CSA Z760 94 Life Cycle Assessment.
- .4 Hardwood lumber: moisture content 7 % or less in accordance with following standards:
- .1 National Hardwood Lumber Association (NHLA).
 - .2 AWMAC custom grade, moisture content as specified.
- .5 Canadian softwood plywood (CSP): to CSA 0151, standard construction.
- .6 Hardwood plywood: Birch plywood to CSA 0115, AWMAC Grade 1 (premium), Grade A, rotary select, white birch species for clear finish. Veneer plywood core assembly for casework, solid MDF/veneer composite or lumber core for doors and drawer fronts, prefinished for cabinets.
- .7 Poplar plywood (PP): to CSA 0153, standard construction.
- .8 Interior mat-formed wood particleboard: to CAN3-0188.1 and ANSI A208.1. minimum density of 720 kg/m³, Grade RRR.
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- .9 Hardboard
 - .1 to CAN/CGSB-11.3, minimum density of 496 kg/cu.m. (31 lb/cu.ft.) Type 2 - tempered, 6 mm nominal thickness unless noted otherwise, smooth one side.
 - .10 MDF (medium density fibreboard) core: to ASTM D-1037 and ANSI A208.2, Premium Grade, minimum density 769 kg/m², thickness as indicated.
 - .1 Medium density fibreboard must:
 - .1 Meet the performance requirements of ANSI A208.2.
 - .2 Be manufactured such that formaldehyde emissions do not exceed 0.30 ppm (0.260 m²/m³) when tested in accordance with ASTM E 1333.
 - .11 Low density fibreboard: to CSA-A247M.
 - .1 Ensure fibreboard is not manufactured with binders, coatings or adhesives that contain resins or other compounds that have potential to release formaldehyde during final product use.
 - .12 Manufacturing process must adhere to Lifecycle Assessment Standards as ISO 14040/14041 LCA Standards, CSA Z760 LCA Standards.
 - .13 Decorative overlaid composite panel - Melamine Component panels (MCP):
 - .1 Decorative overlay, heat and pressure laminated with suitable resin to thickness indicated Grade R particleboard core to NEMA LQ1 standard.
 - .2 Overlay bonded to both faces where exposed two sides, and when panel material requires surface on one side only, reverse side to be overlaid with a plain (buff) balancing sheet.
 - .3 Furniture finish: solid colour selected by Departmental Representative.
 - .4 Edge Finishing: matching melamine and polyester overlay edge strip with self adhesive.
 - .14 Laminated plastic for flatwork: to NEMA LD3, General Purpose Type, composed of phenolic resin impregnated Kraft filler stock, based on printed pattern, colour range with furniture suede finish. 1.27 mm thick for countertops and splashbacks, window sills and horizontal surfaces. 0.76 mm thick for all exposed vertical surfaces.
 - .15 Laminated plastic for postforming work: to NEMA LD 3, Postforming Type, 1.27 mm thick based on printed pattern colour range with furniture finish.
 - .16 Laminated plastic backing sheet: Backer Type not less than 0.76 mm thick or same thickness and colour as face laminate.
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- .17 Laminated plastic liner sheet: Liner Type, 0.76 mm thick, white colour.
- .18 Nails and staples: to CSA B111, galvanized to CAN/CSA-G164 for exterior work, interior humid areas and for treated lumber; plain steel finish elsewhere.
- .19 Wood screws: plainsteel, type and size to suit application.
- .20 Splines: wood.
- .21 Edging: 3 mm thick PVC edgeband to all casework. Colour selected by Departmental Representative.
- .22 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Acceptable materials: ECP-67.
- .23 Sealant: One part silicone to CAN/CGSB-19.13.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Acceptable materials: ECP-45.
- .24 Laminated plastic adhesive: contact adhesive to CAN/CGSB-71.20.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Acceptable materials: ECP-44.
- .25 Draw bolts and splines: as recommended by fabricator.

2.2 HARDWARE

- .1 Refer to Section 08 70 05 - Cabinet and Miscellaneous Hardware.

2.3 FABRICATION

- .1 Fabricate units and components as detailed on drawings and in accordance with AWMAC requirements for custom grade work.
 - .2 Countertops: provide 19 mm thick particleboard core for all countertops and work surfaces with portformed full wrap edge unless detailed otherwise. Vanities and kitchen counters to have full wrap "no drip" edge unless detailed otherwise.
-

- .3 Type 1 Casework: HPDL Finished Flush Overlay Style.
 - .1 Doors:
 - .1 HPDL finished 19 mm thick particleboard core, flush style, colour matched 3 mm thick PVC, edge band.
 - .2 Drawer Units:
 - .1 HPDL finished 19 mm thick particleboard core applied fronts, dadoed, lock joint, thru dovetailed, multiple dovetailed or dowelled and glued to drawer sides; drawer bodies constructed of minimum 13 mm thick plywood or MCP; 6 mm thick minimum plywood, tempered hardboard or 13 mm MCP bottom, dadoed into fronts and sides and securely attached to backs.
 - .3 Casework:
 - .1 All interior vertical surfaces 19 mm thick MCP Panels. Concealed backs to be 6 mm thick minimum plywood, tempered hardboard or MCP. All visible exterior
 - .2 All visible exterior surfaces HPDL finished 19 mm thick particleboard core, flush style, 3 mm thick PVC edge band.
 - .4 Shelves:
 - .1 19 mm thick MCP panels up to 800 mm in length, 25 mm thick if 800 - 1200 mm in length, 32 mm thick if over 1200 mm in length, all complete with 3 mm thick PVC edge band on all four edges.
 - .4 Type 2 Casework: Hardwood Veneer Plywood Flush Overlay Style.
 - .1 Doors:
 - .1 19 mm thick plywood, composite or lumber core for doors and drawer fronts, colour matched 3 mm thick PVC, edge band.
 - .2 Drawer Units:
 - .1 drawer bodies minimum 13 mm thick veneer plywood, drawer fronts 19 mm thick composite or lumber core plywood; dadoed, lock joint, thru dovetailed, multiple dovetailed or dowelled and glued to drawer sides; 6 mm thick minimum plywood, tempered hardboard or 13 mm MCP bottom, dadoed into fronts and sides and securely attached to backs.
 - .3 Casework:
 - .1 19 mm thick veneer plywood. Concealed backs to be 6 mm thick minimum plywood, tempered hardboard or MCP.
 - .4 Shelves:
 - .1 19 mm thick MCP panels up to 800 mm in length, 25 mm thick if 800 - 1200 mm in length, 32 mm thick if over 1200 mm in length, all complete with 3 mm thick PVC edge band on all four edges.
 - .5 Edge Band:
 - .1 Provide 3 mm thick colour matched PVC edge, width to suit material thickness, to all exposed plywood edges unless detailed otherwise.
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- .5 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive finish.
- .6 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .7 Shelving to cabinetwork to be adjustable unless otherwise noted.
- .8 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .9 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

2.4 LAMINATE INSTALLATION

- .1 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
- .2 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cutouts.
- .4 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
- .5 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .6 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .7 Apply laminated plastic liner sheet to interior of cabinetry.

2.5 FINISHING

- .1 Refer to detail drawings for specific requirements for finishing of various components not outlined below.
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- .2 Refer to section 09 91 23 - Interior Painting for products and requirements for stained finishes.
 - .1 Stained Finishes:
 - .1 Shop finish all shop fabricated veneer plywood cabinetwork.
 - .2 Finish concealed surfaces with one coat of sealer.
 - .3 Finish semi-concealed surfaces with one coat of sealer and two coats of semi-gloss varnish.
 - .4 Finish exposed surfaces with one coat of sealer and two coats of semi-gloss varnish, sand before applying varnish.
- .3 Site finish any site or shop fabricated painted millwork.
- .4 High Pressure Decorative Laminate Finish:
 - .1 Apply high pressure plastic laminate to areas indicated on drawings as per NEMA LD 3, Appendix A. Use matching plastic laminate to edge band exposed core materials.
 - .2 Colours and Textures: colours and textures will be chosen by the Departmental Representative from the following manufacturer's full range:
 - .1 Wilsonart Decorative Laminates
 - .2 Formica Decorative Laminates
 - .3 Arborite by Forbo Decorative Laminates (Division of TTW Canada)
 - .4 Nevamar Decorative Laminates
 - .5 Pionite Laminates
- .5 Finish both sides and all edges of doors and drawer fronts to receive plastic laminate.
- .6 Apply plastic laminate backing material to reverse (underside and vertical surface) side of core material receiving plastic laminate finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- .1 Do architectural woodwork to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.
 - .2 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.
 - .3 Fasten and anchor millwork securely. Provide heavy duty fixture attachments for wall mounted cabinets.
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- .4 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm o.c., 75 mm from edge. Make flush hairline joints.
- .5 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.
- .6 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant.
- .7 Apply bituminous coating over wood framing members in contact with masonry or cementitious construction.
- .8 Fit hardware accurately and securely in accordance with manufacturer's written instructions.
- .9 Install all cabinet hardware specified in Section 08 70 05 - Cabinet and Miscellaneous Hardware.
- .10 Site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where approved. Slightly bevel arises. Install laminated plastic plumb, true and square, neatly scribed to adjoining surfaces.
- .11 For site application, offset joints in plastic laminate facing from joints in core.
- .12 Make allowances around perimeter where fixed objects pas through or project into laminated plastic work, to permit normal movement without restriction.
- .13 Provide cut-outs for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.
- .14 At junction of laminated plastic counter back splash and adjacent wall finish, aply small bead of clear sealant.

3.2 CLEANING

- .1 Clean millwork and cabinet work inside cupboards and drawers and outside surfaces.
 - .2 Remove excess glue from surfaces.
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3.3 PROTECTION

- .1 Protect millwork and cabinet work from damage until final inspection.
- .2 Cover finished laminated plastic veneered surfaces with heavy Kraft paper or put in cartons during shipment. Protect installed laminated surfaces by approved means. Do not remove until immediately prior to final inspection.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI 208.1-99, Particleboard.
 - .2 ANSI A208.2-02, Medium Density Fibreboard (MDF) for Interior Applications.

 - .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM D 2832-92(R1999), Standard Guide for Determining Volatile and Nonvolatile Content of Paint and Related Coatings.
 - .2 ASTM D 5116-97, Standard Guide For Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials/Products.

 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

 - .4 Canadian Standards Association (CSA International)
 - .1 CSA O112-M1977(R2001), Standards for Wood Adhesives.
 - .2 CSA O112.5-1.1-Series-M-1977(R2001), Urea Resin Adhesives for Wood (Room- and High-Temperature Curing).
 - .3 CSA O112.7-1.1-Series M-1977(R2001), Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room- and Intermediate-Temperature Curing).
 - .4 CSA O121-M1978(R1998), Douglas Fir Plywood.
 - .5 CAN/CSA O141-91(R1999), Softwood Lumber.
 - .6 CSA O151-M1978(R1998), Canadian Softwood Plywood.
 - .7 CSA O153-M1980(R1998), Poplar Plywood.

 - .5 Environmental Choice Program (EPC)
 - .1 CCD-044-95, Adhesives.
 - .2 CCD-045-95, Sealants and Caulking Compounds.
 - .3 CCD-048-95, Surface Coatings Recycled Water-borne.
 - .4 CCD-047a-98, Paints - Surface Coatings.
 - .5 CCD-048b-98, Stains - Surface Coatings.
 - .6 CCD-048c-98, Varnishes - Surface Coatings.

 - .6 National Electrical Manufacturers Association (NEMA)
 - .1 NEMA LD3-2005, High Pressure Decorative Laminates.

 - .7 Scientific Equipment and Furniture Association (SEFA)
 - .1 SEFA 8-99, Laboratory Furniture.
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1.2 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for adhesives, solvents and cleaners.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit duplicate samples of joints, edging, cutouts and postformed profiles.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .4 Closeout Submittals:
 - .1 Provide maintenance data for laminate work for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 QUALITY ASSURANCE

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

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Storage and Protection:
 - .1 Deliver, handle, store and protect materials of this section in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Maintain relative humidity between 25 and 60% at 22 degrees C during storage and installation.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
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PART 2 - PRODUCTS

2.1 MATERIALS

- .1 High Pressure Decorative Laminate Finish:
 - .1 Apply high pressure plastic laminate to areas indicated on drawings as per NEMA LD 3, Appendix A. Use matching plastic laminate to edge band exposed core materials.
 - .2 Colours and Textures: colours and textures will be chosen by the Departmental Representative from the following manufacturer's full range:
 - .1 Wilsonart Decorative Laminates
 - .2 Formica Decorative Laminates
 - .3 Arborite by Forbo Decorative Laminates.
 - .4 Nevamar Decorative Laminates
 - .5 Pionite Laminates
 - .2 Laminated plastic for flatwork: to NEMA LD 3.
 - .1 Type: General Purpose.
 - .2 Size: 1.27 mm thick for countertops, splashbacks, window sills and horizontal surfaces. 0.76 mm thick for vertical surfaces.
 - .3 Colour: multilayered.
 - .4 Pattern: printed pattern.
 - .5 Finish: furniture.
 - .3 Laminated plastic for postforming work: to NEMA LD 3.
 - .1 Type: Postforming.
 - .2 Size: 1.27 mm thick.
 - .3 Colour: multilayered.
 - .4 Pattern: printed pattern.
 - .5 Finish: furniture.
 - .4 Laminated plastic for backing sheet: to NEMA LD 3.
 - .1 Type: Backer.
 - .2 Size: not less than 0.76 mm thick or same thickness as face laminate.
 - .3 Colour: same colour as face laminate.
 - .5 Laminated plastic for liner: to NEMA LD 3.
 - .1 Type: Cabinet Liner.
 - .2 Size: 0.76 mm thick
 - .3 Colour: white.
 - .6 Laminated plastic adhesive: contact adhesive to CAN/CGSB-71.20.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Acceptable materials: ECP-44.
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- .7 Sealer: water resistant sealer or glue acceptable to laminate manufacturer.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Acceptable materials: ECP-67.
- .8 Sealants: One part silicone to CAN/CGSB-19.13.
 - .1 Test for acceptable VOC emissions in accordance with ASTM D 2369 and ASTM D 2832.
 - .2 Acceptable materials: ECP-45.
- .9 Draw bolts and splines: as recommended by fabricator.

2.2 FABRICATION

- .1 Comply with NEMA LD 3, Annex A.
 - .2 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.
 - .3 Ensure adjacent parts of continuous laminate work match in colour and pattern.
 - .4 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cutouts.
 - .5 Form shaped profiles and bends as indicated, using postforming grade laminate to laminate manufacturer's instructions.
 - .6 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
 - .7 Apply laminate backing sheet to reverse side of core of plastic laminate work.
 - .8 Apply laminated plastic liner sheet to interior of cabinetry where indicated.
-

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install work plumb, true and square, neatly scribed to adjoining surfaces.
- .2 Make allowances around perimeter where fixed objects pass through or project into laminated plastic work to permit normal movement without restriction.
- .3 Use draw bolts and splines in countertop joints. Maximum spacing 450 mm on centre, 75 mm from edge. Make flush hairline joints.
- .4 Provide cutouts for inserts, grilles, appliances, outlet boxes and other penetrations. Round internal corners, chamfer edges and seal exposed core.
- .5 At junction of laminated plastic counter back splash and adjacent wall finish, apply small bead of sealant.
- .6 Site apply laminated plastic to units as indicated. Adhere laminated plastic over entire surface. Make corners with hairline joints. Use full sized laminate sheets. Make joints only where approved. Slightly bevel arrises.
- .7 For site application, offset joints in plastic laminate facing from joints in core.

3.3 PROTECTION

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

3.4 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Perform care and cleaning with NEMA LD 3, Annex B.
- .3 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames .

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 208-95(2001), Specification for Cellulosic Fiber Insulating Board.
 - .2 ASTM C 591-07, Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation.
 - .3 ASTM C 612-04, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
 - .4 ASTM C 726-05, Standard Specification for Mineral Fiber Roof Insulation Board.
 - .5 ASTM C 728-05, Standard Specification for Perlite Thermal Insulation Board.
 - .6 ASTM C 1126-04, Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation.
 - .7 ASTM C 1289-057, Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
 - .8 ASTM E 96/E 96M-05, Standard Test Methods for Water Vapour Transmission of Materials.
 - .2 Canadian Gas Association (CGA)
 - .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
 - .2 CAN/CGA-B149.2-05, Propane Storage and Handling Code.
 - .3 Canadian General Standards Board (CGSB)
 - .1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.
 - .4 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604-M91, Standard for Type A Chimneys.
 - .2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .3 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .4 CAN/ULC-S704-03, Standard for Thermal Insulation Polyurethane and Polyisocyanurate, Boards, Faced.
 - .5 CAN/ULC-S770-00, Determination of Long Term Thermal Resistance of Closed Cell Thermal Insulating Foams.
 - .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
-

1.2 SUBMITTALS

- .1 Manufacturer's Certification: provide the following to the Departmental Representative.
 - .1 Submit proof of manufacturer's CCMC listing and listing number.
 - .2 Submit proof of manufacturer's ISO 9003 registration and compliance.
 - .3 Submit proof of manufacturer's ISO 14001 registration and compliance.
 - .4 Submit proof of manufacturer's participation certificate for Environmental Choice Program.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's insulation products and adhesives.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions, including special handling criteria, installation sequence and cleaning procedures.

1.3 PRODUCT DELIVERY STORAGE AND HANDLING

- .1 Deliver materials in factory wrapped bundles with labels indicating:
 - .1 Manufacturer or trade name.
 - .2 Compliance with CGSB standard and type or CHMC Acceptance Number.
 - .3 Material type and thickness.
- .2 Protect materials from direct exposure to sunlight and physical damage.

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
-

PART 2 - PRODUCTS

2.1 INSULATION

- .1 Foundations: Concrete faced insulated wall panels.
 - .1 Insulation: type 4, 75mm thick.
 - .2 Concrete facing: 8mm thick latex-modified concrete facing.
 - .3 Thickness: 83mm overall, nominal thickness.
 - .4 Size: 610mm x 1220mm panel size.
 - .5 Standard of Acceptance: Tech-Crete.

- .2 Cavity wall: Mineral fibre to CAN/ULC-S702. CFC free and HCFC free with ozone depletion potential better than zero EcoLogo certified.
 - .1 Type: 1.
 - .2 Density: 72 kg/m³.
 - .3 Surfaces: unsurfaced asphalt and fibre glass scrim reinforcement and kraft paper foil.
 - .4 Thickness: 75 mm.
 - .5 Size: maximum practical size.
 - .6 Standard of Acceptance: Roxul

2.2 ADHESIVE

- .1 Adhesive (for polystyrene): to CGSB 71-GP-24.
 - .1 Type: A.
 - .2 VOC emission: low.

- .2 Primer for concrete surfaces: as per manufacturer's recommendations.

2.3 ACCESSORIES

- .1 Insulation clips: impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.

 - .2 Tech-Crete fastening clips and purpose made corner flashings.
-

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 WORKMANSHIP

- .1 Install insulation after building substrate materials are dry.
- .2 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN4-S604 type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 type B and L vents.
- .5 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.
- .6 Offset both vertical and horizontal joints in multiple layer applications.
- .7 Do not enclose insulation until it has been reviewed by Departmental Representative.

3.3 EXAMINATION

- .1 Examine substrates and immediately inform Departmental Representative in writing of defects.
 - .2 Prior to commencement of work ensure:
 - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.
-

3.4 CAVITY WALL INSTALLATION

- .1 Embed insulation boards in vapour barrier on outer surface of inner wythe of wall cavity on bed of adhesive.
- .2 Apply adhesive to insulation board by notched trowel in accordance with manufacturer's recommendations.
- .3 Leave insulation board joints unbonded over line of expansion and control joints. Bond a continuous 150 mm wide 0.15 mm modified bituminous membrane over expansion and control joints using compatible adhesive and primer before application of insulation.

3.5 PERIMETER FOUNDATION INSULATION

- .1 Exterior application: extend boards to top of grade beam or foundation wall. Install on exterior face of perimeter foundation wall with adhesive or purpose made fastening clips, as recommended by manufacturer.
- .2 Leave 3 mm vertical joints to be filled with sealant. Extend concrete faced insulation panels minimum 300 mm below grade. Backfill carefully against concrete faced insulation panels.
- .3 Install purpose made prefinished sheet metal corner flashings to all outside corners. Extend corner guards to 75mm below finished grade.

3.6 CLEANING

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

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .2 ASTM C 665-06, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .3 ASTM C 1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 Canadian Gas Association (CGA)
 - .1 CAN/CGA-B149.1-05, Natural Gas and Propane Installation Code Handbook.
 - .2 CAN/CGA-B149.2-05, Propane Storage and Handling Code.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
- .4 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S604-M1991, Type A Chimneys.
 - .2 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation.

1.2 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

- .1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations in accordance with Section 01 32 16.07 - Construction Progress Schedules - Bar (GANTT) Chart.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordinate with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
-

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 INSULATION

- .1 Blanket mineral or glass fibre (thermal): to ASTM C 665., EcoLogo certified with a minimum 35% recycled content.
 - .1 Type: 1.
 - .2 Thickness: as indicated.
 - .3 Standard of Acceptance: Owens Corning pink fibreglass, CertainTeed Fibre Glass Building Insulation.
- .2 Batt mineral or glass fibre (acoustic): to ASTM C 665., EcoLogo certified with a minimum 35% recycled content, purpose made as acoustical insulation.
 - .1 Type: 1.
 - .2 Thickness: 89 mm.
 - .3 Standard of Acceptance: Owens Corning QuietZone, CetrainTeed NoiseReducer Sound Attenuation Batts.

2.2 ACCESSORIES

- .1 Insulation clips:
 - .1 Impale type, perforated 50 x 50 mm cold rolled carbon steel 0.8 mm thick, adhesive back, spindle of 2.5 mm diameter annealed steel, length to suit insulation, 25 mm diameter washers of self locking type.
 - .2 Nails: galvanized steel, length to suit insulation plus 25 mm, to CSA B111.
 - .3 Staples: 12 mm minimum leg.
 - .4 Tape: as recommended by manufacturer.
-

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSULATION INSTALLATION - THERMAL

- .1 Install insulation to maintain continuity of thermal protection to building elements and spaces.
- .2 Fit insulation closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.
- .3 Do not compress insulation to fit into spaces.
- .4 Keep insulation minimum 75 mm from heat emitting devices such as recessed light fixtures, and minimum 50 mm from sidewalls of CAN/ULC-S604 Type A chimneys and CAN/CGA-B149.1 and CAN/CGA-B149.2 Type B and L vents.
- .5 In locations where insulation is installed vertically and is unsupported by another building material on both sides, retain insulation in place using insulation clips and light guage wire mesh.
- .6 Do not enclose insulation until it has been reviewed by Departmental Representative.

3.3 INSULATION INSTALLATION - ACOUSTIC

- .1 Install acoustic batt insulation between studs in sound rated partitions in areas indicated. Ensure batts fill space continuously from floor to ceiling, over door and window openings, below window openings and around corners.
 - .2 Coordinate installation of acoustic insulation with other work.
 - .3 Ensure insulation is packed around cut openings in gypsum board, behind outlet boxes, around plumbing, heating or structural items passing through the system or at abutting walls.
-

3.4 CLEANING

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

1.1 General

1.2 SECTION INCLUDES

- .1 This Section includes requirements for supply and installation of a spray applied rigid cellular polyurethane thermal insulation foam to provide a continuous air seal/integral thermal insulation assembly at designated wall locations.

1.3 ENVIRONMENTAL REQUIREMENTS

- .1 Maintain minimum ambient temperature of 5°C for minimum 24 hours before, during and 72 hours after completion of application.

1.4 SUBMITTALS

- .1 Provide MSDS data sheets to Departmental Representative prior to the start of any work.

1.5 Products

1.6 SPRAY APPLIED POLYURETHANE FOAM

- .1 Spray Applied Polyurethane Foam Insulation/Air Barrier system, in accordance with CAN/ULC-S705.1-98 Standards for Thermal Insulation Spray Applied Rigid Polyurethane Foam, Medium Density, Material specification (supercedes CAN/CGSB-51.23-92). Barrier shall meet or exceed the following physical performance properties:
 - .1 Density: to ASTM D1622: 32-35 kg/m³ min. (2.0-2.2 lb/cu.ft.)
 - .2 Compressive Strength: to ASTM D1621: 174 kPa min.
 - .3 Tensile Strength: to ASTM D1623: 212 kPa min.
 - .4 Dimensional Stability: to ASTM D2126 (% change in volume at 28 days); -20°C: +0.47% min; 70°: R.H.> 97 + 3 %: +2.58% max; 100°C: +5.89% max.
 - .5 Water Absorption (% volume): to ASTM 2842 (96 hrs): 0.62% max.
 - .6 Water Vapour Permeance: to ASTM E96 (25mm): 86.6 ng/Pa.sm² max.
 - .7 Flame Spread: to CAN/ULC S-102-M88; 335 max.
 - .8 Self-extinguishing: to MVSS 302: B min (self-extinguishing)
 - .9 Thermal Resistance: to ASTM C-518 (90 days/23°C): 1.22/25 mm Min. RSI.
 - .2 Water vapor permeance for spray foam applied on concrete blocks (25mm on substrate) ASTM E96 (system): 36.4ng/ Pa.sm² max.
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- .3 Water vapor permeance for spray foam applied on exterior gypsum board (25mm on substrate) ASTM E96 (system): 68.3 ng/Pa.sm² max.
- .4 Colour - Grey
- .5 Foam Sealant: spray-applied medium density spray polyurethane foam insulation/air/vapour barrier. Acceptable materials:
 - .1 CF 812 Insulating Foam as manufactured by Hilti Corporation.
 - .2 Froth-Pak 180 Foam Sealant as manufactured by Dow Chemical Company.

1.7 Execution

1.8 VERIFICATION OF CONDITIONS

- .1 Inspect areas to receive work of this Section and ensure conditions are suitable for application.
- .2 Ensure that all mechanical or electrical work penetrating the spray applied air seal is complete.
- .3 Ensure that appropriate back-up material has been installed to any large voids.

1.9 PROTECTION OF EXISTING WORK

- .1 Protect all adjacent finished surfaces from overspray.

1.10 SUBSTRATE PREPARATION

- .1 Clean substrates of dirt, dust, grease, oil, loose material and other matter which may affect bond of spray applied materials.
 - .2 Prime substrates in accordance with urethane manufacturer's recommended instructions.
 - .3 Remove oil from galvanized sheet steel substrates and apply prime coating in accordance with manufacturer's instructions.
 - .4 Consider occupancy/occupants of building. As determined, close down air handling equipment while spraying and/or provide supplement ventilating equipment to remove odours.
-

1.11 FOAM SEALANT APPLICATION

- .1 Install foam sealant around electrical chases, exhaust systems, lintels, sheathing, sill plates, sole plates, top plates, wall penetrations, and elsewhere as required to achieve and maintain a complete air seal.
- .2 Install foam sealant around window frames and in all exterior hollow metal door frames; fill frame members as wall is being built, at lifts no greater than 1200mm unless permitted by material manufacturer.
- .3 Apply foam rod and sealant in accordance manufacturer's instructions.
- .4 Seal in and around main power supply conduit and other service lines enter the building.
- .5 Seal where electrical wires and plumbing stacks penetrate the top plates of partition walls intersecting insulated ceilings, or where the first stud of an interior partition wall intersects an exterior perimeter insulated wall.
- .6 Spray application of polyurethane foam shall be in accordance with CAN/ULC-S705.2-98.
- .7 Apply material to thickness to a minimum of 50 mm not to exceed a tolerance of +/- 7 mm.
- .8 Care shall be taken to achieve the best possible surface texture.
- .9 Application shall not commence during inclement weather, when precipitation is imminent or when the surface of substrate is not free of dew, frost or water. When wind velocity exceeds 25 kph application shall not proceed without the use of an effective wind barrier.

3.5 QUALIFICATIONS

- .1 Perform all work of this Section using manufacturer's approved installer having minimum five (5) years certification by CUFCA (Canadian Urethane Foam Contractors Association). Applicator shall have a minimum of five (5) years experience installing spray applied Air Barrier Systems in accordance with CAN/ULC - S705. 2-98 Standards, on projects of similar scope.
-

3.6 MATERIAL STORAGE

- .1 All materials shall be delivered to the job site in unopened new containers bearing the manufacturers original label. All materials will be stacked in a neat and orderly fashion by type and component.

3.7 CLEAN UP

- .1 At conclusion of work, clean-up remnants and debris and remove same from job site.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .2 Underwriter's Laboratories of Canada (ULC)
 - .1 ULC-S115-1995, Fire Tests of Fire stop 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 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.
-

- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials.
- .3 Shop Drawings:
 - .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
 - .2 Construction details should accurately reflect actual job conditions.
- .4 Samples:
 - .1 Submit duplicate 300 x 300 mm samples showing actual fire stop material proposed for project.

1.4 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Installer: company specializing in fire stopping installations with 5 years documented experience.
- .2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's Representative.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.
 - .2 Storage and Protection:
 - .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.
 - .3 Waste Management and Disposal:
-

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

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 and conforming to specified special requirements described in PART 3.
 - .2 Fire stop system rating: to meet ratings of assemblies as indicated.
 - .2 Service penetration assemblies: systems tested to CAN-ULC-S115 and listed in ULC Guide No. 40 U19.
 - .3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115 and listed in ULC Guide 40 U19.13 and U19.15 under Label Service of ULC.
 - .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 intended for ease of re-entry such as cables: elastomeric seal.
 - .7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.
 - .8 Primers: to manufacturer's recommendation for specific material, substrate, and end use.
 - .9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.
 - .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.
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- .11 Sealants for vertical joints: non-sagging.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
 - .1 Ensure that substrates and surfaces are clean, dry and frost free.
- .2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.
- .3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.
- .4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

- .1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.
 - .2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.
 - .3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.
 - .4 Tool or trowel exposed surfaces to neat finish.
 - .5 Remove excess compound promptly as work progresses and upon completion.
-

3.4 SEQUENCES OF OPERATION

- .1 Install floor fire stopping before interior partition erections.
- .2 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.
- .3 Mechanical pipe insulation: certified fire stop system component.
 - .1 Ensure pipe insulation installation precedes fire stopping.

3.5 FIELD QUALITY CONTROL

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

3.6 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.

3.7 SCHEDULE

- .1 Fire stop and smoke seal at:
 - .1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
 - .2 Edge of floor slabs at curtain wall and precast concrete panels.
 - .3 Top of fire-resistance rated masonry and gypsum board partitions.
 - .4 Intersection of fire-resistance rated masonry and gypsum board partitions.
 - .5 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
 - .6 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
 - .7 Openings and sleeves installed for future use through fire separations.
 - .8 Around mechanical and electrical assemblies penetrating fire separations.
-

- .9 Rigid ducts: greater than 129 cm² : fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct,

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 919-02, Standard Practice for Use of Sealants in Acoustical Applications.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).
 - .2 CAN/CGSB-19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
 - .3 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing (Reaffirmation of April 1976).
 - .4 CAN/CGSB-19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
 - .5 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.
- .3 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act, 1999 (CEPA).
- .4 General Services Administration (GSA) - Federal Specifications (FS)
 - .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.
- .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .6 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.2 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .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.
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- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Submit duplicate samples of each type of material and colour.
- .5 Cured samples of exposed sealants for each color where required to match adjacent material.
- .6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Instructions to include installation instructions for each product used.
- .7 Submit MSDS data sheets on all products.

1.3 QUALITY ASSURANCE/MOCK-UP

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
- .2 Construct mock-up to show location, size, shape and depth of joint s complete with back-up material, primer, caulking and sealant.
- .3 Mock-up will be used:
 - .1 To judge workmanship, substrate preparation, operation of equipment and material application.
- .4 Locate where directed.
- .5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with sealant work.
- .6 When accepted, mock-up will demonstrate minimum standard of quality required for this Work. Approved mock-up may remain as part of finished Work.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, handle, store and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.
-

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.6 PROJECT CONDITIONS

- .1 Environmental Limitations:
 - .1 Do not proceed with installation of joint sealants under following conditions:
 - .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
 - .2 When joint substrates are wet.
 - .2 Joint-Width Conditions:
 - .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
 - .3 Joint-Substrate Conditions:
 - .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

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

PART 2 - PRODUCTS

2.1 SEALANT MATERIALS

- .1 Sealants and caulking compounds must:
 - .1 meet or exceed all applicable governmental and industrial safety and performance standards; and
 - .2 be manufactured and transported in such a manner that all steps of the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, bylaws and regulations, including, for facilities located in Canada, the Fisheries Act and the Canadian Environmental Protection Act (CEPA).
 - .2 Sealants and caulking compounds must not be formulated or manufactured with: aromatic solvents, fibrous talc or asbestos, formaldehyde, halogenated solvents, mercury, lead, cadmium, hexavalent chromium, barium or other compounds, except barium sulfate.
 - .3 Sealants and caulking compounds must not contain a total of volatile organic compounds (VOCs) in excess of 5% by weight as calculated from records of the amounts of constituents used to make the product.
 - .4 Sealant and caulking compounds must be accompanied by details instructions for proper application so as to minimize health concerns and maximize performance, and contain information describing proper disposal methods.
 - .5 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.
 - .6 When low toxicity caulks are not possible, confine usage to areas which offgas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize offgas time.
 - .7 In the selection of the products and materials of this Section, preference will be given to those products with the following characteristics: water based, water soluble, water clean-up, non-flammable, biodegradable, low Volatile Organic Compound (VOC) content, manufactured without compounds which contribute to ozone depletion in the upper atmosphere, manufactured without compounds which contribute to smog in the lower atmosphere, does not contain methylene chloride, does not contain chlorinated hydrocarbons.
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- .8 The manufacturing process must adhere to Lifecycle Assessment Standards as per ISO 14040/14041 LCA Standards, CSA Z760-94 LCA Standards.
- .9 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

- .1 Polysulfide Two Part.
 - .1 Self-Leveling to CAN/CGSB-19.24, Type 1, Class B, colour to be selected by Departmental Representative.
 - .2 Polysulfide Two Part.
 - .1 Non-Sag to CAN/CGSB-19.24, Type 2, Class B, colour to be selected by Departmental Representative.
 - .3 Silicones One Part.
 - .1 To CAN/CGSB-19.13.
 - .2 Mildew resistant: to CAN/CGSB-19.22.
 - .4 Acrylic Latex One Part.
 - .1 To CAN/CGSB-19.17.
 - .5 Acoustical Sealant.
 - .1 To ASTM C 919.
 - .6 Butyl.
 - .1 To CGSB 19-GP-14M.
 - .7 Preformed Compressible and Non-Compressible back-up materials.
 - .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
 - .1 Extruded open closed cell foam backer rod.
 - .2 Size: oversize 30 to 50 %.
 - .2 Neoprene or Butyl Rubber.
 - .1 Round solid rod, Shore A hardness 70.
 - .3 High Density Foam.
 - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m³ density, or neoprene foam backer, size as recommended by manufacturer.
 - .4 Bond Breaker Tape.
 - .1 Polyethylene bond breaker tape which will not bond to sealant.
-

2.3 SEALANT SELECTION

- .1 Perimeters of exterior openings where frames meet exterior facade of building (i.e. brick, block, precast masonry): Sealant type: Polysulfide Two Part.
 - .2 Expansion and control joints in exterior surfaces of poured-in-place concrete walls: Sealant type: Polysulfide Two part.
 - .3 Control and expansion joints in exterior surfaces of unit masonry walls: Sealant type: Polysulfide Two Part.
 - .4 Coping joints and coping-to facade joints: Sealant type: Polysulfide Two Part.
 - .5 Cornice and wash (or horizontal surface joints): Sealant type: Polysulfide Two Part.
 - .6 Exterior joints in horizontal wearing surfaces: Sealant type: Polysulfide Two Part.
 - .7 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: Acrylic Latex One Part.
 - .8 Control and expansion joints on the interior of exterior poured-in place concrete walls: Sealant type: Polysulfide Two Part.
 - .9 Control and expansion joints on the interior of exterior surfaces of unit masonry walls: Sealant type: Polysulfide Two Part.
 - .10 Interior control and expansion joints in floor surfaces: Sealant type: Polysulfide Two Part.
 - .11 Perimeters of interior frames, as detailed and itemized: Sealant type: Acrylic Latex One Part.
 - .12 Interior masonry vertical control joints (block-to-block, block-to-concrete, and intersecting masonry walls): Sealant type: Polysulfide Two Part.
 - .13 Joints at tops of non-load bearing masonry walls at the underside of poured concrete: Sealant type: Polysulfide Two Part.
 - .14 Perimeter of bath fixtures (e.g. sinks, tubs, urinals, stools, waterclosets, basins, vanities): Sealant type: Silicone One Part.
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- .15 Exposed interior control joints in drywall: Sealant type: Acrylic Latex One part.
- .16 Perimeter of acoustic partitions: Sealant Type: Acoustical Sealant.
- .17 Door Thresholds: Sealant Type: Butyl.
- .18 All detention areas: Sealant Type: Epoxy sealant or grout.

2.4 JOINT CLEANER

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

PART 3 - EXECUTION

3.1 PROTECTION

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

3.2 SURFACE PREPARATION

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

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

3.4 BACKUP MATERIAL

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

3.5 MIXING

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

3.6 APPLICATION

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

PART 1 - GENERAL

1.1 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM).
 - .1 ASTM D570-95 Water Absorption of Plastics
 - .2 ASTM D638-M96 Tensile Properties of Plastics
 - .3 ASTM D696-91 Coefficient of Linear Thermal Expansion of Plastics Between -30 Degrees C and +30 Degrees C.
 - .4 ASTM D905-94 Strength Properties of Adhesive Bonds in Shear by Compression Loading
 - .5 ASTM D1044-94 Resistance of Transparent Plastic to Surface Abrasion
 - .6 ASTM D1308-87 (1993) el Effect of Household Chemicals on Clear and Pigmented Organic Finishes
 - .7 ASTM D2337-84 (R1996)el Freeze-Thaw Stability of Multicolor Laquers
 - .8 ASTM E84a-96 Surface Burning Characteristics of Building Materials

1.2 QUALITY ASSURANCE

- .1 Epoxy joint filler manufacturer's Representative shall review the site conditions, joint design and installer qualifications.
- .2 Representative shall check container labels, random inspect preparation of substrat materials and random test installed work.
- .3 Make 150mm long cut tests to random locations of installed work. Certify thickness, hardness and surface finish conforms to intended design. Provide written report to the Departmental Representative.

1.3 DELIVERY AND STORAGE

- .1 Receive and store materials as recommended by materials manufacturer.
 - .2 Maintain containers and labels in undamaged condition.
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1.4 PRODUCT DATA

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures, include manufacturer's specifications and data sheets.

1.5 EXISTING CONDITIONS

- .1 Examine substrate materials, joint voids and note temperature and humidity conditions. Report unacceptable conditions to Departmental Representative.
- .2 Concrete surfaces to be fully 28 day cured.
- .3 Commencement of work implies acceptance of conditions.

1.6 PRE-INSTALLATION MEETINGS

- .1 Conduct pre-installation meeting one week prior to commencing work of this section and on-site installations, to verify project requirements, coordinate with other subtrades, establish condition and completeness of substrate, review manufacturer's installation instructions and manufacturer's warranty requirements.

1.7 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Joint Cleaner: non-corrosive solvent recommended by sealant manufacturer for applicable substrate.
 - .2 Epoxy Sealant: low modulus, high strength, moisture insensitive gap filling adhesive, high solids, two component, non-sag epoxy resin system, pot life 30 mins, tack free 3 to 4 hours. Final cure 14 days, 28 day compressive strength (ASTM D-695) 35 MPa. Acceptable products:
 - .1 Tremco Permaquik 2252
 - .2 Pecora Dynapoxy EP-430 Fast
 - .3 Sika AnchorFix 3
 - .4 BASF Epolith G
 - .5 Pecora Dynapoxy EP 1200
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No other products are acceptable.

- .3 Aggregate: Colma Quartzite Aggregate oven dried, then cooled.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, and installation instructions.

3.2 PREPARATION

- .1 Remove dust, paint, loose mortar and all foreign matter: dry joint surfaces. Prepare wood and steel surfaces as recommended by manufacturer.
- .2 Remove rust, mill scale and coatings from ferrous metals by wire brush, grinding or sandblasting to a white metal finish.
- .3 Remove oil, grease and other coatings from ferrous metals with appropriate solvent.

3.3 APPLICATION

- .1 Apply epoxy sealant in accordance with manufacturer's directions.
 - .2 For joints larger than 3mm in width, mix epoxy sealant components to manufacturer's recommendations, adding up to 2 1/2 parts of aggregate to form a pourable grout. Maximum lift 25mm.
 - .3 After application, allow to set for 24 hours before moving.
 - .4 Take all necessary precautions in handling epoxy in accordance with Occupational Health and Safety Division, Alberta Labour.
 - .5 Form surfaces of sealant smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities. Neatly tool surface to a slightly concave joint.
 - .6 Clean adjacent surface immediately and leave work neat and clean. Remove excess joint filler and droppings, using recommended cleaners as work progresses. Remove masking tape after tooling of joints.
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- .7 Apply epoxy sealant to all joints and junctions in cells and other detention areas, around metal door and window frames, around plumbing fixtures, light fixtures and all other joints as required to prevent concealment of contraband and which may be subject to covert attack. Apply to all joints and junctions after all other trades are complete, except high build wall coatings. Apply high build wall coating to all epoxy sealant joints.
- .8 Finish and tool sealant joints in a neat manner compatible with finishes of adjacent surfaces exposed to view. Hidden connections need not be finished in this manner.
- .9 Protect adjacent surfaces from soiling and splatters due to work of this section. Clean all adjacent surfaces to satisfaction of Departmental Representative.
- .10 Caulking or sealant in detention areas shall mean epoxy sealant or grout.

3.4 CLEANUP

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.
- .2 Remove traces of primer, caulking, epoxy and filler materials; clean expansion joint covers.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM B 29-03, Standard Specification for Refined Lead.
 - .3 ASTM B 749-03, Standard Specification for Lead and Lead Alloy Strip, Sheet and Plate Products.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
 - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
 - .3 Canadian Standards Association (CSA International)
 - .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).
 - .4 Canadian Steel Door Manufacturers' Association (CSDMA)
 - .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
 - .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.
 - .5 National Fire Protection Association (NFPA)
 - .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-03, Standard Methods of Fire Tests of Door Assemblies.
 - .6 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1113-04, Architectural Coatings.
 - .2 SCAQMD Rule 1168-05, Adhesives and Sealants Applications.
 - .7 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S701-01, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
 - .3 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .4 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
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- .5 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.2 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Design exterior frame assembly to accommodate to expansion and contraction when subjected to minimum and maximum surface temperature of -35°C to +35°C.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .4 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazed, arrangement of hardware and fire rating and finishes.
 - .2 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings and reinforcing fire rating finishes.
 - .3 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
- .5 Submit acoustic test and engineering data, and installation instructions.

1.4 REGULATORY REQUIREMENTS

- .1 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN4-S104M Or NFPA 252 for fire ratings specified or indicated.
 - .2 Provide fire labelled frame products for those openings requiring fire protection ratings, as scheduled. Test products in strict conformance with CAN4-S104, ASTM E 152 or NFPA 252 and list by nationally recognized agency having factory inspection service and construct as detailed in Follow-Up
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Service Procedures/Factory Inspection Manuals issued by listing agency to individual manufacturers.

1.5 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:
 - .1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Place materials defined as hazardous or toxic waste in designated containers.
 - .2 Ensure emptied containers are sealed and stored safely for disposal away from children
 - .3 Set aside and protect the surplus and uncontaminated waste materials. Deliver to, or arrange collection by employees, individuals, or organizations for verifiable re-use or re-manufacturing
 - .4 Place materials defined as hazardous or toxic waste in designated containers, and place used sealant and adhesive tubes and containers in areas designated for hazardous waste.
 - .5 Return solvent and oil soaked rags, used during installation, for contaminant recovery, proper disposal, or appropriate cleaning with no contaminant release to watre systems.
 - .6 Close and seal tightly all partly used sealant and adhesive containers and store protect in well ventilated fire-safe area at moderate temperature.
 - .7 Seperate corrugated cardboard in accordance with the Wsate managment plan and place in designated areas for recycling.
 - .8 Fold up matel banding, flatten, and place in area for recycling.
 - .9 Collect wood packing shims and pallets and place in designated areas for recycling.
 - .10 Do not dispose of paints or solvents by pouring on the ground. Place in designated containers and ensure proper disposal in accordance with federal, provincial and municipal regulations.
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- .11 Solvent based paints, which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner in accordance with hazardous waste regulations. Information on these controls can be obtained from the provincial Ministries or Environment and Regional levels government. Empty paint cans are to be dry prior to disposal or recycling (where available).
- .12 Where paint recycling is available, collect all waste paint by type and provide for delivery to recycling or collection facility.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.

2.2 DOOR CORE MATERIALS

- .1 Interior Honeycomb Construction (HC):
 - .1 Structural small cell, 24.5 mm maximum kraft paper 'honeycomb', weight: 36.3 kg per ream minimum, density: 16.5 kg/m³ minimum sanded to required thickness.
 - .2 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250 degrees C at 30/60 minutes. Core to be tested as part of a complete door assembly, in accordance with CAN4-S104, ASTM E 152 or NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.

2.3 ADHESIVES

- .1 Honeycomb cores and steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.
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2.4 PRIMER

- .1 Touch-up prime CAN/CGSB-1.181.

2.5 PAINT

- .1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting, 09 91 13 - Exterior Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.6 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Exterior and interior top and bottom caps: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.
- .3 Fabricate glazing stops as formed channel, minimum 16 mm height, accurately fitted, butted at corners and fastened to frame sections with counter-sunk oval head sheet metal screws.
- .4 Door bottom seal: refer to Section 08 71 00 - Door Hardware.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 Fire labels: metal riveted.
- .7 Sealant: refer to Section 07 92 00 - Joint Sealants.
- .8 Glazing: refer to Section 08 80 50 - Glazing.
- .9 Make provisions for glazing as indicated and provide necessary glazing stops.
 - .1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws dry glazing of snap-on type.
 - .2 Design exterior glazing stops to be tamperproof.

2.7 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 (16 ga.)welded type construction.
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- .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 cutouts 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.

2.8 FRAME ANCHORAGE

- .1 Provide appropriate anchorage to floor and wall construction.
- .2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.
- .3 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.
- .4 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.

2.9 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.
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- .6 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

2.10 FRAMES: KNOCKED-DOWN TYPE

- .1 Knocked-down type frames are not permitted on this project.

2.11 DOOR FABRICATION GENERAL

- .1 Doors: swing type, flush.
- .2 Fabricate doors with longitudinal edges welded. Seams: grind welded joints to a flat plane, fill with metallic paste filler and sand to a uniform smooth finish.
- .3 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.
- .4 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.
- .5 Reinforce doors where required, for surface mounted hardware. Provide flush PVC top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.
- .6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.
- .7 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with CAN4-S104 ASTM E 152 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.
- .8 Manufacturer's nameplates on doors are not permitted.

2.12 DOORS: HONEYCOMB CORE CONSTRUCTION

- .1 Form face sheets for interior doors from 1.2 mm (18 ga.) sheet steel with honeycomb core laminated under pressure to face sheets.
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2.13 HOLLOW STEEL CONSTRUCTION

- .1 Form face sheets for interior doors from 1.2 mm (18 ga.) sheet steel.
- .2 Reinforce doors with vertical stiffeners, securely welded laminated to face sheets at 150 mm on centre maximum.
- .3 Fill voids between stiffeners of interior doors with fibreglass core.

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 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.
 - .6 Maintain continuity of air barrier and vapour retarder.
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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, top of carpet, noncombustible sill and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.

3.5 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.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A 653/A 653M-01a, Specification for Steel Sheet, Zinc Coated (galvanized) or Zinc-Iron Alloy Coated (galvannealed) by the Hot-Dip Process.
 - .2 ASTM A 366 - Standard Specification for Steel, Carbon, Cold-Rolled Sheet, Commercial Quality.
 - .3 ASTM A 569 - Standard Specification for Steel, Carbon, (0.15 Maximum Percent), Hot-Rolled Sheet and Strip, Commercial Quality.
 - .4 ASTM B 117 - Standard Method of Salt Spray (fog) Testing.
 - .5 ASTM D 1735 - Standard Practice for Testing Water Resistance of Coating Using Water Fog Apparatus.
 - .6 ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions.
 - .7 ASTM E 336 - Standard Test Method for Measurement of Airborne Sound Insulation of Buildings.
 - .8 ASTM E 413 - Classification for Determination of Sound Transmission Class.
 - .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
 - .3 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coatings.
 - .4 Canadian Standards Association (CSA International)
 - .1 G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CSA W59-M1989 (R2001), Welded Steel Construction (Metal Arc Welding) (Metric Version).
 - .5 Canadian Steel Door Manufacturer's Association (CSDMA).
 - .1 CSDMA, Specifications for Commercial Steel Doors and Frames, 1990.
 - .2 CSDMA, Recommended Selection and Usage Guide for Commercial Steel Doors, 1990.
 - .6 National Fire Protection Association (NFPA)
 - .1 NFPA 80-99, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-99, Standard Methods of Fire Tests of Door Assemblies.
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- .7 Underwriters' Laboratories of Canada (ULC) 1. CAN4-S104-80 (R1985), Fire Tests of Door Assemblies.
 - .1 CAN4-S105-85 (R1992), Fire Door Frames Meeting the Performance Required by CAN4-S104.
- .8 Hollow Metal Manufacturer's Association (HMMA)
 - .1 HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames.

1.2 DESIGN REQUIREMENTS

- .1 Acoustical door assemblies to include doors, frames, and door hardware to include gasketing systems, retainers and retainer covers, automatic surface mounted door bottoms, cam-lift hinges, thresholds, and sills, required to meet or exceed field tested performance of STC 46 for all sound doors supplied, using ASTM E 336 "Standard Test Method for Measurement of Airborne Sound Insulation for Buildings". Acceptable manufacturer: Kreiger.
- .2 Design Specification: Minimum product sound transmission coefficient rating of STC 51 as noted on door schedule, for installed assembly, when tested as operable door assembly in accordance with ASTM E 90 and ASTM E 413.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.
 - .3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Indicate each type of door, material, steel core thicknesses, mortises, reinforcements, location of exposed fasteners, openings, glazing, arrangement of hardware and fire rating and finishes.
 - .2 Indicate each type of frame material, core thickness, reinforcements, glazing stops, locations of anchors and exposed fasteners and reinforcing, fire rating and finishes.
 - .4 Include schedule identifying each unit, with door marks and numbers relating to numbering on drawings and door schedule.
 - .5 Provide independent test data from recognized licensed laboratory indicating compliance with specified Sound
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Transmission Class (STC). Provide this for each sound control STC door type specified.

- .6 Provide documentation required by Clause 1.4 Quality Assurance noted below.
- .7 Warranty documents, executed by manufacturer in owner's name.
- .8 Operation and maintenance data for assembly components.
- .9 Certified statement of manufacturer's authorized Representative, as specified in FIELD QUALITY CONTROL Article of Part 3 of this Section.
- .10 Certified test reports from independent testing agency, as specified in QUALITY ASSURANCE Article of PART 1 of this Section.
- .11 Shop drawings will not be processed unless accompanied by all supporting documentation.

1.4 QUALITY ASSURANCE

- .1 Test Reports:
 - .1 Certified laboratory reports, performed in accordance with ASTM E 90 and ASTM E 413, from independent testing laboratory qualified under National Voluntary Laboratory Accreditation program (NVLAP) supporting compliance of assemblies to specified requirements.
 - .2 Minimum five (5) field tests, performed in accordance with ASTM E 336 and ASTM E 413 by accredited testing agency, substantiating acoustical performance of FSTC 46 minimum.
 - .3 Field performance of FSTC as required in section 3.4.B.
 - .2 Contractor's certification that:
 - .1 Products of the Section, as provided, meet or exceed specified requirements.
 - .2 Manufacturer of products of this Section meet specified requirements.
 - .3 Acoustical Door Manufacturer's certification that the installing contractor has been trained and certified to install, and adjust all components of the door assembly.
 - .4 Manufacturer's instructions: printed installation instructions for each component.
 - .5 Installation of doors and hardware including single source responsibility to achieve field ratings within 5Dbs of laboratory tested assemblies. Frames to be grouted and
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installed by others in accordance with manufacturer's instructions.

1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Store frames in accordance with requirements of HMMA 840.
- .3 Store steel doors in accordance with requirements of HMMA 840.
- .4 Remove wraps or covers from doors and frames upon delivery at building site; clean and touch-up scratches or disfigurements caused by shipping or handling promptly with rust inhibitor.
- .5 Store units on planks or dunnage in a dry location; store doors in a vertical position spaced by blocking.
- .6 Store units covered to protect them from damage, but permitting air circulation.

1.6 SCHEDULING

- .1 Furnish manufacturer's mounting templates for door hardware provided by others to manufacturer of products of this Section in time for factory preparation for door hardware.

1.7 WASTE MANAGEMENT

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- .1 Unless otherwise specified for an individual product or material, supply all products specified in this Section from the same manufacturer.
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2.2 MATERIALS

- .1 Hot dipped galvanized steel sheet: to ASTM A 653/ A 653M, ZF75, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts.
- .2 Reinforcement channel: to CSA G40.20/G40.21, Type 44W, coating designation to ASTM A 653M, ZF75.
- .3 Acoustical Material: manufacturer's standard for required STC rating.
- .4 Primer: Meeting ASTM B 117 salt spray for 150 hours, and ASTM D 1735 water fog test for organic coatings for 2000 hours.
- .5 Glazing: Specified in Section 08 80 50.
- .6 Acoustic Sealants: as required and recommended by manufacturer.

2.3 DOOR FABRICATION

- .1 Fabricate in accordance with Departmental Representative reviewed shop drawings, 1 3/4 inches minimum thickness, and as follows:
 - .1 Face Sheets:
 - .1 Doors for interior use: galvanized steel sheet, minimum 16 ga. sheet thickness.
 - .2 Doors for exterior use: galvanized steel sheet, minimum 16 ga. thickness.
 - .3 Visible seams on face sheets not permitted.
 - .2 Core:
 - .1 Stiffen face sheets with continuous vertical steel sections.
 - .2 Fill spaces between stiffeners with acoustical material.
 - .3 Manufacturer's standard "non-coupling" core to prevent vibration.
 - .3 Vertical Edges:
 - .1 Join face sheets at vertical edges by continuous welding:
 - .1 Join face sheets at vertical edges by continuous weld on each edge, extending full door height.
 - .2 Grind, fill and dress welds to provide smooth flush finish.
 - .2 Form edge profiles both vertical edges of doors with 1/8 inch in 2 inches bevel.
 - .3 Visible seams on vertical edges not permitted.

- .4 Horizontal Edges:
 - .1 Close top and bottom edges of doors with continuous steel channels, 16 ga. minimum; spot weld channels to both door faces.
 - .2 Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
 - .3 Provide additional flush closing channel at top edge of doors; spot weld channel to both door faces.

- .5 Hardware Preparation:
 - .1 Mortise, reinforce, drill, and tap doors at factory for fully templated mortised hardware only, in accordance with approved hardware schedule and supplied templates.
 - .2 Provide reinforcing plates at surface-mounted or non-templated hardware locations.

2.4 FRAME FABRICATION

- .1 Fabricate frames in accordance with Departmental Representative reviewed shop drawings, and as follows:

 - .2 Frames for interior use: Fabricate from galvanized steel sheet, minimum 14 ga. thickness.

 - .3 Frames for exterior use: Fabricate from galvanized steel sheet, minimum 14 ga. thickness.

 - .4 Form frame members straight, and of uniform profile through lengths, as welded units with integral trim, of sizes and profiles indicated.
 - .1 Weld contact edges of joints closed tight.
 - .2 Miter perimeter trim faces and weld continuously.

 - .5 When shipping limitations so dictate, fabricate frames for large openings in sections designed for assembly in the field; install alignment plates or angles of same material and gauge as frame, at each joint.

 - .6 Hardware preparation:
 - .1 Mortise, reinforce, drill, and tap doors at factory for fully templated mortised hardware only, in accordance with approved hardware schedule and supplied templates.
 - .2 Provide reinforcing plates at surface-mounted or non-templated hardware locations.

 - .7 Floor anchors:
 - .1 Fabricate of same material as frame material, minimum 14 ga. thickness.
 - .2 Weld anchors inside each jamb for floor anchorage.
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- .8 Jamb anchors:
 - .1 Fabricate of same material as frame material, weld anchors inside each jamb for wall anchorage.
 - .2 Provide anchor types for indicated adjacent construction.
 - .1 Frames for installation in masonry: adjustable jamb anchors, 16 ga., T-shape type.
 - .2 Frames for installation in stud partitions: continuous steel channel to surround stud, 16 ga., welded inside jamb.
- .9 Plaster guards: Fabricate from minimum 22 ga. steel, weld in place at hardware mortises on frames to be set in plaster, masonry or concrete openings.
- .10 Provide welded frames with temporary steel spreader welded to jamb feet for bracing during shipping and handling.

2.5 LOOSE STOPS

- .1 Fabricate using minimum 12 ga. steel, with factory drilled and countersunk holes for fasteners.
- .2 Form stops with mitered corner joints.
- .3 Supply cadmium plated or zinc coated fasteners, size and quantity required to suit fastener holes.

2.6 DOOR HARDWARE

- .1 Supply gasketing systems, retainers, retainer covers, automatic door bottoms, automatic door bottoms, cam-lift hinges, thresholds, and sills as indicated on Departmental Representative reviewed shop drawings, or specified in manufacturer's product data for project conditions, to achieve specified acoustic requirements. Doors to be supplied with cam-lift hinges, standard butt hinges will not be accepted.
- .2 All other door hardware is specified in Section 08 71 00 - Door Hardware.

2.7 FINISH

- .1 Finish: all tool marks and surface imperfections shall be removed and exposed faces of all welded joints shall be dressed smooth. Assemblies shall be treated and shall be coated on all accessible surfaces with a rust inhibitor primer, which meets ASTM B 117 salt spray for 150 hours, and ASTM D 1735 water fog
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test for organic coatings for 200 hours, and which is fully cured prior to shipment.

- .2 Field paint steel doors and frames in accordance with Section 9 91 23 - Interior Painting. Protect weatherstrips from paint.

2.8 REINFORCING

- .1 Hardware location on doors and frames:
 - .1 Hinges:
 - .1 Top: 5 inches from head of frame to top of hinge.
 - .2 Bottom: 10 inches from finished floor to bottom of hinge.
 - .2 Unit and integral type locks and latches: 38 inches from finished floor to centre-line of knob.
 - .3 Deadlocks: 48 inches from finished floor to centre-line of latch.
 - .4 Panic Hardware: 38 inches from finished floor to centre-line of cross bar, or as indicated on hardware templates.

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 GENERAL

- .1 Install labelled steel fire rated doors and frames in accordance with NFPA 80 except where specified otherwise.
 - .2 Install units in accordance with reviewed shop drawings. Installers are required to be trained and certified by acoustical door manufacturer. Other installation forces will not be accepted.
 - .3 Installer is responsible for scheduling inspection of surrounding conditions prior to installation. Installer is responsible for time allowance for inspection and potential correction of opening prior to installation commencing.
 - .4 Installers must inspect conditions and coordinate construction and reinforcement of openings prior to door installation. Openings must be straight, level and square to manufacturer's
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tolerances. Where unsatisfactory conditions are found Contractor and Departmental Representative to be notified in writing. Do not commence until unsatisfactory conditions have been corrected. Commencing installation will constitute acceptance of the conditions.

- .5 All materials shall be thoroughly inspected upon arrival at the site, and all discrepancies and/or damages shall be immediately reported in writing to the supplier.

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 the 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 frames 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, top of carpet, noncombustible sill and thresholds: 13 mm.
- .3 Adjust operable parts for correct function.

3.5 FIELD QUALITY CONTROL

- .1 Installation of acoustic doors and frames to be by factory trained and certified installers, as approved by door manufacturer.
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- .2 Acoustic door supplier will be solely responsible for correct operation and ensuring that the performance of the finished installation meets the specified sound rating.
- .3 Installer to engage and pay for the field services of authorized manufacturer's Representative to:
 - .1 Inspect complete installation of door and frame assemblies.
 - .2 Verify each component is installed correctly.
 - .3 Issue certified statement of compliance of installed door and frame assemblies to Departmental Representative reviewed shop drawings.

3.6 FINISH REPAIRS

- .1 Touch up with primer, surfaces damaged during installation.
- .2 Fill exposed frame anchors and surface imperfections with metallic paste filler and sand to uniform smooth finish.

3.7 TESTING

- .1 Sound test to be performed on acoustic rooms to verify that installation of walls and door and frame assemblies meet the minimum acceptable field tested sound rating of STC 46. Testing will be carried out by an Inspection and Testing Agency designated by the Departmental Representative. Manufacturer/installer's Representative may be present to witness the testing.
- .2 Owner will pay for tests.
- .3 Assemblies failing to meet above performance criteria to be corrected at no cost the the Owner.
- .4 Retesting to confirm corrective action meets acoustic performance requirements will be paid for by the Contractor.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Aluminum Association (AA), Designation System for Aluminum Finishes (2000)
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
- .3 Canadian Standards Association (CSA) International
 - .1 CSA-A440-00/A440.1-00, A440-00, Windows / Special Publication A440.1-00, User Selection Guide to CSA Standard A440-00, Windows.
 - .2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate materials and details in full size scale for head, jamb and sill, profiles of components, interior and exterior trim junction between combination units elevations of unit, anchorage details, location of isolation coating, description of related components and exposed finishes fasteners, and caulking. Indicate location of manufacturer's nameplates.

1.3 TEST REPORTS

- .1 Submit test reports from approved independent testing laboratories, certifying compliance with specifications, for:
 - .1 Windows classifications: aluminum thermally broken
 - .2 Anodized aluminum finish.
 - .3 Air tightness.
 - .4 Water tightness.
 - .5 Wind load resistance.
 - .6 Condensation resistance..
 - .7 Forced entry resistance.
 - .8 Mullion deflection - combination and composite windows.
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1.4 CLOSEOUT SUBMITTALS

- .1 Provide operation and maintenance data for windows for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Unused or damaged glazing materials are not recyclable and must not be diverted to municipal recycling programs.
- .3 Divert unused or damaged wood materials from landfill to recycling facility approved by Departmental Representative.
- .4 Divert unused metal materials from landfill to metal recycling facility approved by Departmental Representative.
- .5 Divert unused caulking material from landfill to official hazardous material collections site approved by Departmental Representative.
- .6 Plastic caulking tubes are not recyclable and must not be diverted for recycling with other plastic materials.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Materials: to CSA-A440/A440.1 supplemented as follows:
- .2 All windows by same manufacturer.
- .3 Glass: in accordance with Section 08 80 50 - Glazing.
- .4 Isolation coating: alkali resistant bituminous paint.

2.2 WINDOW TYPE AND CLASSIFICATION

- .1 Acoustic Window: fixed aluminum framed, acoustically sealed fixed glazed window unit with integral horizontal pivoting
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aluminum louvre; factory glazed and sealed with following parameters:

- .1 Extruded aluminum perimeter frame, 63 mm nominal width, depth to suit glazing thickness.
- .2 Field performance of installed assembly to be STC 46 or better.
- .3 Glazing: 6 mm polycarbonate / 62 mm air space / 6 mm polycarbonate.
- .4 Horizontal pivoting louvre system, hand operated tilting mechanism concealed in frame with removeable control knob, operation of louvres to be from both the inside and outside of the louvre assembly.
- .5 Finish: white three coat baked-on Duracron finish.
- .6 Standard of Acceptance: Acoustic Louvre Window as manufactured by Unicel Architectural Corp. 2155 Fernard Lafontaine Blvd. Longueuil, QC J4G 2J4 tel: 514 973 5789 toll free: 1 800 668 1580 fax: 866 496 2628

2.3 FABRICATION

- .1 Fabricate in accordance with CSA-A440/A440.1 supplemented as follows:
- .2 Fabricate units square and true with maximum tolerance of plus or minus 1.5 mm for units with a diagonal measurement of 1800 mm or less and plus or minus 3 mm for units with a diagonal measurement over 1800 mm.
- .3 Face dimensions detailed are maximum permissible sizes.
- .4 Brace frames to maintain squareness and rigidity during shipment and installation.
- .5 Finish steel clips and reinforcement with shop coat primer to CAN/CGSB-1.40, 380 g/m² zinc coating to CAN/CSA-G164.

2.4 ISOLATION COATING

- .1 Isolate aluminum from following components, by means of isolation coating:
 - .1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.
 - .2 Concrete, mortar and masonry.
 - .3 Wood.
-

2.5 GLAZING

- .1 Glaze windows in accordance with CSA-A440/A440.1. and in accordance with Section 08 80 50 - Glazing.

PART 3 - EXECUTION

3.1 PREPARATION/ INSPECTION

- .1 Inspect openings to receive aluminum windows for the following:
 - .1 Rough openings are plumb and square
 - .2 Rough openings are correct dimensions
 - .3 Adequate supports and indicated backing materials materials are in place and secure.
- .2 Report frame defects or unsuitable substrate conditions to the Contractor prior to proceeding with the work. Proceeding with installation shall mean acceptance of the existing conditions.

3.2 WINDOW INSTALLATION

- .1 Install in accordance with CSA-A440/A440.1.
- .2 Install windows in accordance with manufacturer's instructions and reviewed shop drawings.
- .3 Maintain dimensional tolerances.
- .4 Maintain alignment with adjacent work.
- .5 Erect and secure widow units in prepared openings, plumb and square, free from warp, twist or superimposed loads.

3.3 CAULKING

- .1 Use epoxy caulk to sel perimeter of acoustic window to blockwork.

3.4 ADJUSTING AND CLEANING

- .1 Remove all visible labels.
 - .2 Leave job site and windows in a clean condition. Final cleaning of glass to be done in accordance with Section 01 74 11 - Cleaning, and in accordance with manufacturer's recommended cleaning method.
-

3.5 PROTECTION

- .1 Cover windows during spray painting or other construction activities that might cause damage.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-69.25-M90/ANSI/BHMA A156.9-1982, Cabinet Hardware.
 - .2 CAN/CGSB-69.27-93/ANSI/BHMA A156.11-1991, Cabinet Locks.
 - .3 CAN/CGSB-69.32-M90/ANSI/BHMA A156.16-1981, Auxiliary Hardware.
 - .4 CAN/CGSB-69.34-93/ANSI/BHMA A156.18-1987, Materials and Finishes.
 - .5 CAN/CGSB-69.36-M90/ANSI/BHMA A156.20-1984, Strap and Tee Hinges and Hasps.

1.2 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Hardware List:
 - .1 Submit contract hardware list in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.
- .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .5 Closeout Submittals:
 - .1 Provide maintenance data, parts list, and manufacturer's instructions for incorporation into maintenance manual specified in Section 01 78 00 - Closeout Submittals.

1.3 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
-

.2 Package items of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.2 Storage and Protection:

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

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

.1 Use one manufacturer's product for all similar items.

2.2 CABINET HARDWARE

.1 Cabinet hardware: to CAN/CGSB-69.25, provide as required and/or as shown on drawings.

.1 Hinges: Richelieu 79T555180.

.2 Pulls: Richelieu 33285 195 128mm c/c brushed nickel wire.

.3 Sliding Door Pulls: Richelieu 40250-900

.4 Small Drawer Sliders: Accuride T2632-2G-18; Hettich KA5632 full extension.

.5 Large Drawer Sliders: Accuride 3832-2G-28; Hettich KA5632 full extension.

.6 Pull Out Shelf Slider: Accuride T340-2G-22.

.7 File Drawer Sliders: Accuride 4034-C-26; Hettich KA555.

.8 Door Bumpers: Richelieu BP303-11, 10mm ϕ self adhesive clear nylon.

.9 Counter-Top Grommets: Richelieu 1657690 156mm x 65mm oblong black plastic.

.10 Gable Grommets: Richelieu 60.0910-90 60mm ϕ black plastic.

.11 Wire management Moulding: Richelieu PF56-90.

.12 Drawer Locks and Door Locks: National C8703 Disc Tumbler.

.13 Keyboard Trays: Richelieu 14647-90.

.14 Keyboard: Richelieu 500159890.

.15 Sliding CPU Support: Accuride T340-2G-22.

.16 Shelf Standards: K & V 255

.17 Shelf Clips: K & V 256

PART3 EXECUTION

2.3 Installation

- .1 Install all cabinet and miscellaneous hardware in accordance with manufacturer's instructions.
- .2 Install Hardware as follows::
 - .1 Door or Drawer locks: as shown on drawings.
 - .2 Door Hinges:
 - .1 two per door up to 900mm in height.
 - .2 three per door up to 1500mm in height.
 - .3 four per door over 1500mm in height.
 - .3 Door and Drawer Bumpers:
 - .1 two per door up to 900mm in height.
 - .2 three per door over 1200mm in height.
 - .3 two per drawer.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).
 - .1 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): standard hardware location dimensions.

 - .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-69.17-M86 (R1993) ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
 - .2 CAN/CGSB-69.18-M90/ANSI/BHMA A156.1-2006, Butts and Hinges.
 - .3 CAN/CGSB-69.19-93/ANSI/BHMA A156.3-2008, Exit Devices.
 - .4 CAN/CGSB-69.20-M90/ANSI/BHMA A156.4-2008, Door Controls (Closers).
 - .5 CAN/CGSB-69.21-M90/ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
 - .6 CAN/CGSB-69.22-M90/ANSI/BHMA A156.6-2005, Architectural Door Trim.
 - .7 CAN/CGSB-69.24-M90/ANSI/BHMA A156.8-2005, Door Controls - Overhead Holders.
 - .8 CAN/CGSB-69.26-96/ANSI/BHMA A156.10-2005, Power-operated Pedestrian Doors.
 - .9 CAN/CGSB-69.28-M90/ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
 - .10 CAN/CGSB-69.29-93/ANSI/BHMA A156.13-2005, Mortise Locks and Latches.
 - .11 CAN/CGSB-69.30-93/ANSI/BHMA A156.14-2007, Sliding and Folding Door Hardware.
 - .12 CAN/CGSB-69.31-M89/ANSI/BHMA A156.15-2006, Closer/Holder Release Device.
 - .13 CAN/CGSB-69.32-M90/ANSI/BHMA A156.16-2008, Auxiliary Hardware.
 - .14 CAN/CGSB-69.33-M90/ANSI/BHMA A156.17-2004, Self-closing Hinges and Pivots.
 - .15 CAN/CGSB-69.34-93/ANSI/BHMA A156.18-2006, Materials and Finishes.
 - .16 CAN/CGSB-69.35-M89/ANSI/BHMA A156.19-2007, Power Assist and Low Energy Power Operated Doors.
 - .17 CAN/CGSB-69.36-M90/ANSI/BHMA A156.20-2006, Strap and Tee Hinges and Hasps.
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1.2 SUBMITTALS AND SHOP DRAWINGS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

 - .2 Samples:
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.
 - .3 After approval samples will be returned for incorporation in the Work.

 - .3 Hardware List:
 - .1 Submit contract hardware list in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit hardware schedule in vertical format prepared in accordance with Door and hardware Institute Sequence and format - 1993 recommendations.
 - .3 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information. Incorporate addenda items and any other Departmental Representative accepted changes into detailed hardware schedule.
 - .4 Schedule and detail each floor separately. On doors of different sizes or where hinges, closers, or locks are different, use a separate heading. Do not combine labeled openings with non-labeled openings.
 - .5 Clearly indicate hardware proposed, including make, model, material, function, finish, quantities and location in project, and all other pertinent information.

 - .4 Manufacturer's Instructions/Product Literature:
 - .1 Submit manufacturer's installation instructions.
 - .2 Provide two copies of manufacturer's printed literature for each piece of hardware listed in the hardware schedule, with technical information and a picture of each item.
 - .3 Submit template information to all manufacturer's who have door hardware applied to their products.
 - .4 Furnish confirmation of hardware compliance to ANSI/NFPA80, ANSI/NFPA101 and the National Building Code by the supplier prior to installation.
 - .5 Submit drawings of each type of door indicating mounting heights and locations of each piece of hardware. Do not prepare doors to receive hardware until the Departmental Representative has confirmed mounting heights and hardware locations.
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- .5 Closeout Submittals
 - .1 Provide operation and maintenance data for door closers, locksets, door holders, electrified hardware and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .3 After installation turn over to Owner, one (1) copy of representative templates, installation instruction sheets, hardware schedule, and keying schedule for permanent record.
 - .4 Supply two sets of wrenches for door closers, locksets and fire exit hardware. Upon completion, the hardware installer must turn over all wrenches and installation instructions to the Departmental Representative, who in turn will turn such wrenches and instructions to the Owner.
 - .5 Brief the building maintenance staff regarding the proper care of hardware such as lubrication of locksets, adjustments of door closers, cleaning and general maintenance.

1.3 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.
 - .2 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.
 - .3 Employ an experienced Hardware Consultant who is a member of the Door and Hardware Institute and is an AHC, for scheduling, detailing, ordering and coordinating the hardware for this project.
 - .4 Take responsibility for coordinating hardware and ensuring compatibility within each hardware set and doors and frames. Any functional incompatibilities must be brought to the attention of the Departmental Representative during the tender period. Any subsequent incompatibility is the responsibility of the hardware supplier.
 - .5 Hardware installation to be by qualified locksmith approved by the hardware supplier, with a minimum of ten (10) years experience in the installation of mortise hardware.
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1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, Shipping, Handling and Unloading:
 - .1 Deliver, store, handle and protect materials in accordance with Section 01 61 00 - Common Product Requirements.
 - .2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.
 - .3 Coordinate the delivery of hardware so as to avoid any delay in the work.
 - .4 Deliver and store materials in original undamaged containers with manufacturer's labels intact, except for permanent cylinders and keys.
 - .5 Neatly package hardware items in substantial and secure boxes, properly labelled and readily identifiable for individual locations and use.
 - .6 Packaging to include the following with each item of hardware:
 - .1 Screws, bolts and fasteners necessary for installation. Through bolts for wood doors.
 - .2 Use Robertson head type screws except where specifically required otherwise.
 - .3 Installation instructions.
 - .4 Special tools required for installation.
- .2 Storage and Protection:
 - .1 Store finishing hardware in locked, clean and dry area. Provide the room with adequate security. Provide adequate shelving to permit organization so item numbers are readily visible. Ambient room temperature to be between 0 degrees C and 50 degrees C.
 - .2 Protect knobs, handles, push plates and pulls with adhesive release paper of type easily removable without marring the finish. Do not remove protective coating until completion of project.

1.5 WASTE DISPOSAL AND MANAGEMENT

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

1.6 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Supply two sets of wrenches for door closers locksets and fire exit hardware.
-

1.7 WARRANTY

- .1 Provide ten (10) year warranty for door closers and a three (3) year warranty for panic devices. Provide copies of manufacturer's warranties for door closers and panic devices.

PART 2 - PRODUCTS

2.1 HARDWARE ITEMS

- .1 Use one manufacturer's products only for similar items.

2.2 DOOR HARDWARE

- .1 Only door closers, locksets and latchsets listed issued by Interdepartmental Qualification Board for Builders Finishing Hardware and manufactured by Yale/Corbin (excluding Yale locksets/latchsets), Sargent, LCN, Schlage are acceptable for use on this project. Note: all door closers, locksets and latchsets are to be supplied and installed by the contractor.
 - .2 Manufacture hardware to CGSB standard specified for each specific use.
 - .3 When CGSB standard does not exist, manufacture the hardware item to suit the specified function and to a standard proven in use.
 - .4 Locks and latches:
 - .1 Mortise locks and latches: to CAN/CGSB-69.29, series 1000 mortise lock, grade 1, designed for function and keyed as stated in Hardware Schedule.
 - .5 Butts and hinges:
 - .1 Butts and hinges: to CAN/CGSB-69.18, non-removable pins (NRP) for exterior outswing doors or for security requirements.
 - .6 Exit devices: to CAN/CGSB-69.19.
 - .7 Door Closers and Accessories:
 - .1 Door controls (closers): to CAN/CGSB-69.20.
 - .2 Door controls - overhead holders: to CAN/CGSB-69.24.
 - .3 Closer/holder release devices: to CAN/CGSB-69.31.
 - .8 Door Operators:
 - .1 Power-operated pedestrian doors: to CAN/CGSB-69.26.
 - .2 Power assist and low energy power operated doors: to CAN/CGSB-69.35.
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- .9 Auxiliary locks and associated products: to CAN/CGSB-69.21.
- .10 Architectural door trim: to CAN/CGSB-69.22
- .11 Auxiliary hardware: to CAN/CGSB-69.32.
- .12 Viewers: Only the following ULC fire rated door viewers are acceptable on this project: Loxem 190, Madison No. 20R35, Ives No. U698B

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 Doors to be keyed as directed. Prepare detailed keying schedule in conjunction with Departmental Representative.
 - .2 Stamp keying code numbers on keys and cylinders.
 - .3 To order and purchase the restricted RCMP Abloy CY403 and Abloy CY415 cylinders/keys in IIFF profile, supplier shall request a "Purchase Authorization" letter from Kevin Hanniman or Dean Lynchuk (RCMP "K" Division) to the Alberta Abloy representative, Ted Tetreau.
 - .4 Provide six pin design cylinders keyed 000000. Supplier's completed prepaid order is to be sent directly from Abloy Canada to RCMP "K" Division Headquarters PTSS, attention Dean Lynchuk, 11140 - 109th Street, Edmonton.
 - .5 After keying by the RCMP, the RCMP will install the Abloy cylinders.
-

PART 3 - EXECUTION

3.1 INSPECTION

- .1 Verify that frames have been installed plumb and within tolerances as set out in DHI Document "Installation of Commercial Steel Doors and Frames".
- .2 Prior to installation ensure that doors and frames are properly prepared and reinforced to receive finish hardware.
- .3 Ensure that door frames and finished floor are sufficiently plumb and level to permit proper engagement and operating of hardware.

3.2 INSTALLATION INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Furnish manufacturers' instructions for proper installation of each hardware component.
- .4 Certified locksmith to install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer's Association.
- .5 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .6 Any repairs which the Owner is required to make due to ill-fitting preparation of the doors will be deducted from the contract amount.

3.3 INSPECTION OF INSTALLATION

- .1 After installation, the hardware supplier shall inspect the hardware and certify in writing to the Contractor (copy to the Departmental Representative) whether or not all hardware items are in accordance with specification requirements and are installed and functioning properly.
-

3.4 ADJUSTING

- .1 Prior to final inspection, 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 provide tight fit at contact points with frames.
- .4 Install and test locks with cylinders to ensure proper operation.

3.5 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacture's instructions. Replace hardware that is scratched, marked or damaged.
- .3 Remove protective material from hardware items where present.
- .4 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.6 DEMONSTRATION

- .1 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
 - .2 Description, use, handling, and storage of keys.
 - .3 Use, application and storage of wrenches for door closers, locksets and fire exit hardware.
 - .2 Demonstrate operation, operating components, adjustment features, and lubrication requirements.
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3.7 SCHEDULE

- .1 It is the intent that all new doors on this project have suitable hardware. Any doors shown on drawings and not scheduled or vice versa must be brought to the attention of the Departmental Representative during the tender period otherwise Contractor and the Hardware Supplier will supply all necessary hardware for these doors at no additional cost to the Owner.
- .2 Refer to the Hardware Schedule.

**RENOVATIONS TO GOVERNMENT OF CANADA BUILDING
4806 – 55 STREET
ST. PAUL, ALBERTA**

ITEM 1:	1 Single Door 108 New Overnight Exhibit 109A To Secure Exhibit 108 900mm x 2150mm x 45mm	HMD x PSF	LH
	3 Butts	CB179 114mm x 101mm NRP	652
	1 Lockset (F15/15K)	L9485L-03B/42B x Less "Do Not Disturb Indicator"	626
	1 Abloy Cylinder	CY415T x Cam To Suit	626
	1 Closer	4041 DEL SCUSH	689
	1 Kick Plate	K10A-400mm x 860mm	32D
	1 Door Bottom	CT-52 x 900mm	AL

ITEM 2:	1 Single Door 109A Corridor 114 To New Overnight Exhibit 109A Existing Door & Frame		LH
	3 Butts	CB179 114mm x 101mm NRP	652
	1 Lockset (F15)	L9485L-03B x Less "Do Not Disturb Indicator"	626
	1 Abloy Cylinder	CY415T x Cam To Suit	626
	1 Closer	4041 DEL Reg.	689
	1 Kick Plate	K10A-400mm x 860mm	32D
	1 Floor Stop	S113	26D

ITEM 3:	1 Single Door 130 Corridor 125 To Secure Interview 130 900mm x 2150mm x 45mm	HMD x PSF STC51 Acoustic Door	LH
	1 Set Cam Hinge	Cam Hinges By Door Supplier	
	1 Abloy Cylinder	CY402T x Cam To Suit	26D
	1 Abloy Cylinder	CY415T x Cam To Suit	626
	1 Lockset (F14)	L9466L-42B	626
	1 Closer	4040XP Reg.	689
	1 Kick Plate	K10A-400mm x 860mm x D/S Tape	32D
	1 Floor Stop	S113	26D

Balance Of Hardware By Door Supplier

ITEM 4:	1 Single Door 153A Corridor 154D To New MCU Bull Pen 153A 900mm x 2150mm x 45mm	HMD x PSF	LH
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Reuse Door, Frame, and Hardware From D153

ITEM 5:	1 Single Door 153C New MCU Bull Pen 153A To New Office 153C		LH
ITEM 6:	1 Single Door D211.1 Work Area 208A To Office 211 900mm x 2150mm x 45mm	HMD x PSF	LH
	6 Butts	CB179 114mm x 101mm	652
	2 Locksets (F04)	L9050L- 03B	626
	2 Abloy Cylinders	CY415T x Cam To Suit	626
	2 Kick Plates	K10A-400mm x 860mm	32D
	2 Wall Stops	S123	26D

ITEM 7:	1 Single Existing Door D209 Work Area 208A To Office 209	RH
ITEM 8:	1 Single Existing Door 207 Room 208B To Room 207 Existing Door & Frame	RH

Reuse Door, Frame and Hardware

ITEM 9:	1 Single Existing Door D210.1 Work Area 208A To Office 210	LH
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Reuse Door, Frame and Hardware in Door 208E

ITEM 10:	1 Single Door 208B Work Area 208A To Room 208B	RH
ITEM 11:	1 Single Door 208C Work Area 208A To Room 208C	LH
ITEM 12:	1 Single Door 208D Work Area 208A To Room 208D	LH
ITEM 13:	1 Single Door 211 Work Area 208A To Room 211	LH
	900mm x 2150mm x 45mm HMD x PSF	
	12 Butts CB179 114mm x 101mm	652
	4 Locksets (F04) L9050L- 03B	626
	4 Abloy Cylinders CY415T x Cam To Suit	626
	4 Kick Plates K10A-400mm x 860mm	32D
	4 Wall Stops S123	26D

ITEM 14:	1 Single Door 208E Work Area 208A To Room 208E	RH
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Reuse Door, Frame and Hardware from Door D210.1

ITEM 15:	1 Single Door 210 Work Area 208A To Room 210	LH
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Reuse Door, Frame and Hardware from Door D211.2

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C 542-94(1999), Specification for Lock-Strip Gaskets.
 - .2 ASTM D 790-02, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - .3 ASTM D 1003-00, Test Method for Haze and Luminous Transmittance of Plastics.
 - .4 ASTM D 1929-96(R2001)e1, Test Method for Determining Ignition Temperature of Plastics.
 - .5 ASTM D 2240-02b, Test Method for Rubber Property - Durometer Hardness.
 - .6 ASTM E 84-01, Test Method for Surface Burning Characteristics of Building Materials.
 - .7 ASTM F 1233-98, Test Method for Security Glazing Materials and Systems.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-12.12-M90, Plastic Safety Glazing.
- .3 Environmental Choice Program (ECP).
 - .1 CCD-045-95, Sealants and Caulking.

1.2 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 For glazing materials during application and curing.
 - .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
 - .4 Closeout Submittals:
 - .1 Provide maintenance data including cleaning instructions for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
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1.3 QUALITY ASSURANCE

- .1 Perform work in accordance with FGMA Glazing Manual, IGMAC and Laminators Safety Glass Association - Standards Manual for glazing installation methods.
- .2 Pre-installation Meetings: conduct pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

1.4 SITE CONDITIONS

- .1 Environmental Requirements:
 - .1 Install glazing when ambient temperature is 10 degrees C minimum. Maintain ventilated environment for 24 hours after application.
 - .2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.5 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS SECURITY

- .1 Security Glazing:
 - .1 Lexan 6 mm thick.
 - .2 Marguard 6 mm thick.

2.2 ACCESSORIES

- .1 Setting blocks: Neoprene or EPDM, 80-90 Shore A durometer hardness to ASTM D 2240, to suit glazing method, glass light weight and area.
 - .2 Spacer shims: Neoprene, 50-60 Shore A durometer hardness to ASTM D 2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.
 - .3 Glazing tape:
 - .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D 2240; coiled on release paper; sized to suit application.
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- .4 Glazing splines: resilient polyvinyl chloride, extruded shape to suit glazing channel retaining slot, grey colour.
- .5 Lock-strip gaskets: to ASTM C 542.
- .6 Sealant: in accordance with Section 07 92 00 - Joint Sealants.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

- .1 Verify that openings for glazing are correctly sized and within tolerance.
- .2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.3 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.

3.4 INSTALLATION: INTERIOR - DRY METHOD (TAPE AND TAPE)

- .1 Perform work in accordance with FGMA Glazing Manual IGMAC and Laminators Safety Glass Association - Standards Manual for glazing installation methods.
 - .2 Cut glazing tape to length and set against permanent stops, projecting 1.6 mm above sight line.
 - .3 Place setting blocks at 1/4 points, with edge block maximum 150 mm from corners.
 - .4 Rest glazing on setting blocks and push against tape for full contact at perimeter of light or unit.
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- .5 Place glazing tape on free perimeter of glazing in same manner described.
- .6 Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- .7 Knife trim protruding tape.

3.5 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
- .2 Remove traces of primer, caulking.
- .3 Remove glazing materials from finish surfaces.
- .4 Remove labels after work is complete.
- .5 Clean glass using approved non-abrasive cleaner in accordance with manufacture's instructions.
- .6 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

3.6 PROTECTION OF FINISHED WORK

- .1 After installation, mark light with an "X" by using removable plastic tape or paste.

3.7 SCHEDULE

LOCATION	GLASS TYPE	THICKNESS (mm)
Acoustic Window	6 mm Lexan/ 62 mm air space/ 6 mm Marguard	

PART 1 - GENERAL

1.1 REFERENCES

- .1 Aluminum Association
 - .1 Designation for Aluminum Finishes-1997.
 - .2 American Society for Testing and Materials International, (ASTM)
 - .1 ASTM C 36/C 36M-01, Specification for Gypsum Wallboard.
 - .2 ASTM C 79/C 79M-01, Standard Specification for Treated Core and Non-treated Core Gypsum Sheathing Board.
 - .3 ASTM C 442/C 442M-01, Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board.
 - .4 ASTM C 475-01, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .5 ASTM C 514-01, Specification for Nails for the Application of Gypsum Board.
 - .6 ASTM C 557-99, Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 - .7 ASTM C 630/C 630M-01, Specification for Water-Resistant Gypsum Backing Board.
 - .8 ASTM C 840-01, Specification for Application and Finishing of Gypsum Board.
 - .9 ASTM C 931/C 931M-01, Specification for Exterior Gypsum Soffit Board.
 - .10 ASTM C 954-00, 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.
 - .11 ASTM C 960/C 960M-01, Specification for Pre-decorated Gypsum Board.
 - .12 ASTM C 1002-01, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - .13 ASTM C 1047-99, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .14 ASTM C 1280-99, Specification for Application of Gypsum Sheathing Board.
 - .15 ASTM C 1177-01, Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .16 ASTM C 1178/C 1178M-01, Specification for Glass Mat Water-Resistant Gypsum Backing Board.
 - .3 Association of the Wall and Ceilings Industries International (AWEI)
 - .4 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
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.2 CAN/CGSB-71.25-M88, Adhesive, for Bonding Drywall to Wood Framing and Metal Studs.

.5 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102-1988(R2000), Surface Burning Characteristics of Building Materials and Assemblies.

1.2 DELIVERY, STORAGE AND HANDLING

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

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

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

1.3 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

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

1.4 SAMPLES

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Standard board: to ASTM C 36/C 36M regular, and Type X, thickness as indicated, 1200 mm wide x maximum practical length, ends square cut, edges bevelled, EcoLogo certified minimum 25% recycled content usin flue gas desulpherization gypsum.
 - .2 Metal furring runners, hangers, tie wires, inserts, anchors: to CSA A82.30-80.
 - .3 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
 - .4 Resilient drywall furring: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
 - .5 Nails: to ASTM C 514.
 - .6 Steel drill screws: to ASTM C 1002.
 - .7 Stud adhesive: to CAN/CGSB-71.25 ASTM C 557.
 - .8 Laminating compound: as recommended by manufacturer, asbestos-free.
 - .9 Casing beads, corner beads, control joints and edge trim: to ASTM C 1047, metal, zinc-coated by electrolytic process, 0.5 mm base thickness, perforated flanges, one piece length per location.
 - .10 Sealants: in accordance with Section 07 92 00 - Joint Sealing.
 - .11 Acoustic sealant: in accordance with Section 07 92 00 - Joint Sealing.
 - .12 Polyethylene: to CAN/CGSB-51.34, Type 2.
 - .13 Joint compound: to ASTM C 475, asbestos-free.
 - .14 Security Screws: Torx head.
-

PART 3 - EXECUTION

3.1 ERECTION

- .1 Do application and finishing of gypsum board in accordance with ASTM C 840 except where specified otherwise.
- .2 Do application of gypsum sheathing in accordance with ASTM C 1280.
- .3 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C 840 except where specified otherwise.
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200.
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.
- .7 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.
- .8 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .9 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .10 Install wall furring for gypsum board wall finishes in accordance with ASTM C 840, except where specified otherwise.
- .11 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .12 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

3.2 APPLICATION

- .1 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work are approved.
-

- .2 Apply single and double layer gypsum board, as indicated, to wood or metal furring or framing using screw fasteners for both layers. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C 840.
 - .2 Apply gypsum board vertically, providing sheet lengths that will minimize end joints. Install gypsum board no more than 6 mm above the floor. If gap is larger than 6 mm install solid blocking as backing for the resilient base.
 - .2 Double-Layer Application:
 - .1 Install gypsum board for base layer and exposed gypsum board for face layer.
 - .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 400 mm.
 - .3 Apply base layers at right angles to supports unless otherwise indicated.
 - .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset 400 mm with base layer joints. Install gypsum board no more than 6 mm above the floor. If gap is larger than 6 mm install solid blocking a backing for resilient base.
 - .3 Apply board using stud adhesive on furring or framing laminating adhesive on base layer of gypsum board.
 - .4 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
 - .5 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.
 - .6 Install gypsum board with face side out.
 - .7 Do not install damaged or damp boards.
 - .8 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.
-

3.3 ACOUSTIC ASSEMBLIES

- .1 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 and other penetrations.
- .2 Acoustic rated rooms will be tested to ensure a minimum STC 46 rating is achieved.
- .3 Any tests indicating the minimum STC 46 rating has not been achieved will be corrected at the Contractor's expense.
- .4 Retesting of acoustic rated rooms to confirm compliance with the STC rating will be at the Contractor's expense.

3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre using contact adhesive for full length.
 - .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 Construct control joints of preformed units two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint.
 - .6 Provide continuous polyethylene dust barrier behind and across control joints.
 - .7 Locate control joints where indicated at changes in substrate construction at approximate 10 m spacing on long corridor runs at approximate 15 m spacing on ceilings.
 - .8 Install control joints straight and true.
 - .9 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.
-

- .10 Install expansion joint straight and true.
 - .11 Install cornice cap where gypsum board partitions do not extend to ceiling.
 - .12 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
 - .13 Splice corners and intersections together and secure to each member with 3 screws.
 - .14 Install access doors to electrical and mechanical fixtures specified and supplied in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
 - .15 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.
 - .16 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish:
 - .1 Levels of finish:
 - .1 Level 5: 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; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.
 - .17 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.
 - .18 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board so as to be invisible after surface finish is completed.
 - .19 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
 - .20 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.
 - .21 Apply one coat of white primer sealer over surface to be textured. When dry apply textured finish in accordance with manufacturer's instructions.
 - .22 Mix joint compound slightly thinner than for joint taping.
-

- .23 Apply thin coat to entire surface using trowel or drywall broadknife or longnap texture roller to fill surface texture differences, variations or tool marks.
- .24 Allow skim coat to dry completely.
- .25 Remove ridges by light sanding or wiping with damp cloth.
- .26 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

3.5 SCHEDULES

- .1 Construct fire rated assemblies where indicated.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM C 645-00, Specification for Nonstructural Steel Framing Members.
 - .2 ASTM C 754-00, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .2 Canadian General Standards Board (CGSB).
 - .1 CAN/CGSB-1.40-97, Primer, Structural Steel, Oil Alkyd Type.
 - .2 CAN/CGSB-19.21-87, Sealing and Bedding Compound, Acoustical.
- .3 Environmental Choice Program (ECP).
 - .1 CCD-047a -98, Paints - Surface Coatings.
 - .2 CCD-048-98, Surface Coatings - Recycled Water-borne.

1.2 QUALITY

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

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Non-load bearing channel stud framing: to ASTM C 645, stud size as indicated, roll formed from 0.48 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.
 - .2 Interior heavy gauge non-load bearing channel stud framing: to ASTM C 645, stud size as indicated, roll formed from 1.43 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board, for installation around acoustic door opening.
-

- .3 Floor and ceiling tracks: to ASTM C 645, in widths to suit stud sizes, 32 mm flange height at floors, 50 mm flange height at ceilings.
- .4 Metal channel stiffener: size to suit stud, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .5 Acoustical sealant: to CAN/CGSB-19.21.
- .6 Insulating strip: rubberized, moisture resistant 3 mm thick cork strip, 12 mm wide, with self sticking adhesive on one face, lengths as required.
- .7 Security Screws: Torx head.

PART 3 - EXECUTION

3.1 ERECTION

- .1 Align partition tracks at floor and ceiling and secure at 600 mm on centre maximum.
 - .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. 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 and ceiling track using screws.
 - .6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.
 - .7 Co-ordinate erection of studs with installation of door/window frames and special supports or anchorage for work specified in other Sections.
 - .8 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. 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 openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.
- .11 Frame openings and around built-in equipment, cabinets, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.
- .12 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .13 Install steel studs or furring channel between studs for attaching electrical and other boxes.
- .14 Extend partitions to underside of roof deck except where noted otherwise on drawings.
- .15 Maintain clearance under beams and structural slabs to avoid transmission of structural loads to studs. Use 50 mm leg ceiling tracks. Use double track slip joint as indicated.
- .16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

3.2 ACOUSTIC WALLS

- .1 Ensure that no back to back electrical boxes, ducts or conduit are installed in the same stud space or attached to the same stud.
- .2 Install two continuous beads of acoustical sealant under studs and tracks around perimeter of acoustically rated partitions.

Ensure tight fit to adjacent substrate. Fill gaps prior to installation of gypsum board.

3.3 FIELD QUALITY CONTROL

- .1 Sound test to be performed on acoustic rooms to verify that installation of walls and door and frame assemblies meet a minimum field STC 46 rating. Testing will be carried out by Inspection Agency designated by Departmental Representative.
 - .2 Contractor will pay for any retesting if necessitated by failure of the assemblies and systems to meet the required STC 46 rating.
-

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3.4 CLEANING

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

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 423-02a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - .2 ASTM E 1264-98, Standard Classification for Acoustical Ceiling Products.
 - .3 ASTM E 1477-98a(2003), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-2003, Surface Burning Characteristics of Building Materials and Assemblies.

1.2 SUBMITTALS

- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit duplicate 300 mm x 300 mm samples of each type of acoustical units.

1.3 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by Canadian Certification Organization accredited by Standards Council of Canada.
 - .2 Mock-up:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up one panel size minimum of each type acoustical panel ceiling including one inside corner and one outside corner.
 - .3 Construct mock-up where directed.
 - .4 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with ceiling work.
-

.5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may not remain as part of the finished work.

.3 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Protect on site stored or installed absorptive material from moisture damage.
- .2 Store extra materials required for maintenance, where directed by Departmental Representative.
- .3 Waste Management and Disposal:
 - .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction /Demolition Waste Management and Disposal.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Permit wet work to dry before beginning to install.
- .2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20 -40 % before and during installation.
- .3 Store materials in work area 48 hours prior to installation.

1.6 EXTRA MATERIALS

- .1 Provide extra materials of acoustic units in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type required for project. In no case provide less than one full box of each type.
 - .3 Ensure extra materials are from same production run as installed materials.
 - .4 Clearly identify each type of acoustic unit, including colour and texture.
 - .5 Store where directed by Departmental Representative.
-

- .6 Deliver to Departmental Representative upon completion of the work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1.
 - .1 Type 1: Standard lay-in mineral fibre.
 - .1 Standard of Acceptance: Armstrong Fine Fissured High Acoustics, medium texture, or approved equivalent.
 - .2 Pattern: non-directional fissured
 - .3 Flame Spread Rating: 25 or less
 - .4 Smoke Developed: 25 or less
 - .5 Noise Reduction Coefficient (NRC): 0.70
 - .6 Light Reflectance: 0.85
 - .7 Ceiling Plenum Sound Transmission (CAC): 40
 - .8 Edge Type: square
 - .9 Colour: white
 - .10 Size: 610 mm x 1220 mm x 19 mm thick.
 - .11 Shape: flat
 - .12 Surface Covering: low VOC paint

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Departmental Representative.

3.2 INSTALLATION

- .1 Install acoustical panels and tiles in ceiling suspension system.

3.3 APPLICATION

- .1 Install acoustical units parallel to building lines with edge unit not less than 50% of unit width with directional pattern running in same direction. Refer to reflected ceiling plan.
 - .2 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.
-

3.4 INTERFACE WITH OTHER WORK

- .1 Co-ordinate with Section 09 53 00.01 - Acoustical Suspension.
- .2 Co-ordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 635-04, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - .2 ASTM C 636/C 636M-06, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.2 DESIGN REQUIREMENTS

- .1 Maximum deflection: 1/360th of span to ASTM C 635 deflection test.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit one representative model of each type ceiling suspension system.
 - .2 Ceiling system samples to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

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

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Intermediate duty system to ASTM C 635.
- .2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated.
- .3 Suspension system: non fire rated, made up as follows:
 - .1 Two directional exposed tee bar grid.
- .4 Exposed tee bar grid components: shop painted satin sheen white. Components die cut. Main tee with double web, rectangular bulb and 25 mm rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
- .5 Hanger wire: galvanized soft annealed steel wire:
 - .1 3.6 mm diameter for access tile ceilings.
 - .2 2.6 mm diameter for other ceilings.
- .6 Hanger inserts: purpose made.
- .7 Carrying channels: 38 x 19 mm channel, of 1.6 mm thick painted steel.
- .8 Accessories: splices, clips, wire ties, retainers and wall moulding flush, to complement suspension system components, as recommended by system manufacturer.

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 Installation: in accordance with ASTM C 636 except where specified otherwise.
 - .2 Install suspension system to manufacturer's instructions and Certification Organizations tested design requirements.
-

- .3 Do not erect ceiling suspension system until work above ceiling has been inspected by Departmental Representative.
 - .4 Secure hangers to overhead structure using attachment methods acceptable to Departmental Representative.
 - .5 Install hangers spaced at maximum 1200 mm centres and within 150 mm from ends of main tees.
 - .6 Unless shown otherwise on drawings, lay out centre line of ceiling both ways, to provide balanced borders at room perimeter with border units not less than 50% of standard unit width with directional pattern running in same direction throughout ceiling. If edge units are less than 50% of standard unit width, obtain Departmental Representative approval before proceeding.
 - .7 Ensure suspension system is co-ordinated with location of related components.
 - .8 Install wall moulding to provide correct ceiling height. No pieces shorter than 1200 mm.
 - .9 Completed suspension system to support superimposed loads, such as lighting fixtures, diffusers, grilles and speakers.
 - .10 Support at light fixtures, diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
 - .11 Interlock cross member to main runner to provide rigid assembly.
 - .12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.
 - .13 Install access splines to provide 10 percent ceiling access.
 - .14 Finished ceiling system to be square with adjoining walls and level within 1:1000.
 - .15 Expansion joints:
 - .1 Supply and install "Z" shaped metal trim pieces at each side of expansion joint. Design to accommodate plus or minus 25 mm movement and maintain visual closure. Finish metal components to match adjacent exposed metal trim. Provide backing plates behind butt joints.
-

3.3 CLEANING AND FINISHING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Touch up scratches, abrasions, voids and other defects in painted surfaces to the satisfaction of the Departmental Representative.
- .3 Where joints between wall moulding and wall is inconsistent and exceeds 3 mm, fill with paintable acrylic sealant, paint to match ceiling grid.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM F 1303-04, Standard Specification for Sheet Vinyl Floor Covering with Backing.
- .2 Canadian Standards Association (CSA International)
 - .1 CAN/CSA-ISO 14040-97, Environmental Management - Life Cycle Assessment - Principles and Framework (Adopted ISO 14040:1997, first edition).
- .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 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base, nosing, feature strips, treads, edge strips.
- .4 Seaming Diagrams: provide layout drawing showing proposed seam locations for approval by Departmental Representative.
- .5 Closeout Submittals:
 - .1 Provide maintenance data for resilient flooring 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.
 - .2 Waste Management and Disposal:
 - .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
-

1.4 AMBIENT CONDITIONS

- .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

1.5 MAINTENANCE

- .1 Extra Materials:
 - .1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Provide 10 m² of each colour, pattern and type flooring material required for project for maintenance use.
 - .3 Extra materials one piece and from same production run as installed materials.
 - .4 Identify each roll of sheet flooring and each container of adhesive.
 - .5 Deliver to Departmental Representative upon completion of the work of this section.
 - .6 Store where directed by Departmental Representative.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Linoleum sheet flooring: composed of natural ingredients which are mixed and calendered onto a jute backing:
 - .1 Pattern: marbleized.
 - .2 Thickness: 2.5 mm.
 - .3 No wax integral surface coating.
 - .4 Colour: two colours selected by Departmental Representative from manufacturer's standard range.
 - .2 Resilient base: continuous, top set, complete with premoulded end stops and external corners:
 - .1 Type: rubber.
 - .2 Style: cove.
 - .3 Thickness: 3.17 mm.
 - .4 Height: 101.6 mm.
 - .5 Lengths: cut lengths minimum 2400 mm.
 - .6 Colour: up to three colours selected by Departmental Representative from manufacturer's full range.
 - .3 Seam Rod: colour to be selected by Departmental Representative from manufacturer's full range.
-

- .4 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
- .5 Sub-floor filler and leveller: white premix latex requiring water only to produce cementitious paste 2 part latex-type filler requiring no water as recommended by flooring manufacturer for use with their product.
- .6 Metal edge strips:
 - .1 Aluminum extruded, smooth, mill finish polished stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .7 External corner protectors: stainless steel, type recommended by flooring manufacturer.
- .8 Edging to floor penetrations: stainless steel, type recommended by flooring manufacturer.
- .9 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

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 SITE VERIFICATION OF CONDITIONS

- .1 Ensure concrete floors are clean and dry by using test methods recommended by flooring manufacturer.

3.3 PREPARATION

- .1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.
 - .2 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
 - .3 Prime Seal concrete slab to resilient flooring manufacturer's printed instructions.
-

3.4 APPLICATION: FLOORING

- .1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
 - .2 To minimize emissions from adhesives, use water based, solvent free adhesive for linoleum.
 - .3 Apply low VOC water based adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.
 - .4 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material.
 - .5 Run sheets in direction of traffic. Double cut sheet joints and continuously heat weld according to manufacturer's printed instructions.
 - .6 Heat weld seams of linoleum sheet flooring in accordance with manufacturer's printed instructions.
 - .7 As installation progresses, roll flooring with 45 kg minimum roller to ensure full adhesion.
 - .8 Cut flooring around fixed objects.
 - .9 Install feature strips and floor markings where indicated. Fit joints tightly.
 - .10 Install flooring in pan type floor access covers. Maintain floor pattern.
 - .11 Continue flooring over areas which will be under built-in furniture.
 - .12 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
 - .13 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.
 - .14 Install metal edge strips at unprotected or exposed edges where flooring terminates, and at junction of dissimilar materials.
-

- .15 If flooring is gouged, scratched, cut or otherwise damaged, replace entire section of damaged flooring to the extent determined by the Departmental Representative. Inset patches or additional seams will not be accepted.

3.5 APPLICATION: BASE

- .1 Lay out base to keep number of joints at minimum.
- .2 Clean substrate and prime with one coat of adhesive.
- .3 Apply adhesive to back of base.
- .4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.
- .5 Install straight and level to variation of 1:1000.
- .6 Scribe and fit to door frames and other obstructions. Use premoulded end pieces at flush door frames.
- .7 Cope internal corners. Use premoulded corner units for right angle external corners. Use formed straight base material for external corners of other angles.
- .8 Use toeless type base where floor finish will be carpet, coved type elsewhere.
- .9 Install toeless type base before installation of carpet on floors.
- .10 Heat weld base in accordance with manufacturer's printed instructions.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Remove excess adhesive from floor, base and wall surfaces without damage.
- .3 Upon completion of installation, scrub floor with a neutral cleanser and rinse. Apply three coats of sealer finish as recommended by flooring manufacturer.
-

3.7 PROTECTION

- .1 Protect new floors from time of final set of adhesive until Occupancy Inspection.
- .2 Prohibit traffic on floor for 48 hours after installation.
- .3 Use only water-based coating for linoleum.
- .4 Protect finished installation from damage by work of other trades with a non-staining protective cover. Do not use duct tape to fasten edges.
- .5 If completion of deficiencies after Occupancy Inspection has the potential to damage or dirty the flooring, re-install protective cover until all deficiencies are corrected.
- .6 Replace damaged flooring as directed by Departmental Representative.

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Concrete Institute (ACI)
 - .1 ACI 503R-93(R1998), Use of Epoxy Compounds with Concrete.

 - .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 307-99 (2008), Standard Test Method for Tensile Strength of Chemical Resistant Mortar, Grouts, and Monolithic Surfacing.
 - .2 ASTM C 413-01(2006), Standard Test Method for Absorption of Chemical resistant Mortars, Grouts and Monolithic Surfacing.
 - .3 ASTM C 579-01(2006), Standard Test Method for Compressive Strength of Chemical Resistant Mortars, Grouts, Monolithic Surfacing and Polymer Concretes.
 - .4 ASTM C 580-02(2008), Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical Resistant Mortars, grouts, Monolithic Surfacing and Polymer Concretes.
 - .5 ASTM C 882/C882M-05E1, Standard Test Method for Bond Strength of Epoxy Resin Systems used with Concrete by Slant Shear.
 - .6 ASTM D 638-03, Standard Test Method for Tensile Properties of Plastics.
 - .7 ASTM D 1044-94(2008), Resistance of Transparent Plastic to Surface Abrasion.
 - .8 ASTM D 1308-02(2007), Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - .9 ASTM D 2047-04, Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured By the James Machine.

 - .3 National Association of Corrosion Engineers (NACE):
 - .1 NACE RP 01 88-(99), Discontinuity (Holiday) Testing of Protective Coatings.

 - .4 Underwriters Laboratories of Canada(ULC)
 - .1 CAN/ULC-S102.2-98, Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

 - .5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

 - .6 United States Military Standards (MIL):
 - .1 MIL D 3134-(1989J), Deck Covering Materials.
-

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures. Include duplicate copies of manufacturer's literature indicating recommended installation, finishing and maintenance procedures.
- .3 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. WHMIS MSDS acceptable to Labour Canada and Health Canada for high build glazed coatings. Indicate VOC content.
- .4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit duplicate 300 x 300 mm samples of each colour and finish coating applied to plywood.
- .5 Provide maintenance data for coatings for incorporation into manual specified in Section 01 77 00 - Closeout Procedures.

1.3 QUALITY ASSURANCE

- .1 Work of this Section shall be applied only by experienced applicators, licensed to do so by the product manufacturer.
- .2 Construct mock-up 10 m² of each type of epoxy quartz flooring including one inside corner, one outside corner, change of material, and door threshold.
- .3 Construct mock-up where directed.
- .4 Allow 24 hours for inspection of mock-up by Departmental Representative.
- .5 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

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 job site just prior to installation, in original unopened containers bearing manufacturer's seals and labels.
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- .3 Store materials inside, in dry location, away from heavy traffic areas. Maintain temperature in storage area at 12 degrees C, minimum.
- .4 Deliver and store materials in manner to prevent damage.
- .5 Waste Management and Disposal:
 - .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.5 ENVIRONMENTAL REQUIREMENTS

- .1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of materials.
 - .1 Ensure no open flame heating devices are used.
 - .2 Discourage occupancy of treated space until volatile materials are no longer being emitted and there is no odour.
 - .3 Provide adequate respiratory protection to individuals exposed to the products.
 - .2 Ventilation:
 - .1 Provided continuously during and after installation. Run system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of installation.
 - .2 Ventilate enclosed spaces in accordance with Section 01 41 00 - Regulatory Requirements.
 - .3 Temperature:
 - .1 Maintain temperature and structural base temperature at epoxy quartz installation area above 12 degrees C for 24 hours prior to, during, and for 24 hours following installation.
 - .2 Maintain minimum temperature 10 degrees C within area of installation until Final Acceptance of building.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Seamless Flooring: to CAN/CGSB 1.146-M, thermosetting 100% epoxy coating with troweled matrix (coloured aggregate) embedded in clear epoxy filler and an epoxy top coat meeting the following requirements:
 - .1 Abrasion Resistance: to ASTM D1044-94; CS-17 wheel, maximum weight loss 0.1 grams per 10,000 cycles.
 - .2 Bond Strength: to ASTM C 882; 550 psi minimum.
 - .3 Flammability: to CAN/ULC-S102.2; flame spread 40, smoke developed 304.
 - .4 Impact Resistance: to MIL D 3134; 0.225 mm.
 - .5 Coefficient of Friction: to ASTM D 2047; 0.6.
 - .6 Tensile Strength: to ASTM C 307; 15 MPa minimum after 7 days.
 - .7 Compressive Strength: to ASTM C 579; 72 MPa minimum after 7 days.
 - .8 Flexural Strength: to ASTM C 580; 34 MPa minimum.
 - .9 Elongation: to ASTM D 638; 14%.
 - .10 Linear Shrinkage: nil.
 - .11 Water Absorption: to ASTM C 413; 0.01% maximum.
 - .12 Chemical Resistance: no chemical attack or discolouration when tested to ASTM D 1308 at 72 degrees F for 7 days against;
 - .1 Ammonium hydroxide; 28%
 - .2 Clorox
 - .3 Ethylene Glycol
 - .4 Gasoline
 - .5 Isopropyl Alcohol; 98%
 - .6 Mineral Spirits
 - .7 Skydrol #500
 - .8 Sodium Hydroxide; 30%
 - .9 Urine-Synthetic; 6.6%
 - .13 Pin Holing: none permitted when tested using Holiday test.

2.2 FINISHES

- .1 One colour, to match Stonshield SLT Medium Texture "Driftwood" by Stonhard. Satin or gloss finish as directed.
-

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 CONDITION OF SUBSTRATE

- .1 Inspect substrates to ensure they are clean, sound, level and free from cracks.
- .2 Report any unacceptable conditions to the Departmental Representative and the Contractor. Do not proceed with work until unacceptable conditions have been corrected.

3.3 PREPARATION

- .1 Prepare substrate by diamond grinding, shot blasting, or other manufacturer approved method, to receive bond coat in accordance with manufacturer's instructions.
- .2 Mask surrounding surfaces to provide neat, clean juncture lines.
- .3 Level or patch substrate flooring to manufacturer's recommendations.
- .4 For shrinkage cracks 3 mm or larger, diamond grind to open up cracks and fill with 75 mm stripe coat 20 mil thickness with urethane or epoxy.

3.4 APPLICATION

- .1 Apply bond coat, trowelled aggregate and binder and finish coat to manufacturer's instructions.
 - .2 Match finish work to reviewed samples. Maintain uniform thickness, sheen, colour and texture.
 - .3 Cured thickness of finished flooring shall be minimum 3 mm.
 - .4 In cell block, form seamless coved base as indicated, to a height of 100 mm. Fit epoxy flooring neatly into reveal above first course of concrete block. Note: square base is required
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to extent of travel of cell door. See sliding Cell Door detail E 16 on sheet 16 in Section 08 32 01 - Cell Door Details.

- .5 Remove and make good any protrusions that are capable of producing cuts or abrasions to the satisfaction of the Departmental Representative.

3.5 PROTECTION

- .1 Protect finished areas for a minimum period of 6 days after completion of work, or until floor has fully cured.
- .2 Restrict traffic over finished areas and protect in accordance with manufacturer's instructions until all other work is complete.

3.6 CLEANING

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

1.1 GENERAL

1.2 SUBMITTALS

- .1 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for high build glazed coatings. Indicate VOC content.
- .3 Submit duplicate copies of manufacturer's literature indicating recommended installation, finishing and maintenance procedures.

1.3 SAMPLES

- .1 Comply with requirements of Section 01 33 00 - Submittal Procedures.
- .2 Submit two complete sets of carpet manufacturer's colour and pattern range.

1.4 PRODUCT DATA

- .1 Comply with requirements of 01 33 00 - Submittal Procedures.
- .2 Submit two copies of carpet manufacturers' documentation verifying carpet and adhesive proposed are approved by carpet manufacturer for carpet installation specified.
- .3 Submit two copies of adhesive manufacturer's documentation verifying that adhesives are highest quality as specified.

1.5 MAINTENANCE MATERIALS

- .1 Extra Stock: provide 10 full size carpet tiles of selected colour.

1.6 PRODUCT OFF-GASSING, HANDLING, DELIVERY AND STORAGE

- .1 Deliver carpet and other accessories clearly marked as to size, type, dye lot and quantity.
 - .2 Store under cover and away from moisture. Keep dry at all times.
-

1.7 SITE CONDITIONS

- .1 Maintain minimum temperature of 18° C in installation areas for at least 48 hours prior to, during and 48 hours after installation.
- .2 Keep doors and windows open when weather permits, and operate ventilation fans at maximum capacity during and for at least 72 hours after glue-down installation.

1.8 SEQUENCING AND SCHEDULING

- .1 Install carpet prior to installation of:
 - .1 Partitions under which carpet is continuous.
 - .2 Telephone and electrical power pedestal outlets.
 - .3 Coved resilient base.

1.9 Products

1.10 CARPET

- .1 Minimum 19 oz., eco*solution nylon 100%, 36" modular tile, multi level, patterned loop.
- .2 Standard of Acceptance:
 - .1 SHAW CONTRACT GROUP: Mirro Image tile.

1.11 ACCESSORIES

- .1 Carpet Adhesive: Releasable pressure sensitive type adhesive. Adhesive must be water-based and allow for removal of Carpet tile without damage to carpet or substrate. Adhesive to meet or exceed the VOC and emission standards for South Coast Air Quality Management District Rule #1168. VOC levels to be 3rd party certified. Preference will be given to products with mill applied adhesives.
 - .2 Cementitious Underlayment: self-levelling and trowel grade, pre-mixed, polymer-modified, containing no gypsum, not softened by water after final set. Minimum compressive strength 10 MPa at 8 hours and 20 Mpa at 7 days. Suitable for floorcovering installation not more than 4 hours after application. Floor fillinr or leveling shall be feathered over a minimum 1200 wide area.
 - .3 Underlayment Bond Coat: as recommended by carpet manufacturer to maintain requirements for releasable pressure sensitive tile to substrate.
-

- .4 Carpet Edge Guard: as follows:
 - .1 Type: non-metallic, extruded or molded heavy duty rubber "T" shaped cap insert and minimum 50 mm wide extruded aluminum anchorage flange, profiled to accept cap.
 - .2 Colour: selected by the Departmental Representative from manufacturer's standard range.

- .5 Resilient Base: continuous, top set, complete with premoulded end stops and external corners:
 - .1 Type: rubber.
 - .2 Style: cove.
 - .3 Thickness: 3.17 mm.
 - .4 Height: 101.6 mm.
 - .5 Lengths: cut lengths minimum 2400 mm.
 - .6 Colour: selected by Departmental Representative from manufacturer's full range.

1.12 Execution

1.13 CONDITION OF SUBSTRATE

- .1 Inspect substrate and verify substrate surfaces are sufficiently dry and properly cured before beginning work of this Section.

- .2 Ensure surfaces are reasonably level, smooth and free of grease, wax and other foreign matter.

1.14 SUBSTRATE PREPARATION

- .1 Provide cementitious underlayment as barrier coating over the entire area to receive carpet.

 - .2 Vacuum substrate to remove dust and other small particles.

 - .3 Fill small holes, cracks, depressions and low spots with cementitious underlayment. Trowel and float to produce a smooth, flat surface. Allow to cure properly.

 - .4 When underlayment has cured, clean substrate surface and allow to dry.

 - .5 Test cementitious substrate for porosity, moisture content and alkalinity.

 - .6 Ensure substrate has an acceptable level of absorbency.
-

1.15 CARPET INSTALLATION GENERAL

- .1 Store carpet tile in area of installation and allow sufficient time for carpet to relax and stabilize at ambient temperature and humidity prior to installation , but not less than 24 hours.
- .2 Install carpet tile and accessories in accordance with manufacturer's recommendations and as specified.
- .3 Trim and straighten factory edges. Use sharp cutting blades to prevent ragged and uneven edges.
- .4 Apply releasable pressure sensitive type adhesive.to Manufacturer's recommendations.
- .5 Install edge guards where carpet terminates at other floor finishes.

1.16 CLEANING & PROTECTION

- .1 Follow carpet manufacturer's recommendations for all cleaning procedures.
- .2 Remove excess adhesive from carpet face, accessories and adjacent surfaces.
- .3 Vacuum clean carpet after installation as soon as traffic is allowed and during final cleaning of building.
- .4 Protect carpet from damage and soiling due to construction traffic until acceptance by Owner.

1.17 TRAINING

- .1 Provide qualified representative to instruct building maintenance staff in proper, removable, reinstallation, cleaning methods and equipment required.

END OF SECTION

PART 1 - GENERAL

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C 423-07, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for Use in Building Construction.
 - .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.
- .3 Canadian Standards Association (CSA International)
 - .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.
 - .2 CAN/CSA-ISO 14040, Lifecycle Assessment Standards.
- .4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .5 Underwriter Laboratories of Canada (ULC)
 - .1 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
- .3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit duplicate 300 mm x 300 mm sample of each type of acoustical unit.

1.3 QUALITY ASSURANCE

- .1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct one Representative mock-up of each type acoustical wall treatment system.
-

- .3 Construct mock-up one panel in size minimum to indicate method of assembly, installation and fixing.
- .4 Construct mock-up where directed.
- .5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with work.
- .6 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of the finished work.

1.4 ENVIRONMENTAL REQUIREMENTS

- .1 Commence installation after building enclosed and dust generating activities are completed.
- .2 Permit wet work to dry prior to commencement of installation.
- .3 Maintain uniform minimum temperature of 15 degrees C and relative humidity of 20- 40% prior to, during and after installation.

1.5 DELIVERY, HANDLING AND STORAGE

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Waste Management and Disposal:
 - .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Acoustical construction products must:
 - .1 Not require being labelled as poisonous, corrosive, flammable or explosive under Consumer Chemical and Container Regulations of the Hazardous Products Act.
 - .2 Be accompanied by detailed instructions for proper handling and installation so as to minimize health concerns.
 - .3 The manufacturing process must adhere to Lifecycle Assessment Standards as per CAN/ISO 14040.
-

- .2 Type 2: Cementitious wood fibre acoustical units:
 - .1 Acoustic core material: to CAN/CGSB-92.1.
 - .1 Standard Units, 1200 x full length of wall x 38 mm thick and as dimensioned, bevel-butt edge, factory paint finish standard white, NRC designation of 0.85. Standard C-40 mounting.
 - .2 Flame Spread Rating: 25 or less, passing CAN/ULN-S102
 - .3 Sound Absorption Characteristics: Hz 150 250 500 1000 2000 4000 Sabins 0.32 0.70 1.09 0.93 0.76 0.94
 - .3 Adhesive: type recommended by acoustic unit manufacturer.
 - .4 Staples, nails and screws: to CSA B111, non-corrosive finish, type recommended by acoustic unit manufacturer.
 - .5 Polyethylene: to CAN/CGSB-51.34, 0.015 mm thick.
 - .6 Touch-up paint: manufacturer's recommended product for repainting or touching up wood fibre acoustic units without reducing noise reduction properties.

2.2 FABRICATION

- .1 Type 2: Cementitious wood fibre acoustic units:
 - .1 Cementitious wood fibre acoustic units; aspen wood fibres bonded with inorganic hydraulic cement binder.

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 Ensure substrate surface is straight to tolerance of plus or minus 3 mm over 3000 mm.
 - .2 Install Type 2 cementitious wood fibre acoustic units plumb and aligned. Cut units to be at least 50 % of unit width.
 - .3 Scribe acoustic units to fit adjacent work. Butt joints tight.
-

- .4 Install wall panels on 38 mm 38 mm perimeter wood furring and 38 mm x 38 mm wood strapping with fibrous acoustical media and spacers behind for a manufacturer's designation C-40 mounting.
- .5 Install ceiling panels directly to ceiling.
- .6 Install wood trim and finish as detailed.

3.3 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
- .2 Keep acoustic installation and all components clean. Remove blemishes immediately.

3.4 PROTECTION

- .1 Use polyethylene to protect finished acoustical wall treatment from damage.
- .2 Remove prior to Occupancy Inspection.

PART 1 - GENERAL

1.1 SUMMARY

- .1 Section Includes:
 - .1 Material and installation of site applied paint finishes to new interior surfaces, including site painting of shop primed surfaces.

1.2 REFERENCES

- .1 Department of Justice Canada (Jus)
 - .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33
- .2 Environmental Protection Agency (EPA)
 - .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).
- .3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Master Painters Institute (MPI)
 - .1 MPI Architectural Painting Specifications Manual, 2004.
- .5 National Fire Code of Canada - current edition
- .6 Society for Protective Coatings (SSPC)
 - .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.
- .7 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
 - .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.
-

- .2 Conform to latest MPI requirements for interior painting work, including preparation and priming.
- .3 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.
- .4 Paint materials such as linseed oil, shellac, turpentine, etc. shall be the highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and shall be compatible with other coating materials as required.
- .5 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements and submit to Departmental Representative if requested.
- .6 Standard of Acceptance:
 - .1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Ceilings: No defects visible from eye level at 45 degrees to surface when viewed using final lighting source.
 - .3 Final coating to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .7 Pre-Installation Meeting:
 - .1 Convene pre-installation meeting one week prior to beginning work of this Section.
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Coordination with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.
- .8 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 ENVIRONMENTAL PERFORMANCE REQUIREMENTS

- .1 Provide paint products meeting MPI "Environmentally Friendly" E1, E2, E3 ratings based on VOC (EPA Method 24) content levels. Wherever possible the lowest VOC rated product (E3) is to be used.
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1.5 INSPECTION REQUIREMENTS

- .1 The Contractor shall pay for the following Inspection Services:
 - .1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and the Alberta Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plan and elevation drawings (including pertinent details) as well as a Finish Schedule. The Contractor shall pay for the inspection services.
 - .2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Departmental Representative and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.
 - .3 Where " Special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application and approval of their paint or coating system application as required.

1.6 SCHEDULING

- .1 Submit work schedule for various stages of painting to Departmental Representative for review. Submit schedule minimum of 48 hours in advance of proposed operations.
 - .2 Obtain written authorization from Departmental Representative for changes in work schedule.
 - .3 Schedule painting operations to prevent disruption of occupants in and about the building.
 - .4 The mechanical room, and other rooms where there is a significant amount of mechanical or electrical equipment, conduits, piping and ductwork are to be painted prior to the installation of the electrical and mechanical work.
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1.7 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Product Data:
 - .1 Submit product data and manufacturer's installation/application instructions for each paint and coating product to be used.
 - .2 Submit manufacturer's product data for the use and application of paint thinner.
 - .3 Submit copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOCs during application and curing.
 - .3 Samples:
 - .1 Submit full range colour sample chips to Departmental Representative in accordance with Section 01 33 00 - Submittal Procedures. Indicate where colour availability is restricted.
 - .2 After colours have been selected by Departmental Representative, submit duplicate 200 x 300 mm sample panels of each paint, stain, clear coating, and special finish 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 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 When approved, retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.
 - .4 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation and application instructions.
 - .5 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.
 - .4 MPI Environmentally Friendly classification system rating.
 - .5 Manufacturer's Material Safety Data Sheets (MSDS).
-

1.8 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 - four 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 All materials to be new, unopened and clearly identified. Insert cross-referenced to room locations into the O & M Manual.
 - .4 Deliver to Departmental Representative and store where directed.

1.9 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 with temperature range 7 degrees C to 30 degrees 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.
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- .8 Fire Safety Requirements:
 - .1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
 - .2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
 - .3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

 - .9 Waste Management and Disposal:
 - .1 Dispose of 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 Unused paint and coating materials must be disposed of at official hazardous material collections site as approved by Departmental Representative.
 - .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 which cannot be reused must 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 amount 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 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.
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1.10 SITE CONDITIONS

- .1 Heating, Ventilation and Lighting:
 - .1 Do not perform painting work unless adequate and continuous ventilation and sufficient heating facilities are in place to maintain ambient air and substrate temperatures above 10 degrees 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 written approval by specifying authority, Paint Inspection Agency Authority and product manufacturer, perform no painting when:
 - .1 Ambient air and substrate temperatures are below 10 degrees C.
 - .2 Substrate temperature is above 32 degrees 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 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
 - .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. Maximum moisture content 12%.
-

- .2 15 % for wood.
- .3 12 % for plaster and gypsum board.
- .3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
- .4 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.

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 Only qualified products with E3 "Environmentally Friendly" rating are acceptable for use on this project, unless approved by Departmental Representative.
 - .4 Conform to latest MPI requirements for interior painting work including preparation and priming.
 - .5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI Architectural Painting Specification Manual "Approved Product" listing.
 - .6 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.
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- .7 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes to meet minimum "Environmentally Friendly" E2 rating.

2.2 COLOURS

- .1 Departmental Representative will provide Colour Schedule after Contract award.
- .2 Colour schedule will be based upon selection of three base colours and two accent colours. No more than five colours will be selected for entire project and no more than three colours will be selected in each area.
- .3 Selection of colours from manufacturers full range of colours.
- .4 Where specific products are available in restricted range of colours, selection based on limited range.
- .5 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. On-site tinting of painting materials is allowed only with Departmental Representative's written approval.
- .2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.
- .3 Where necessary 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 speified and as noted on Finish Schedule.

2.5 INTERIOR PAINTING SYSTEMS

- .1 Concrete horizontal surfaces: floors (Unless a traffic coating is specified):
- .1 INT 3.2C - Epoxy low gloss finish.
- .2 Concrete masonry units: smooth face block:
- .1 INT 4.2D - High performance architectural latex G5 finish. (Unless a High Build Coating is specified)
- .3 Structural steel and metal fabrications: columns, beams, joists:
- .1 INT 5.1B - Waterborne light industrial G5 coating.(Unless a cementitious fireproofing or intumescent paint fireproofing is specified)
- .4 Galvanized metal: doors, frames, railings, misc. steel, pipes, overhead decking, and ducts.
- .1 INT 5.3B - Waterborne light industrial G5 coating.
-

- .5 Dressed lumber: including doors, door and window frames, casings, mouldings:
 - .1 INT 6.3K - Polyurethane varnish G5 finish.
- .6 Wood paneling and casework: partitions, panels, shelving, millwork:
 - .1 INT 6.4J - Polyurethane varnish G5 finish.
- .7 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
 - .1 INT 9.2A - Latex G3 finish (over latex sealer).
- .8 Canvas and cotton coverings.
 - .1 INT 10.1A - Latex G3 finish.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 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 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Departmental Representative damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.
 - .2 Conduct moisture testing of surfaces to be painted using 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.
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- .3 Maximum moisture content as follows:
 - .1 Stucco, plaster and gypsum board:12%.
 - .2 Concrete: 12 %.
 - .3 Clay and Concrete Block/Brick: 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 Removal of electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations by General Contractor. Items shall be securely stored and re-installed after painting is completed by General Contractor.
 - .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 approval of Departmental Representative.
 - .3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly.
 - .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
 - .6 Use trigger operated spray nozzles for water hoses.
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- .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 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.
- .5 Prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .6 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.
- .7 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 blowing with clean dry compressed air or vacuum cleaning.
- .8 Touch up of shop primers with primer as specified.
- .9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

- .1 Method of application to be as approved by Departmental Representative. Apply paint by brush, roller, air sprayer or airless sprayer. 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.
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- .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
 - .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
 - .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
 - .4 Brush out immediately all runs and sags.
 - .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.
- .4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.
- .5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish closets and alcoves as specified for adjoining rooms.
- .10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Prime and paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in finished areas with colour and finish to match adjacent surfaces, except where items are plated with a prefinished cladding or otherwise noted. Mechanical and electrical installation and equipment to be identified in accordance with the requirements of the electrical and mechanical specification divisions.
-

- .2 Boiler room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment. Mechanical and electrical installation and equipment to be identified in accordance with the requirements of the electrical and mechanical specification divisions.
- .3 Unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks. Mechanical and electrical installation and equipment to be identified in accordance with the requirements of the electrical and mechanical specification divisions.
- .4 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.
- .5 Do not paint over nameplates.
- .6 Keep sprinkler heads free of paint.
- .7 Paint inside of ductwork where visible behind grilles, registers and diffusers with primer and one coat of matt black paint.
- .8 Paint fire protection piping red.
- .9 Paint disconnect switches for fire alarm system and exit light systems in red enamel.
- .10 Paint natural gas piping yellow.
- .11 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.
- .12 Do not paint interior transformers and substation equipment.

3.7 FIELD QUALITY CONTROL

- .1 Interior painting and decorating work shall be inspected by a Paint Inspection Agency (inspector) acceptable to the specifying authority and local Painting Contractor's Association. Painting contractor shall notify Paint Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project painting specification, plans and elevation drawings (including pertinent details) as well as a Finish Schedule.
-

- .2 Interior surfaces requiring painting shall be inspected by Paint Inspection Agency who shall notify Departmental Representative and General Contractor in writing of defects or problems, prior to commencing painting work, or after prime coat shows defects in substrate.
- .3 Where "special" painting, coating or decorating system applications (i.e. elastomeric coatings) or non-MPI listed products or systems are to be used, paint or coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific paint or coating system application as well as on site supervision, inspection and approval of their paint or coating system application as required at no additional cost to the owner.
- .4 Standard of Acceptance:
 - .1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.
 - .2 Ceilings: no defects visible from eye level at 45 degrees to surface when viewed using final lighting source.
 - .3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.
- .5 Field inspection of painting operations to be carried out by independent inspection firm as designated by Departmental Representative.
- .6 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.
- .7 Cooperate with inspection firm and provide access to areas of work.
- .8 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.8 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.
- .6 Where a finished wall or ceiling is worked on, or damaged, by other trades or the General Contractor, after corrective work is completed to the wall or ceiling, repaint entire wall or ceiling surface to the nearest natural break in the wall or ceiling plane, such as an internal or external corner, projecting column, or ceiling bulkhead.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/ULC-S102-M88, Surface Burning Characteristics of Building Materials and Assemblies.
- .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, cleaning procedures.
- .3 Submit proof that product does not exceed flame spread 25 and smoke developed 50 when tested in conformance with CAN/ULC-S102-M88, and carries a ULC or cUL rating.
- .4 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 02 81 01 - Hazardous Materials. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for high build glazed coatings. Indicate VOC content.
- .5 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit duplicate 300 x 300 mm samples of each colour and finish coating applied to plywood.
- .6 Closeout Submittals:
 - .1 Provide maintenance data for coatings for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.3 QUALITY ASSURANCE

- .1 All materials and components to be from one manufacturer.
 - .2 Work to be carried out by a manufacturer approved and licensed applicator. Provide written proof of manufacturer approval.
-

- .3 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
- .4 Apply coating of each finish to 10 m² area of surface to be treated.
- .5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with coating work.
- .6 When accepted, mock-up will demonstrate minimum standard for this work. Mock-up may remain as part of finished work.

1.4 INSPECTION REQUIREMENTS

- .1 The Contractor shall pay for the following Inspection Services:
 - .1 High Build Coating work shall be inspected by an Inspection Agency (inspector) acceptable to the specifying authority. High Build Coating contractor shall notify Inspection Agency a minimum of one week prior to commencement of work and provide a copy of project specification, plan and elevation drawings (including pertinent details) as well as a Finish Schedule. The Contractor shall pay for the inspection services.
 - .2 Interior surfaces requiring high build coatings shall be inspected by Inspection Agency who shall notify Departmental Representative and General Contractor in writing of defects or problems, prior to commencing high build coating work, or after prime coat shows defects in substrate.
 - .3 Where " Special" painting, coating or decorating system applications (i.e. high build coatings) or non-MPI listed products or systems are to be used, coating manufacturer shall provide as part of this work, certification of surfaces and conditions for specific coating system application and approval of their coating system application as required.

1.5 DELIVERY, HANDLING AND STORAGE

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

1.6 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:
 - .1 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.
 - .2 Ventilate enclosed spaces in accordance with Section 01 41 00 - Regulatory Requirements.

- .3 Temperature:
 - .1 Do not apply emulsion systems unless uniform minimum 10 degrees C air temperature at installation area for 24 hours prior to and after application.
 - .2 Maintain minimum temperature 10 degrees C within area of installation until final acceptance of building.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Interior high build glazed coating materials: to CAN/CGSB-1.186-M89; two component, inorganic, non-thermosetting epoxy resin, pigmented, with anti-microbial additive.
 - .1 Colour: to match General Paint Colorlife L 2722W "Dornix".
 - .2 Standard of Acceptance: Duroplast 100.
 - .1 Duroplast 100
 - .2 Stonhard VSR

 - .2 Block filler: Epoxy as approved by high build coating manufacturer.
-

2.2 MIXES

- .1 Mix coatings according to manufacturer's instructions.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

- .1 Prepare surfaces in accordance with CAN/CGSB-1.186-M89 and 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.
- .4 Doors and frames in detention area to be cleaned and prepared to provide 0.5mil anchor profile using SP2 or SP3 method. Epoxy primer may be used if approved and warranted by the high build coating manufacturer.

3.3 WALL APPLICATION

- .1 Apply coating to produce smooth surface, uniform in semi-gloss sheen, colour and finish, free from marks, dirt, particles, runs, crawls, curling, holes, air pockets and other defects and to achieve smoothness index in accordance with CAN/CGSB-1.186-M89.
 - .2 Apply filler coats to porous surfaces by brush or spray in minimum two coats to achieve minimum total dry film thickness of 16 mils (400 microns). Additional coats may be necessary to ensure no pinholing to be evident.
 - .3 Apply minimum two glaze coats to minimum total dry film thickness of 12 mils (300 microns).
 - .4 Measure thickness immediately after application using appropriate wet film thickness gauges to the satisfaction of the Departmental Representative.
-

3.4 DOOR AND FRAME APPLICATION

- .1 Doors and frames in the detention area to be spray finished after all adjacent work is completed:
 - .1 1 coat epoxy primer 2 mils (50 microns) dry film thickness, or factory primed.
 - .2 2 glaze coats 12 mils (300 microns) dry film thickness.

3.5 CLEANING

- .1 Proceed in accordance with Section 01 74 11 - Cleaning.
 - .1 Clean surfaces to coating manufacturer's printed instructions.

PART 1 - GENERAL

1.1 REFERENCES

- .1 Aluminum Association (AA).
 - .1 DAF 45-03, Designation System for Aluminum Finishes.
 - .1 AA-6063-T6.

1.2 SUBMITTALS

- .1 Product Data.
 - .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's:
 - .1 For caulking materials during application.
 - .2 For adhesives.
- .2 Shop Drawings.
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate, by large scale details, materials, finishes, dimensions, anchorage and assembly.
- .3 Samples.
 - .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Submit duplicate 300 mm long samples of profiles and colours for corner and wall guards.
- .4 Manufacturer's Instructions.
 - .1 Submit manufacturer's installation instructions.

1.3 WASTE MANAGEMENT AND DISPOSAL

- .1 Dispose of waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
-

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Stainless steel corner guard: 304 stainless steel alloy, 89mm x 89mm size, length to match wall protection. CS Group CO-8 corner guards or approved equivalent.
- .2 Wall protection: High impact non-reinforced acrylic/polyvinylchloride alloy sheet, 1.5 mm (0.60") nominal thickness, 1220 mm x 2440 mm sheet size, slight stipple texture finish to one side of sheet. Acceptable products:
 - .1 Kydex wallcovering manufactured by Kleerdex Company.
 - .2 Acrovyn wallcovering manufactured by Construction Specialties Inc.
 - .3 Rigiwall manufactured by GenCorp Polymer Products and distributed by Westroc.
 - .4 Korogard manufactured by Koroseal.

2.2 ACCESSORIES

- .1 Accessory Mouldings: use colour integrated matching inside corners and outside corners, division strips and surface mounted top edge caps.
- .2 Sealant: silicone, clear. Use colour matched sealant on vertical butt joints.
- .3 Fasteners: self-tapping stainless steel, concealed mounting.
- .4 Adhesive: Fast Bond #30 NF water-based contact adhesive manufactured by 3M, or XT-2000 water-based mastic adhesive manufactured by Super-Tek Products Inc. or a recommended by manufacturer.

2.3 FINISHES

- .1 Allow for two colours to be selected by Departmental Representative from manufacturer's full range.
-

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install units on solid backing and erect with materials and components straight, tight and in alignment.
- .2 Dry lay panels to establish joint location and obtain approval of Departmental Representative prior to beginning installation.
- .3 Install panel system in accordance with manufacturer's instructions with top edge 1200 mm above finished floor, straight and level to maximum variation of plus or minus 3 mm over 3000mm straight edge, non-cumulative.
- .4 Apply adhesive to wall substrate and to back of panel.
- .5 Set panels in place ensuring butt joints are tight. Provide temporary bracing until adhesive has set.
- .6 Install mouldings to all panel edges, inside and outside corners.
- .7 Install inside and outside corner pieces and top caps.
- .8 Seal all mouldings and joints between system and substrate with sealant.
- .9 Mechanically fasten corner guards to substrate in accordance with manufacturer's recommendations. Mount corner guards so the top is the same height above the finished floor as the wall protection.

3.3 CLEANING

- .1 Perform cleaning after installation to remove construction and accumulated environmental dirt.
 - .2 Clean surfaces after installation using manufacturer's recommended cleaning procedures.
-

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

3.4 SCHEDULE

- .1 Install wall protection as indicated on drawings.
- .2 Install stainless steel corner guards on all external gypsum board corners, including returns into door frames.

Part 1 General

1.1 SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Shop drawings to show:
 - .1 Mounting arrangements.
 - .2 Operating and maintenance clearances.
- .3 Shop drawings and product data accompanied by:
 - .1 Detailed drawings of bases, supports, and anchor bolts.
 - .2 Acoustical sound power data, where applicable.
 - .3 Points of operation on performance curves.
 - .4 Manufacturer to certify current model production.
 - .5 Certification of compliance to applicable codes.
- .4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.
- .5 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.
 - .2 Operation and maintenance manual approved by, and final copies deposited with, Consultant before final inspection.
 - .3 Operation data to include:
 - .1 Control schematics for systems including environmental controls.
 - .2 Description of systems and their controls.
 - .3 Description of operation of systems at various loads together with reset schedules and seasonal variances.
 - .4 Operation instruction for systems and component.
 - .5 Description of actions to be taken in event of equipment failure.
 - .6 Valves schedule and flow diagram.
 - .7 Colour coding chart.
 - .4 Maintenance data to include:
 - .1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.
 - .2 Data to include schedules of tasks, frequency, tools required and task time.
 - .5 Performance data to include:
 - .1 Equipment 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.
- .6 Approvals:
 - .1 Submit 2 copies of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless directed by Consultant.
 - .2 Make changes as required and re-submit as directed by Consultant.
- .7 Additional data:
 - .1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.
- .8 Site records:
 - .1 Consultant 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 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.
- .9 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 Consultant 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.
- .10 Submit copies of as-built drawings for inclusion in final TAB report.

1.2 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section 01 45 00 - Quality Control.
- .2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

- .1 Waste Management and Disposal:
 - .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Materials and products in accordance with Section 01 47 15 - Sustainable Requirements: Construction.
- .2 Do verification requirements in accordance with Section 01 47 17 - Sustainable Requirements: Contractor's Verification.

Part 3 Execution

3.1 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.

3.2 CLEANING

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

3.3 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 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers International (ASME)
 - .1 ANSI/ASME B16.15-06, Cast Bronze Threaded Fittings, Classes 125 and 250.
 - .2 ANSI/ASME B16.18-01, Cast Copper Alloy Solder Joint Pressure Fittings.
 - .3 ANSI/ASME B16.22-01, Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
 - .4 ANSI/ASME B16.24-01, Cast Copper Alloy Pipe Flanges and Flanged Fittings, Class 150, 300, 400, 600, 900, 1500 and 2500.
- .2 ASTM International Inc.
 - .1 ASTM B88M-05, Standard Specification for Seamless Copper Water Tube (Metric).
- .3 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
 - .1 MSS-SP-80-03, Bronze Gate, Globe, Angle and Check Valves.
- .4 National Research Council (NRC)/Institute for Research in Construction
 - .1 NRCC 38728, National Plumbing Code of Canada (NPC) - 1995.

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, finish and limitations.
- .3 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 Place materials defined as hazardous or toxic in designated containers.
- .2 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

Part 2 Products

2.1 PIPING

- .1 Domestic hot, cold and recirculation systems, within building.

- .1 Above ground: copper tube, hard drawn, type L: to ASTM B88M.
- .2 Buried or embedded: copper tube, soft annealed, type K: to ASTM B88M, in long lengths and with no buried joints.

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 under: cast bronze.
- .6 NPS 2 and over: wrought copper, bronze.

2.3 JOINTS

- .1 Bolts, nuts, hex head and washers: to ASTM A307, heavy series.
- .2 Solder: 95/5 tin copper alloy.
- .3 Teflon tape: for threaded joints.
- .4 Dielectric connections between dissimilar metals: dielectric fitting, complete with thermoplastic liner.

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 and 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 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.

3.3 VALVES

- .1 Isolate equipment, fixtures and branches with gate or ball valves.

3.4 PRESSURE TESTS

- .1 Conform to requirements of Section 21 05 01 - Common Work Results for Mechanical.
- .2 Test pressure: greater of 1 times maximum system operating pressure or 860 kPa.

3.5 FLUSHING AND CLEANING

- .1 Flush entire system for 8 h. Ensure outlets flushed for 2 hours. Let stand for 24 hours. Let system flush for additional 2 hours, then draw off another sample for testing.

3.6 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 air chambers, expansion compensators are installed properly.

3.7 START-UP

- .1 Timing: start up after:
 - .1 Pressure tests have been completed.
- .2 Provide continuous supervision during start-up.
- .3 Rectify start-up deficiencies.

3.8 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.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .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 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.
- .3 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36-00, Commercial Adhesives.

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.

Part 2 Products

2.1 COPPER TUBE AND FITTINGS

- .1 Above ground sanitary and vent Type DWV to: ASTM B306.
 - .1 Fittings.
 - .1 Cast brass: to CAN/CSA-B125.3.

- .2 Wrought copper: to CAN/CSA-B125.3.
- .2 Solder: 50:50.

2.2 CAST IRON PIPING AND FITTINGS

- .1 Buried sanitary minimum NPS 3, to: CAN/CSA-B70.
 - .1 Joints:
 - .1 Hub and spigot:
 - .1 Caulking lead: to CSA B67.
 - .2 Cold caulking compounds.
- .2 Above ground sanitary and vent: to CAN/CSA-B70.
 - .1 Joints:
 - .1 Hub and spigot:
 - .1 Caulking lead: to CSA B67.

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 01 - Use of HVAC Systems During Construction.
- .2 Install in accordance with National Plumbing Code and 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 Ensure that fixtures are properly anchored, connected to system and effectively vented.
- .4 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.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American Society for Testing and Materials International (ASTM).
 - .1 ASTM A126-95(2001), Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.
 - .2 ASTM B62-02, Specification for Composition Bronze or Ounce Metal Castings.
- .2 Canadian Standards Association (CSA International).
 - .1 CSA-B79-94(R2000), Floor, Area and Shower Drains, and Cleanouts for Residential Construction.

1.2 SUBMITTALS

- .1 Submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet for fixtures and equipment.
 - .2 Indicate dimensions, construction details and materials for specified items.
- .3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
- .4 Instructions: submit manufacturer's installation instructions.
- .5 Manufacturers' Field Reports: manufacturers' field reports specified.
- .6 Closeout submittals: submit maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals, include:
 - .1 Description of plumbing specialties and accessories, giving manufacturers name, type, model, year and capacity.
 - .2 Details of operation, servicing and maintenance.
 - .3 Recommended spare parts list.

1.3 QUALITY ASSURANCE

- .1 Pre-Installation Meetings:
 - .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.

Part 2 Products

2.1 CLEANOUTS

- .1 Cleanout Plugs: heavy cast iron male ferrule with brass screws and threaded brass or bronze plug. Sealing-caulked lead seat or neoprene gasket.
- .2 Access Covers:
 - .1 Wall Access: face or wall type, polished nickel bronze or stainless steel round cover with flush head securing screws, bevelled edge frame complete with anchoring lugs.
 - .2 Floor Access: round cast iron body and frame with adjustable secured nickel bronze top and:
 - .1 Plugs: bolted bronze with neoprene gasket.
 - .2 Cover for Unfinished Concrete Floors: nickel bronze round, gasket, vandal-proof screws.
 - .3 Cover for Tile and Linoleum Floors: polished nickel bronze with recessed cover for linoleum or tile infill, complete with vandal-proof locking screws.
 - .4 Cover for Carpeted Floors: polished nickel bronze with deep flange cover for carpet infill, complete with carpet retainer vandal-proof locking screws.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install in accordance with National Plumbing Code of Canada and local authority having jurisdiction.
- .2 Install in accordance with manufacturer's instructions and as specified.

3.3 CLEANOUTS

- .1 Install cleanouts at base of soil and waste stacks, 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 NPS4.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 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.
- .2 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36-00, Commercial Adhesives.

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 washroom fixtures, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Indicate fixtures and trim:
 - .1 Dimensions, construction details, roughing-in dimensions.

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.

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Fixtures: manufacture in accordance with CAN/CSA-B45 series.
- .2 Trim, fittings: manufacture in accordance with CAN/CSA-B125.3.
- .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 Fixture descriptions to be as per equipment schedule on drawings.

- .8 Fixture piping:
 - .1 Hot and cold water supplies to fixtures:
 - .1 Chrome plated 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.
- .9 Fixture carriers:
 - .1 Factory manufactured floor-mounted carrier systems for 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: refer to architectural.

3.3 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 USE OF SYSTEMS

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .2 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-11-2008, 2nd Edition, Environmental Standard for Paints and Coatings.

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, specifications and datasheets for piping and equipment and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIAL

- .1 Paint: zinc-rich to CAN/CGSB-1.181.
- .2 Fire Stopping: in accordance with Section 07 84 00 - Fire Stopping.

Part 3 Execution

3.1 APPLICATION

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

3.2 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions unless otherwise indicated.

- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Use double swing joints when equipment mounted on vibration isolation and when piping subject to movement.

3.3 CLEARANCES

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

3.4 DIELECTRIC COUPLINGS

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

3.5 PIPEWORK INSTALLATION

- .1 Screwed fittings jointed with Teflon tape.
- .2 Protect openings against entry of foreign material. Install to isolate equipment and allow removal without interrupting operation of other equipment or systems.
- .3 Assemble piping using fittings manufactured to ANSI standards.
- .4 Install exposed piping, equipment, rectangular cleanouts and similar items parallel or perpendicular to building lines.
- .5 Install concealed pipework to minimize furring space, maximize headroom, conserve space.
- .6 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .7 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .8 Group piping wherever possible.
- .9 Ream pipes, remove scale and other foreign material before assembly.
- .10 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .11 Provide for thermal expansion as indicated.

3.6 SLEEVES

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

3.7 ESCUTCHEONS

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

3.8 PREPARATION FOR FIRE STOPPING

- .1 Install firestopping within annular space between pipes, ducts, insulation and adjacent fire separation in accordance with Section 07 84 00 - Fire Stopping.
- .2 Uninsulated unheated pipes not subject to movement: no special preparation.
- .3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe movement without damaging firestopping material or installation.

- .4 Insulated pipes and ducts: ensure integrity of insulation and vapour barriers.

3.9 FLUSHING OUT OF PIPING SYSTEMS

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

3.10 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

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

3.11 EXISTING SYSTEMS

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

3.12 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)
 - .1 ANSI/ASME B1.20.1-1983(R2006), Pipe Threads, General Purpose (Inch).
 - .2 ANSI/ASME B16.18-2001, Cast Copper Alloy Solder Joint Pressure Fittings.
- .2 Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS)
 - .1 MSS-SP-25-1998, Standard Marking System for Valves, Fittings, Flanges and Unions.
 - .2 MSS-SP-80-2008, Bronze Gate Globe, Angle and Check Valves.
 - .3 MSS-SP-110-1996, Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets for equipment and systems and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit data for valves specified in this Section.

1.3 CLOSEOUT SUBMITTALS

- .1 Provide maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

- .1 Valves:
 - .1 Except for specialty valves, to be single manufacturer.

- .2 Gate Valves:
 - .1 Requirements common to gate valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: union with hexagonal shoulders.
 - .3 Connections: screwed with hexagonal shoulders.
 - .4 Inspection and pressure testing: to MSS SP-80. Tests to be hydrostatic.
 - .5 Packing: non-asbestos.
 - .6 Handwheel: non-ferrous.
 - .7 Handwheel Nut: bronze to ASTM B62.
 - .2 NPS 2 and under, non-rising stem, solid wedge disc, Class 125
 - .1 Body: with long disc guides, screwed bonnet with stem retaining nut.
 - .2 Operator: Handwheel.
 - .3 NPS 2 and under, rising stem, solid wedge disc, Class 125:
 - .1 Body: with long disc guides, screwed bonnet.
 - .2 Operator: handwheel.
- .3 Globe Valves:
 - .1 Requirements common to globe valves, unless specified otherwise:
 - .1 Standard specification: MSS SP-80.
 - .2 Bonnet: union with hexagonal shoulders.
 - .3 Connections: screwed with hexagonal shoulders.
 - .4 Pressure testing: to MSS SP-80. Tests to be hydrostatic.
 - .5 Stuffing box: threaded to bonnet with gland follower, packing nut, high grade non-asbestos packing.
 - .6 Handwheel: non-ferrous.
 - .7 Handwheel Nut: bronze to ASTM B62.
 - .2 NPS 2 and under, composition disc, Class 125:
 - .1 Body and bonnet: screwed bonnet.
 - .2 Disc and seat: renewable rotating PTFE disc, regrindable bronze seat, loosely secured to bronze stem to ASTM B505.
 - .3 Operator: handwheel
- .4 Ball Valves:
 - .1 NPS 2 and under:
 - .1 Body and cap: cast high tensile bronze to ASTM B62.
 - .2 Pressure rating: Class 125.
 - .3 Connections: screwed ends to ANSI B1.20.1 and with hexagonal shoulders; solder ends to ANSI.
 - .4 Stem: tamperproof ball drive.
 - .5 Stem packing nut: external to body.
 - .6 Ball and seat: replaceable stainless steel or hard chrome solid ball and Teflon seats.
 - .7 Stem seal: TFE with external packing nut.

- .8 Operator: removable lever handle.

Part 3 Execution

3.1 INSTALLATION

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

3.2 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 REFERENCES

- .1 ASTM International
 - .1 ASTM A125-1996(2007), Standard Specification for Steel Springs, Helical, Heat-Treated.
 - .2 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A563-07a, Standard Specification for Carbon and Alloy Steel Nuts.
- .2 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)
 - .1 MSS SP58-2002, Pipe Hangers and Supports - Materials, Design and Manufacture.
 - .2 MSS SP69-2003, Pipe Hangers and Supports - Selection and Application.
 - .3 MSS SP89-2003, Pipe Hangers and Supports - Fabrication and Installation Practices.

1.2 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 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 ANSI B31.1 and MSS SP58.
- .2 Use components for intended design purpose only. Do not use for rigging or erection purposes.

2.3 PIPE HANGERS

- .1 Finishes:
 - .1 Pipe hangers and supports: painted with zinc-rich paint after manufacture.
 - .2 Ensure steel hangers in contact with copper piping are copper plated.
- .2 Upper attachment structural: suspension from lower flange of I-Beam:
 - .1 Cold piping NPS 2 maximum: malleable iron C-clamp with hardened steel cup point setscrew, locknut
 - .1 Rod: 9 mm .
 - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron beam clamp, eye rod, jaws and extension with carbon steel retaining clip, tie rod, nuts and washers,.
- .3 Upper attachment structural: suspension from upper flange of I-Beam:
 - .1 Cold piping NPS 2 maximum: ductile iron top-of-beam C-clamp with hardened steel cup point setscrew, locknut and carbon steel retaining clip.
 - .2 Cold piping NPS 2 1/2 or greater, hot piping: malleable iron top-of-beam jaw-clamp with hooked rod, spring washer, plain washer and nut.
- .4 Upper attachment to concrete:
 - .1 Ceiling: carbon steel welded eye rod, clevis plate, clevis pin and cotters with weldless forged steel eye nut. Ensure eye 6 mm minimum greater than rod diameter.
 - .2 Concrete inserts: wedge shaped body with knockout protector plate to MSS SP69.
- .5 Hanger rods: threaded rod material to MSS SP58:
 - .1 Hanger rods to be galvanized.
 - .2 Ensure that hanger rods are subject to tensile loading only.
 - .3 Provide linkages where lateral or axial movement of pipework is anticipated.
- .6 Pipe attachments: material to MSS SP58:
 - .1 Attachments for steel piping: carbon steel.
 - .2 Attachments for copper piping: copper plated black steel.
 - .3 Use insulation shields for hot pipework.
 - .4 Oversize pipe hangers and supports for insulated piping.
- .7 Adjustable clevis: material to MSS SP69, clevis bolt with nipple spacer and vertical adjustment nuts above and below clevis.
- .8 Yoke style pipe roll: carbon steel yoke, rod and nuts with cast iron roll, to MSS SP69.

- .9 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.
- .10 Pipe rollers: cast iron roll and roll stand with carbon steel rod to MSS SP69.

2.4 RISER CLAMPS

- .1 Steel or cast iron pipe: galvanized carbon steel to MSS SP58, type 42.
- .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.

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 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.
- .2 Clevis plates:
 - .1 Attach to concrete with 4 minimum concrete inserts, one at each corner.
- .3 Provide supplementary structural steelwork where structural bearings do not exist or where concrete inserts are not in correct locations.

3.3 HANGER SPACING

- .1 Plumbing piping: to Canadian Plumbing Code.
- .2 Copper piping: up to NPS 1/2: every 1.5 m.
- .3 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	

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.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-1.60-97, Interior Alkyd Gloss Enamel.
 - .2 CAN/CGSB-24.3-92, Identification of Piping Systems.

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 IDENTIFICATION OF PIPING SYSTEMS

- .1 Identify contents by background colour marking, pictogram (as necessary), legend; direction of flow by arrows. To CAN/CGSB 24.3 except where specified otherwise.
- .2 Pictograms:
 - .1 Where required: Workplace Hazardous Materials Information System (WHMIS) regulations.
- .3 Legend:
 - .1 Block capitals to sizes and colours listed in CAN/CGSB 24.3.
- .4 Arrows showing direction of flow:
 - .1 Outside diameter of pipe or insulation less than 75 mm: 100 mm long x 50 mm high.
 - .2 Outside diameter of pipe or insulation 75 mm and greater: 150 mm long x 50 mm high.
 - .3 Use double-headed arrows where flow is reversible.
- .5 Extent of background colour marking:
 - .1 To full circumference of pipe or insulation.
 - .2 Length to accommodate pictogram, full length of legend and arrows.
- .6 Materials for background colour marking, legend, arrows:
 - .1 Pipes and tubing 20 mm and smaller: waterproof and heat-resistant pressure sensitive plastic marker tags.
 - .2 Other pipes: pressure sensitive plastic-coated cloth 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		
Hot water heating supply	Yellow	HEATING SUPPLY
Hot water heating return	Yellow	HEATING RETURN
Domestic hot water supply	Green	DOM. HW SUPPLY
Dom. HWS recirculation	Green	DOM. HW CIRC
Domestic cold water supply	Green	DOM. CWS
Sanitary	Green	SAN
Plumbing vent	Green	SAN. VENT

2.5 IDENTIFICATION DUCTWORK SYSTEMS

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

2.6 VALVES, CONTROLLERS

- .1 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.

2.7 CONTROLS COMPONENTS IDENTIFICATION

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

2.8 LANGUAGE

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

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 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 or 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.

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.
- .3 TAB will apply to new portions of systems installed in this project, and modifications to existing systems only where required to balance the new portions.

1.2 QUALIFICATIONS OF TAB PERSONNEL

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

1.3 PURPOSE OF TAB

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

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

1.4 EXCEPTIONS

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

1.5 CO-ORDINATION

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

1.6 PRE-TAB REVIEW

- .1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and other aspects of design and installation pertinent to success of TAB.
- .2 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.

1.8 START OF TAB

- .1 Notify Consultant 7 days prior to start of TAB.
- .2 Start TAB when work is essentially completed, including:
- .3 Pressure, leakage, other tests specified elsewhere Division 23.
- .4 Provisions for TAB installed and operational.
- .5 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 Fire, smoke, volume control dampers installed and open.
- .5 Access doors, installed, closed.
- .6 Outlets installed, volume control dampers open.
- .3 Liquid systems:
 - .1 Flushed, filled, vented.
 - .2 Isolating and balancing valves installed, open.
 - .3 Calibrated balancing valves installed, at factory settings.

1.9 APPLICATION TOLERANCES

- .1 Do TAB to following tolerances of design values:
 - .1 HVAC systems: $\pm 5\%$.
 - .2 Hydronic systems: $\pm 10\%$.

1.10 ACCURACY TOLERANCES

- .1 Measured values accurate to within $\pm 2\%$ of actual values.

1.11 INSTRUMENTS

- .1 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.
- .2 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.12 TAB REPORT

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

1.13 SETTINGS

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

1.14 COMPLETION OF TAB

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

1.15 AIR SYSTEMS

- .1 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.
- .2 Locations of equipment measurements: to include as appropriate:
 - .1 Inlet and outlet of dampers, fan, other equipment causing changes in conditions.
 - .2 At controllers, controlled device.
- .3 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

Part 2 Products

2.1 NOT USED

- .1 Not used.

Part 3 Execution

3.1 NOT USED

- .1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Definitions:
 - .1 For purposes of this section:
 - .1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.
 - .2 "EXPOSED" - means "not concealed" as previously defined.
 - .3 Insulation systems - insulation material, fasteners, jackets, and other accessories.
 - .2 TIAC Codes:
 - .1 CRD: Code Round Ductwork,
 - .2 CRF: Code Rectangular Finish.
- .2 Reference Standards:
 - .1 ASTM International Inc.
 - .1 ASTM B209M-07, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric).
 - .2 ASTM C335-05ae1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.
 - .3 ASTM C411-05, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C547-07e1, Standard Specification for Mineral Fiber Pipe Insulation.
 - .6 ASTM C553-02e1, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .7 ASTM C612-04e1, Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
 - .8 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .9 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
 - .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .3 Green Seal Environmental Standards (GSES)
 - .1 Standard GS-36-00, Commercial Adhesives.
 - .4 South Coast Air Quality Management District (SCAQMD), California State
 - .1 SCAQMD Rule 1168-A2005, Adhesive and Sealant Applications.
 - .5 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

- .6 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.2 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.

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.

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 cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

- .2 Lagging adhesive: compatible with insulation.

2.4 ACCESSORIES

- .1 Vapour retarder lap adhesive:
 - .1 Water based, fire retardant type, compatible with insulation.
- .2 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.
- .3 Tape: self-adhesive, aluminum, reinforced, 50 mm wide minimum.
- .4 Contact adhesive: quick-setting
- .5 Canvas adhesive: washable.
- .6 Tie wire: 1.5 mm stainless steel.
- .7 Banding: 12 mm wide, 0.5 mm thick stainless steel.
- .8 Facing: 25 galvanized steel hexagonal wire mesh stitched on one face of insulation.
- .9 Fasteners: 2 mm diameter pins with 35mm diameter clips, length to suit thickness of insulation.

Part 3 Execution

3.1 APPLICATION

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

3.2 PRE-INSTALLATION REQUIREMENTS

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

3.3 INSTALLATION

- .1 Install in accordance with TIAC National Standards.
- .2 Apply materials in accordance with manufacturer's instructions and as indicated.
- .3 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.
 - .1 Ensure hangers, and supports are outside vapour retarder jacket.
- .4 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.

- .5 Fasteners: install at 300 mm on centre in horizontal and vertical directions, minimum 2 rows each side.

3.4 DUCTWORK INSULATION SCHEDULE

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

	TIAC Code	Vapour Retarder	Thickness (mm)
Rectangular cold and dual temperature supply air ducts	C-1	yes	50
Round cold and dual temperature supply air ducts	C-2	yes	50
Supply, return and exhaust ducts exposed in space being served			none
Exhaust duct between dampers and louvres	C-1	no	25
Acoustically lined ducts	none		

- .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	Round
Indoor, concealed	Rectangular none	Round none
Indoor, exposed within mechanical room	CRF/1	CRD/2
Indoor, exposed elsewhere	CRF/2	CRD/3

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 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM B209M-04, Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate Metric.
 - .2 ASTM C335-04, Standard Test Method for Steady State Heat Transfer Properties of Horizontal Pipe Insulation.
 - .3 ASTM C411-04, Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
 - .4 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.
 - .5 ASTM C533-2004, Calcium Silicate Block and Pipe Thermal Insulation.
 - .6 ASTM C547-2003, Mineral Fiber Pipe Insulation.
 - .7 ASTM C795-03, Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
 - .8 ASTM C921-03a, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.
- .2 Canadian General Standards Board (CGSB)
 - .1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
 - .2 CAN/CGSB-51.53-95, Poly (Vinyl Chloride) Jacketing Sheet, for Insulated Pipes, Vessels and Round Ducts
- .3 Manufacturer's Trade Associations
 - .1 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (Revised 2004).
- .4 Underwriters' Laboratories of Canada (ULC)
 - .1 CAN/ULC-S102-03, Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC-S701-01, Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .3 CAN/ULC-S702-1997, Thermal Insulation, Mineral Fibre, for Buildings
 - .4 CAN/ULC-S702.2-03, Thermal Insulation, Mineral Fibre, for Buildings, Part 2: Application Guidelines.

1.2 DEFINITIONS

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

- .1 CRF: Code Rectangular Finish.
- .2 CPF: Code Piping Finish.

1.3 QUALITY ASSURANCE

- .1 Qualifications:
 - .2 Installer: specialist in performing work of this Section, and have at least 3 years successful experience in this size and type of project.
 - .3 Health and Safety:
 - .1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 DELIVERY, STORAGE AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 - Common Product Requirements.
 - .2 Deliver, store and handle materials in accordance with manufacturer's written instructions.
 - .3 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Storage and Protection:
 - .1 Protect from weather, construction traffic.
 - .2 Protect against damage.
 - .3 Store at temperatures and conditions required by manufacturer.

Part 2 Products

2.1 FIRE AND SMOKE RATING

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

2.2 INSULATION

- .1 Mineral fibre specified includes glass fibre, rock wool, slag wool.
- .2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.
- .3 TIAC Code A-1: rigid moulded mineral fibre without factory applied vapour retarder jacket.
 - .1 Mineral fibre: to CAN/ULC-S702.
 - .2 Maximum "k" factor: to CAN/ULC-S702.

- .4 TIAC Code A-3: rigid moulded mineral fibre with factory applied vapour retarder jacket.
 - .1 Mineral fibre: to CAN/ULC-S702.
 - .2 Jacket: to CGSB 51-GP-52Ma.
 - .3 Maximum "k" factor: to CAN/ULC-S702.

2.3 INSULATION SECUREMENT

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

2.4 CEMENT

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

2.5 VAPOUR RETARDER LAP ADHESIVE

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

2.6 INDOOR VAPOUR RETARDER FINISH

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

2.7 JACKETS

- .1 Canvas:
 - .1 220 gm/m² cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.
 - .2 Lagging adhesive: compatible with insulation.
- .2 Aluminum:
 - .1 To ASTM B209.
 - .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, 0.5mm thick at 300 mm spacing.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PRE-INSTALLATION REQUIREMENT

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

3.3 INSTALLATION

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

3.4 REMOVABLE, PRE-FABRICATED, INSULATION AND ENCLOSURES

- .1 Application: at expansion joints, valves, primary flow measuring elements flanges and unions at equipment.
- .2 Design: to permit movement of expansion joint and to permit periodic removal and replacement without damage to adjacent insulation.
- .3 Insulation:
 - .1 Insulation, fastenings and finishes: same as system.
 - .2 Jacket: aluminum.

3.5 INSTALLATION OF ELASTOMERIC INSULATION

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

3.6 PIPING INSULATION SCHEDULES

- .1 Includes valves, valve bonnets, strainers, flanges and fittings unless otherwise specified. TIAC Code: A-1.
 - .1 Securements: Tape at 300 mm on centre.

- .2 Seals: lap seal adhesive, lagging adhesive.
- .3 Installation: TIAC Code 1501-H.
- .2 TIAC Code: A-3.
 - .1 Securements: Tape at 300 mm on centre.
 - .2 Seals: VR lap seal adhesive, VR lagging adhesive.
 - .3 Installation: TIAC Code: 1501-C.
- .3 Thickness of insulation as listed in following table.
 - .1 Run-outs to individual units and equipment not exceeding 4000 mm long.
 - .2 Do not insulate exposed runouts to plumbing fixtures, chrome plated piping, valves, fittings.

Application	Temp degrees C	TIAC code	Pipe sizes (NPS) and insulation thickness (mm)					
			Run out	to 1	1 1/4 to 2	2 1/2 to 4	5 to 6	8 & over
Hot Water Heating	60 - 94	A-1	25	38	38	38	38	38
Hot Water Heating	up to 59	A-1	25	25	25	25	38	38
Domestic HWS		A-1	25	25	25	38	38	38
Domestic CWS		A-3	25	25	25	25	25	25

- .4 Finishes:
 - .1 Exposed indoors: aluminum jacket.
 - .2 Exposed in mechanical rooms: canvas jacket.
 - .3 Concealed, indoors: canvas on valves, fittings. No further finish.
 - .4 Use vapour retarder jacket on TIAC code A-3 insulation compatible with insulation.
 - .5 Installation: to appropriate TIAC code CRF/1 through CPF/5.

3.7 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Scope of work to include new piping installation prior to connection to existing system.

1.2 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.

1.3 DELIVERY, STORAGE, AND HANDLING

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

Part 2 Products

2.1 CLEANING SOLUTIONS

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

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 CLEANING HYDRONIC SYSTEMS

- .1 Timing: systems operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.
- .2 Cleaning Agency:
 - .1 Retain qualified water treatment specialist to perform system cleaning.
- .3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist.
- .4 Cleaning procedures:

- .1 Provide detailed report outlining proposed cleaning procedures at least 2 weeks prior to proposed starting date. Report to include:
 - .1 Cleaning procedures, flow rates, elapsed time.
 - .2 Chemicals and concentrations used.
 - .3 Inhibitors and concentrations.
 - .4 Specific requirements for completion of work.
 - .5 Special precautions for protecting piping system materials and components.
- .5 Conditions at time of cleaning of systems:
 - .1 Systems: free from construction debris, dirt and other foreign material.
 - .2 Control valves: operational, fully open to ensure that terminal units can be cleaned properly.
- .6 Report on Completion of Cleaning:
 - .1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.
- .7 Hydronic Systems:
 - .1 Add chemicals under direct supervision of chemical treatment supplier.
 - .2 Closed loop systems: circulate system cleaner at 60 degrees C for at least 36 h. Drain as quickly as possible. Refill with water and inhibitors. Test concentrations and adjust to recommended levels.
 - .3 Flush velocity in system mains and branches to ensure removal of debris.
 - .4 Add chemical solution to system.
 - .5 Establish circulation, raise temperature slowly to maximum design. Circulate for 12 h, ensuring flow in all circuits. Remove heat, continue to circulate until temperature is below 38 degrees C. Drain as quickly as possible. Refill with clean water. Circulate for 6 h at design temperature. Drain and repeat procedures specified above. Flush through low point drains in system. Refill with clean water adding to sodium sulphite (test for residual sulphite).

3.3 START-UP OF HYDRONIC SYSTEMS

- .1 After cleaning is completed and system is filled:
 - .1 Establish circulation.
 - .2 Ensure air is removed.
 - .3 Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
 - .4 Repeat with water at design temperature.
 - .5 Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.
 - .6 Bring system up to design temperature and pressure.
 - .7 Perform TAB as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.
 - .8 Adjust pipe supports, hangers, springs as necessary.
 - .9 Monitor pipe movement, performance of expansion joints, loops, guides, anchors.

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

1.1 REFERENCES

- .1 American National Standards Institute/American Water Works Association (ANSI/AWWA)
 - .1 ANSI/AWWA C111/A21.11-06, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
- .2 American Society of Mechanical Engineers (ASME)
 - .1 ASME B16.1-10, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - .2 ASME B16.3-06, Malleable Iron Threaded Fittings: Classes 150 and 300.
 - .3 ASME B16.5-09, Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.
 - .4 ASME B16.9-07, Factory-Made Wrought Buttwelding Fittings.
 - .5 ASME B18.2.1-10, Square Hex, Heavy Hex and Askew Head Bolts and Hex, Heavy Hex, Hex Flange. Loded Head and Lag Screws (Inch Series).
 - .6 ASME B18.2.2-10, Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series).
- .3 ASTM International
 - .1 ASTM A47/A47M-99(2009), Standard Specification for Ferritic Malleable Iron Castings.
 - .2 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
 - .3 ASTM A536-84(2009), Standard Specification for Ductile Iron Castings.
 - .4 ASTM B61-08, Standard Specification for Steam or Valve Bronze Castings.
 - .5 ASTM B62-09, Standard Specification for Composition Bronze or Ounce Metal Castings.
- .4 CSA International
 - .1 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
- .5 Manufacturer's Standardization of the Valve and Fittings Industry (MSS)
 - .1 MSS-SP-70-06, Gray Iron Gate Valves, Flanged and Threaded Ends.
 - .2 MSS-SP-71-05, Gray Iron Swing Check Valves Flanged and Threaded Ends.
 - .3 MSS-SP-80-08, Bronze Gate, Globe, Angle and Check Valves.
 - .4 MSS-SP-85-02, Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.

1.2 DELIVERY, STORAGE AND HANDLING

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

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

Part 2 Products

2.1 PIPE

- .1 Steel pipe: to ASTM A53/A53M, Grade B, as follows:
 - .1 To NPS 6: Schedule 40.
 - .2 NPS 8 and over, 10.
 - .3 NPS 12 and over, 10 mm wall thickness.

2.2 PIPE JOINTS

- .1 NPS 2 and under: screwed fittings with PTFE tape or lead-free pipe dope.
- .2 NPS 2-1/2 and over: welding fittings and flanges to CSA W48.
- .3 Flanges: plain or raised face, weld neck to ANSI/AWWA C111/ A21.11.
- .4 Orifice flanges: slip-on raised face, 2100 kPa.
- .5 Flange gaskets: to ANSI/AWWA C111/ A21.11.
- .6 Pipe thread: taper.
- .7 Bolts and nuts: to ASME B18.2.1 and ASME B18.2.2.

2.3 FITTINGS

- .1 Screwed fittings: malleable iron, to ASME B16.3, Class 150.
- .2 Pipe flanges and flanged fittings:
 - .1 Cast iron: to ASME B16.1, Class 125.
 - .2 Steel: to ASME B16.5.
- .3 Butt-welding fittings: steel, to ASME B16.9.
- .4 Unions: malleable iron, to ASTM A47/A47M and ASME B16.3.

Part 3 Execution

3.1 PIPING INSTALLATION

- .1 Install pipework in accordance with Section 23 05 05 - Installation of Pipe Work.

3.2 CIRCUIT BALANCING VALVES

- .1 Install and flow balancing valves as indicated.
- .2 Remove handwheel after installation and when TAB is complete.

3.3 CLEANING, FLUSHING AND START-UP

- .1 In accordance with Section 23 08 02 - Cleaning and Start-Up of Mechanical Piping Systems.

3.4 TESTING

- .1 Test system in accordance with Section 21 05 01 - Common Work Results for Mechanical.

3.5 BALANCING

- .1 Balance water systems to within plus or minus 5% of design output.
- .2 In accordance with Section 23 05 93 - Testing, Adjusting and Balancing for HVAC for applicable procedures.

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.

3.7 PROTECTION

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

- .1 Materials and installation of low-pressure metallic ductwork, joints and accessories.

1.2 REFERENCES

- .1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE).
- .2 American Society for Testing and Materials International, (ASTM).
 - .1 ASTM A480/A480M-03c, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
 - .2 ASTM A635/A635M-02, Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot Rolled.
 - .3 ASTM A653/A653M-03, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- .3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA).
 - .1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2nd Edition 1995 and Addendum No. 1, 1997.
 - .2 SMACNA HVAC Air Duct Leakage Test Manual, 1985, 1st Edition.
 - .3 IAQ Guideline for Occupied Buildings Under Construction 1995, 1st Edition.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Protect on site stored or installed absorptive material from moisture damage.

Part 2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

Maximum Pressure Pa	SMACNA Seal Class
500	C
250	C
125	C

.2 Seal classification:

- .1 Class C: transverse joints and connections made air tight with sealant. Longitudinal seams unsealed.

2.2 SEALANT

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

2.3 TAPE

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

2.4 DUCT LEAKAGE

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

2.5 FITTINGS

- .1 Fabrication: to SMACNA.
- .2 Radiused elbows:
 - .1 Rectangular: standard radius. Centreline radius: 1.5 times width of duct.
 - .2 Round: smooth radius. Centreline radius: 1.5 times diameter.
- .3 Mitred elbows, rectangular:
 - .1 To 400 mm: with single thickness turning vanes.
 - .2 Over 400 mm: with double thickness turning vanes.
- .4 Branches:
 - .1 Rectangular main and branch: with 45 degrees entry on branch.
 - .2 Round main and branch: enter main duct at 45 degrees with conical connection.
 - .3 Provide volume control damper in branch duct near connection to main duct.
- .5 Transitions:
 - .1 Diverging: 20 degrees maximum included angle.
 - .2 Converging: 30 degrees maximum included angle.
- .6 Offsets:
 - .1 as indicated.
- .7 Obstruction deflectors: maintain full cross-sectional area.

2.6 FIRE STOPPING

- .1 Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 - Firestopping.
- .2 Fire stopping material and installation must not distort duct.

2.7 GALVANIZED STEEL

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

- .3 Joints: to SMACNA.

2.8 HANGERS AND SUPPORTS

- .1 Hangers and Supports: in accordance with Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

- .1 Strap hangers: of same material as duct.
 - .1 Maximum size duct supported by strap hanger: 500.
- .2 Hanger configuration: to SMACNA.
- .3 Hangers: galvanized steel angle with galvanized steel rods to following table:

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

- .4 Upper hanger attachments:
 - .1 For concrete: manufactured concrete inserts.
 - .2 For steel joist: manufactured joist clamp.
 - .3 For steel beams: manufactured beam clamps.

Part 3 Execution

3.1 GENERAL

- .1 Do work SMACNA.
- .2 Do not break continuity of insulation vapour barrier with hangers or rods.
- .3 Support risers in accordance with SMACNA.
- .4 Install breakaway joints in ductwork on sides of fire separation.

3.2 HANGERS

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

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

3.3 SEALING AND TAPING

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

3.4 LEAKAGE TESTS

- .1 In accordance with SMACNA HVAC Duct Leakage Test Manual.
- .2 Do leakage tests in sections.
- .3 Make trial leakage tests as instructed to demonstrate workmanship.
- .4 Do not install additional ductwork until trial test has been passed.
- .5 Complete test before performance insulation or concealment Work.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Balancing dampers for mechanical forced air ventilation and air conditioning systems.

1.2 REFERENCES

- .1 Sheet Metal and Air Conditioning National Association (SMACNA)
 - .1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-1985.

1.3 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.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Packing, shipping, handling and unloading:
 - .1 Deliver, store and handle in accordance with Section 01 61 00 - Common Product Requirements.

Part 2 Products

2.1 GENERAL

- .1 Manufacture to SMACNA standards.

2.2 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.
- .3 Locking quadrant with shaft extension to accommodate insulation thickness.
- .4 Inside and outside nylon end bearings.
- .5 Channel frame of same material as adjacent duct, complete with angle stop.

Part 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 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.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Fire and smoke dampers, and fire stop flaps.

1.2 REFERENCES

- .1 American National Standards Institute/National Fire Protection Association (ANSI/NFPA)
 - .1 ANSI/NFPA 90A-2002, Standard for the Installation of Air Conditioning and Ventilating Systems.
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN4-S112-M1990, Fire Test of Fire Damper Assemblies.
 - .2 CAN4-S112.2-M84, Standard Method of Fire Test of Ceiling Firestop Flap Assemblies.
 - .3 ULC-S505-1974, Fusible Links for Fire Protection Service.

1.3 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 Indicate the following:
 - .1 Fire dampers.
 - .2 Fire stop flaps.
 - .3 Operators.
 - .4 Fusible links.
 - .5 Design details of break-away joints.
- .2 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 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 FIRE DAMPERS

- .1 Fire dampers: arrangement Type C, listed and bear label of ULC. Fire damper assemblies fire tested in accordance with CAN4-S112.
- .2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.
 - .1 Fire dampers: automatic operating type and have dynamic rating suitable for maximum air velocity and pressure differential to which it will be subjected.
- .3 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.
- .4 40 x 40 x 3 mm retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.
- .5 Equip fire dampers with steel sleeve or frame installed disruption ductwork or impair damper operation.
- .6 Equip sleeves or frames with perimeter mounting angles attached on both sides of wall or floor opening. Construct ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce ceiling to conform with ULC.
- .7 Design and construct dampers to not reduce duct or air transfer opening cross-sectional area.
- .8 Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition or floor slab depth or thickness.
- .9 Unless otherwise indicated, the installation details given in SMACNA, and in manufacturer's instructions for fire dampers shall be followed.

2.2 FIRE STOP FLAPS

- .1 Fire smoke flaps: ULC listed and labelled and fire tested in accordance with CAN4-S112.2.
- .2 Construct of minimum 1.5 mm thick sheet steel with 1.6 mm thick non-asbestos ULC listed insulation and corrosion-resistant pins and hinges.
- .3 Flaps held open with fusible link conforming to ULC-S505 and close at 74 degrees C.

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 ANSI/NFPA 90A and in accordance with conditions of ULC listing.
- .2 Maintain integrity of fire separation.
- .3 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.
- .4 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories.
- .5 Co-ordinate with installer of firestopping.
- .6 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible.
- .7 Install break-away joints of approved design on each side of fire separation.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/NFPA 90A-2002, Standard for the Installation of Air Conditioning and Ventilating Systems.
- .2 Underwriter's Laboratories (UL)
 - .1 UL 181-2003, Factory-Made Air Ducts and Air Connectors.

1.2 SYSTEM DESCRIPTION

- .1 Performance Requirements:
 - .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from certified ADC (Air Diffusion Council) testing agency signifying adherence to codes and standards.

1.3 SUBMITTALS

- .1 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 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 Indicate the following:
 - .1 Capacity.
 - .2 Pressure drop.
 - .3 Noise rating.
 - .4 Leakage.

Part 2 Products

2.1 MANUFACTURED UNITS

- .1 Terminal units of the same type to be product of one manufacturer.

2.2 VARIABLE VOLUME BOXES

- .1 Pressure independent factory reset to air flow between minimum and maximum air volume.
- .2 Sizes, capacities, differential pressures: as indicated.

- .3 Differential pressure not to exceed 25 Pa at inlet air velocity of 10 m/s.
- .4 Complete with:
 - .1 Sound attenuator.
 - .2 Reheat coil: as indicated.
 - .3 Pneumatic controller to operate damper operator between maximum or minimum air volume settings:
- .5 Minimum 35 kPa reset span.
- .6 Adjustable reset start point.
- .7 Adjustable reset span to maximum 70 kPa when supplied with minimum 140 kPa main control air.
- .8 No control air bleed off through inlet sensor.
- .9 Operator to be factory mounted and calibrated:
 - .1 Gauge taps for balancing with standard pressure gauge.
 - .2 Controller to have adjustable flow settings.
- .10 Casing: constructed of 0.0607 mm thick galvanized steel, internally lined with 25 mm, 0.7 kg density fibrous glass, to UL181 and ANSI/NFPA 90A. Mount control components inside protective metal shroud.
- .11 Damper: galvanized steel with peripheral gasket and self-lubricating bearings. Air leakage past closed damper not to exceed 2% of nominal rating at 750 Pa inlet static pressure, in accordance with Air Diffusion Council test procedure.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install in accordance with manufacturers recommendations.
- .2 Support independently of ductwork.
- .3 Install with a minimum of four duct diameters of straight inlet duct, same size as inlet.
- .4 Locate controls, dampers and access panels for easy access.

END OF SECTION

Part 1 General

1.1 SYSTEM DESCRIPTION

- .1 Performance Requirements:
 - .1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

1.2 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 Indicate following:
 - .1 Capacity.
 - .2 Throw and terminal velocity.
 - .3 Noise criteria.
 - .4 Pressure drop.
 - .5 Neck velocity.

Part 2 Products

2.1 GENERAL

- .1 Frames:
 - .1 Full perimeter gaskets.
 - .2 Plaster frames where set into plaster or gypsum board.
 - .3 Concealed fasteners.
- .2 Concealed manual volume control damper operators.
- .3 Colour: as directed by Consultant.

2.2 MANUFACTURED UNITS

- .1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.3 DIFFUSERS, REGISTERS AND GRILLES

- .1 As indicated in schedule on drawings.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install with flat head screws in countersunk holes where fastenings are visible.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 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 Indicate:
 - .1 Equipment, capacity, piping, and connections.
 - .2 Dimensions, internal and external construction details, recommended method of installation with proposed structural steel support, sizes and location of mounting bolt holes.
 - .3 Special enclosures.

Part 2 Products

2.1 CAPACITY

- .1 As indicated, based on 82 degrees C average water temperature, 11 degrees C temperature drop and 18 degrees C at entering air temperature.

2.2 FINNED TUBE RADIATION

- .1 Heating elements: NPS 3/4 seamless copper tubing, 1.2 mm minimum wall thickness, mechanically expanded into flanged collars of evenly spaced aluminum fins, 100 x 100 mm nominal, 130 fins per metre suitable for sweat fittings.
- .2 Element hangers: cradle type providing unrestricted longitudinal movement on enclosure brackets. Space brackets 900 mm centres maximum.
- .3 Standard enclosures: 1.2 mm thick steel complete with components for wall-to-wall or complete with die formed end caps having no knock-outs, with inside corners, outside corners, as indicated. Provide full length channel and sealer strip at top of wall edge. Height as indicated. Joints and filler pieces flush with cabinet. Support rigidly top and bottom, on wall mounted brackets. Provide access doors for valves. Finish cabinet with factory applied baked primer coat.
- .4 Special enclosures: as indicated.
- .5 Dimensions for enclosures: measure site conditions. Do not scale from drawing.
- .6 Provide for noiseless expansion of components.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Install in accordance with piping layout and approved shop drawings.
- .3 Provide for pipe movement during normal operation.
- .4 Maintain sufficient clearance to permit performance of service maintenance.
- .5 Check final location with Consultant if different from that indicated prior to installation. Should deviations beyond allowable clearances arise, request and follow Consultant's directive.
- .6 Valves:
 - .1 Install valves with stems upright or horizontal unless approved otherwise.
 - .2 Install isolating valves on inlet and lockshield balancing valves on outlet of each unit.
- .7 Venting:
 - .1 Install screwdriver vent on cabinet convactor, terminating flush with surface of cabinet.
 - .2 Install automatic air vent on continuous finned tube radiation.
- .8 Clean finned tubes and comb straight.
- .9 Install flexible expansion compensators as indicated.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-06, Canadian Electrical Code, Part 1 (20th Edition), Safety Standard for Electrical Installations.
 - .2 CAN3-C235-83(R2000), 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.

1.2 DEFINITIONS

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

1.3 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 and labels for control items in English.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Shop drawings:
 - .1 Prior to ordering of any equipment, submit PDF shop drawings and specifications to the electrical consultants for their approval and comments. Comply with any changes requested as part of the contract, but notify the consultant immediately of such changes, prepare and furnish any additional drawings, details or information as may be required.
 - .2 Submit shop drawings for all major equipment (panel boards, floor monuments, lighting, etc.).
 - .3 Each Shop Drawing or catalogue sheet shall be stamped and signed by the Contractor to indicate that he has checked the drawing for conformance with all requirements of the drawings and specifications, that he has co-ordinated this equipment with other equipment to which it is attached and/or connected and that he has verified all dimensions to ensure the proper installation of equipment within the available space and without interference with the work of other trades.
 - .4 If changes are required, notify Consultant of these changes before they are made.

1.5 QUALITY ASSURANCE

- .1 Quality Assurance: in accordance with Section [01 45 00 - Quality Control].

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Construction/Demolition 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 MATERIALS AND EQUIPMENT

- .1 Provide [material] [and] [equipment] in accordance with Section [01 61 00 - Common Product Requirements].
- .2 Material and equipment to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction or inspection authorities before delivery to site and submit such approval as described in PART 1 - SUBMITTALS.

2.2 WIRING TERMINATIONS

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

2.3 EQUIPMENT IDENTIFICATION

- .1 Labels: embossed plastic labels with [6]mm high letters unless specified otherwise.
- .2 Allow for minimum of twenty-five (25) letters per label.
- .3 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.
- .4 Disconnects, starters and contactors: indicate equipment being controlled and voltage.
- .5 Terminal cabinets and pull boxes: indicate system and voltage.
- .6 Transformers: indicate capacity, primary and secondary voltages.

2.4 WIRING IDENTIFICATION

- .1 Identify wiring with permanent indelible identifying markings, coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Maintain phase sequence and colour coding throughout.
- .3 Colour coding: to CSA C22.1.
- .4 Use colour coded wires in communication cables, matched throughout system.

2.5 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
up to 5 kV	Yellow	Blue
up to 15 kV	Yellow	Red
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Emergency Voice	Red	Blue
Other Security Systems	Red	Yellow

Part 3 Execution

3.1 INSTALLATION

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

3.2 NAMEPLATES AND LABELS

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

3.3 CONDUIT AND CABLE INSTALLATION

- .1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.
- .2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.4 LOCATION OF OUTLETS

- .1 Do not install outlets back-to-back in wall; allow minimum 150 mm horizontal clearance between boxes.
- .2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.
- .3 Locate light switches on latch side of doors.

3.5 MOUNTING HEIGHTS

- .1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

- .2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.
- .3 Install electrical equipment at following heights 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.
 - .3 Panelboards: as required by Code or as indicated.
 - .4 Telephone and interphone outlets: 300 mm.
 - .5 Fire alarm bells: 2100mm.

3.6 CO-ORDINATION OF PROTECTIVE DEVICES

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

3.7 FIELD QUALITY CONTROL

- .1 Load Balance:
 - .1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.
 - .2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.
 - .3 Provide upon completion of work, load balance report as directed in PART 1 - SUBMITTALS: phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

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 Clamps or connectors for armoured cable, TECK cable, flexible conduit, as required to: CAN/CSA-C22.2 No.18.

END OF SECTION

Part 1 General

1.1 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 All wiring shall be copper unless identified as aluminium or NUAL on the drawings.
- .3 Copper conductors: size as indicated, with 600V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE, RWU90 XLPE.
- .4 Branch circuit wiring to be upsized as follows to address voltage drop when:
 - .1 The entire length of the circuit wiring exceeds 25m – branch wiring to be a minimum of No. 10 AWG.
 - .2 The entire length of the circuit wiring exceeds 40m – branch wiring to be a minimum of No. 8 AWG.
 - .3 The entire length of the circuit wiring exceeds 60m – branch wiring to be a minimum of No. 6 AWG.

2.2 TECK 90 CABLE

- .1 Cables to CAN/CSA-C22.2 No.131.
- .2 Conductors:
 - .1 Grounding conductor copper.
 - .2 Circuit conductors: copper, size as indicated unless aluminium or NUAL is identified on the drawings. Aluminium or NUAL conductor to be provided as per item 2.1.4.
- .3 Insulation:
 - .1 Chemically cross-linked thermosetting polyethylene type RW90, rated 1000 V.
- .4 Inner jacket: polyvinyl chloride material.
- .5 Armour: interlocking aluminum.
- .6 Overall covering: thermoplastic polyvinyl chloride material rated at a minimum of FT-4. Provide FT-6 jacket when TECK cables are run in return air plenum.

2.3 MINERAL-INSULATED CABLES

- .1 Conductors: solid bare soft-annealed copper, size as indicated.

- .2 Insulation: compressed powdered magnesium oxide to form compact homogeneous mass throughout entire length of cable.
- .3 Outer covering: annealed seamless copper sheath, Type M1 rated 600 V, 250 degrees C.
- .4 Overall jacket: PVC applied over the sheath.
- .5 Two hour fire rating.

2.4 ARMOURED CABLES

- .1 Cables to: CSA-C22.2 No. 51-95.
- .2 Circuit conductors: copper, size as indicated unless aluminium or NUAL is identified on the drawings. Aluminium or NUAL conductor to be provided as per item 2.1.4.
- .3 Type: AC90 (BX).
- .4 Armour: interlocking type fabricated from aluminum strip.
- .5 Type: ACWU90 - PVC flame retardant jacket over armour meeting requirements of Vertical Tray Fire Test of CSA C22.2 No.0.3 with maximum flame travel of 1.2 m (3 ft. 11 in.).

2.5 ALUMINUM SHEATHED CABLE

- .1 Conductors: copper, size as indicated.
- .2 Insulation: RA90 rated 1000V.
- .3 Sheath: aluminum applied to form continuous corrugated seamless sheath.
- .4 Outer jacket of PVC applied over sheath for direct burial or wet locations.

Part 3 Execution

3.1 GENERAL CABLE INSTALLATION

- .1 Provide a minimum of one grounding wire for each three ungrounded conductors on all cable runs. Size grounding to Table 16 of the Canadian Electrical Code. Provide separate ground conductors for ground fault circuit interrupter circuits. All ground conductors to be copper and insulated with a green coloured insulation.
- .2 All equipment, junction boxes, pull boxes, liquid tight flex, etc. to be grounded through ground wires.
- .3 compression type fittings to be two-hole long barrel type. Where mechanical screw type lugs are allowed by the Engineer's Representative, they will be suitable for quantity of parallel runs of wire that are to be terminated under.
- .4 Armoured Cable Type AC90 (BX) may only be used for individual drops from slab mounted junction box to surface or recessed mounted light fixtures or where noted on the

drawings where wiring is required to be installed within an existing wall. The maximum allowable distance of armoured cable is 3m. Contractor to receive written approval from the Engineer's Representative to run armoured cable further than 3m. Wiring in conduit is to be brought to a junction box to allow for the transition to armoured cable. Armoured cable is not to be installed directly into electrical panels.

- .5 Branch circuit wiring to be upsized as follows to address voltage drop when:
 - .1 The entire length of the circuit wiring exceeds 25m – branch wiring to be a minimum of No. 10 AWG.
 - .2 The entire length of the circuit wiring exceeds 40m – branch wiring to be a minimum of No. 8 AWG.
 - .3 The entire length of the circuit wiring exceeds 60m – branch wiring to be a minimum of No. 6 AWG.

3.2 Installation Of Building Wires

- .1 Install all building wiring in conduit unless otherwise noted. Conduit to be sized to the electrical code unless noted on the drawings or in the specifications.
- .2 All conductors are to be colour coded. Provide colour tape at all terminations to identify all conductors in each run.

3.3 Installation Of Teck90 Cable, Variable Frequency Drive Cable, Armoured Cable Or Aluminum Sheathed Cable

- .1 Group cables wherever possible on channels.
- .2 Terminate cables in accordance with manufacturer's instructions.
- .3 Fastenings:
 - .1 One hole steel straps to secure surface cables 50 mm (2 in.) and smaller. Two hole steel straps for cables larger than 50 mm (2 in.).
- .4 Channel type supports for two or more cables.
- .5 Galvanized threaded rods: 6 mm (1/4 in.) dia. minimum to support suspended channels.
- .6 Connectors:
 - .1 Watertight, approved for respective cables.

3.4 Installation Of Mineral – Insulated Cables

- .1 Handling:
 - .1 Cable shall be uncoiled by rolling or rotating supply reel. Do not pull from coil periphery or center.
- .2 Bending:
 - .1 Not less than six (6) times the cable diameter for cable not more than ¾ inch (250 kcmil).

- .2 Not less than twelve (12) times the cable diameter for cable diameter for cable more than $\frac{3}{4}$ inch (350 and 500 kcmil).
- .3 Splicing:
 - .1 All fire rated splices shall be made in the factory. In the event of a field splice is necessary, it must be made in the field by manufacturer's field technician.
- .4 Terminations:
 - .1 Field made terminations shall be made with cable manufacturer's termination kits only. Stripping tools, crimping and compression tools available from the manufacturer shall be used for proper cable termination.
 - .2 Connections to ferrous cabinets for single conductor cables shall incorporate brass plates. Installed per manufacturer's drawing.
 - .3 At cable terminations use thermoplastic sleeving over bare conductors.
- .5 Sheath induction reduction:
 - .1 When multi-phase circuits have paralleled single conductors, cables shall be run in groups having one of each phase in each group.
 - .2 Each set of paralleled conductors shall be separated by at least two single cable diameters.
- .6 Exposed or Surface Installations:
 - .1 Cable shall be secured directly to fire rated building structure using:
 - .1 Straps: 13 mm ($\frac{1}{2}$ in.) wide x 38 mm ($3\frac{1}{2}$ in.) long by 0.75 mm ($\frac{1}{32}$ in.) thick stainless steel or copper straps. Each strap shall contain two 5 mm ($\frac{1}{4}$ in.) holes for securing with 5 mm ($\frac{3}{16}$ in.) by minimum 44 mm ($1\frac{3}{4}$ in.) long steel anchors.
- .7 Support 2 hr fire rated cables at 1 m (3 ft. 3 in.) intervals.
- .8 Wall or floor penetrations:
 - .1 Provide approved fire stopping of all penetrations.
 - .2 Neatly train and lace cable inside boxes, equipment, and panelboards.
 - .3 Where cables are buried in cast concrete or masonry, sleeve for entry of cables.
- .9 Field quality control
 - .1 Prior to energizing cables, measure insulation resistance of each cable. Ensure readings are acceptable per Installation recommendations. Tabulate and submit for approval.

END OF SECTION

Part 1 General

- .1 Not Used

Part 2 Products**2.1 SUPPORT CHANNELS**

- .1 Provide “U” type support Strut as manufactures by Unistrut.

Part 3 Execution**3.1 INSTALLATION**

- .1 Secure equipment to 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 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 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.
- .9 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.
- .10 Do not use wire lashing or perforated strap to support or secure raceways or cables.
- .11 Do not use supports or equipment installed for other trades for conduit or cable support except with permission of other trade and approval of Consultant.

- .12 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 REFERENCES

- .1 Canadian Standards Association (CSA International)
 - .1 CSA C22.1-06, Canadian Electrical Code, Part 1, 20th Edition.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

- .1 Size boxes in accordance with CSA C22.1.
- .2 Gang boxes where wiring devices are grouped.
- .3 Blank cover plates for boxes without wiring devices.
- .4 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 38mm or as indicated. 102mm square outlet boxes when more than one conduit enters one side with extension and plaster rings as required.
- .3 Utility boxes for outlets connected to surface-mounted EMT conduit, minimum size 102 x 54 x 48mm.
- .4 102mm square or octagonal outlet boxes for lighting fixture outlets.
- .5 Extension and plaster rings for flush mounting devices in finished plaster and/or tile walls.

2.3 MASONRY BOXES

- .1 Electro-galvanized steel masonry single and multi-gang boxes for devices flush mounted in exposed block walls.

2.4 CONCRETE BOXES

- .1 Electro-galvanized sheet steel concrete type boxes for flush mount in concrete with matching extension and plaster rings as required.

2.5 FITTINGS - GENERAL

- .1 Bushing and connectors with nylon insulated throats.

- .2 Knock-out fillers to prevent entry of debris.
- .3 Conduit outlet bodies for conduit up to 35mm and pull boxes for larger conduits.
- .4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

- .1 Support boxes independently of connecting conduits.
- .2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.
- .3 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, mineral insulated and 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 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).

Part 2 Products

2.1 SWITCHES

- .1 20A, single pole, double pole, three-way, specification grade switches to: CSA C22.2 No.55 and CSA C22.2 No.111.
- .2 Manually-operated general purpose AC switches with following features:
 - .1 Terminal holes approved for No. 10 AWG wire.
 - .2 Silver alloy contacts.
 - .3 Urea or melamine moulding for parts subject to carbon tracking.
 - .4 Suitable for back and side wiring.
 - .5 Color to match existing facility.
- .3 Toggle operated locking fully rated for tungsten filament and fluorescent lamps, and up to 80% of rated capacity of motor loads.
- .4 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

- .1 All receptacles to be specification grade.
- .2 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:
 - .1 Color to match existing facility
 - .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.
- .3 Other receptacles with ampacity and voltage as indicated.
- .4 Receptacles to be coloured as follows:
 - .1 Normal Power – Colour to be selected by Architect/ Engineer's Representative

- .2 Emergency/Essential Power – Red
- .3 Isolated Ground – Orange
- .5 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

- .1 Cover plates for wiring devices to: CSA C22.2 No.42.1.
- .2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.
- .3 Plastic cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box. Color to match existing.

Part 3 Execution

3.1 INSTALLATION

- .1 Switches:
 - .1 Install single throw switches with handle in "UP" position when switch closed.
 - .2 Install switches in gang type outlet box when more than one switch is required in one location.
 - .3 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
 - .4 Install GFI type receptacles as indicated.
- .2 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.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 CSA International
 - .1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

Part 2 Products

2.1 BREAKERS GENERAL

- .1 Moulded-case circuit breakers, Circuit breakers, and ground-fault circuit-interrupters: to CSA C22.2 No. 5
 - 1.1.1. Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 deg. C. (104 deg. F.) ambient.
 - .2 Plug-in moulded case circuit breakers: quick- make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.
 - .3 Common-trip breakers: with single handle for multi-pole applications.
 - .4 Magnetic instantaneous trip elements in circuit breakers to operate only when value of current reaches setting.
 - .1 Trip settings on breakers with adjustable trips to range from 3-8 times current rating.
 - .5 Circuit breakers with interchangeable trips

2.2 THERMAL MAGNETIC BREAKERS

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

2.3 MAGNETIC BREAKERS

- .1 Moulded case circuit breaker to operate automatically by means of magnetic tripping devices to provide instantaneous tripping for short circuit protection.

2.4 OPTIONAL FEATURES

- .1 Include:
 - .1 Shunt trip.
 - .2 Auxiliary switch.
 - .3 Motor-operated mechanism [c/w time delay unit].

- .4 Under-voltage release.
- .5 On-off locking device.
- .6 Handle mechanism.

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 Consultant.
 - .2 Inform Consultant of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied Consultant.

3.2 INSTALLATION

- .1 Install circuit breakers where required.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 American National Standards Institute (ANSI)
 - .1 ANSI C82.1-04, Lamp Ballasts-Line Frequency Fluorescent Lamp Ballast.
- .2 Canadian Standards Association (CSA International)
- .3 Underwriters' Laboratories of Canada (ULC)

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Product Data:
 - .1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Consultant.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .2 Divert unused metal materials from landfill to metal recycling facility.
- .3 Disposal and recycling of fluorescent lamps as per local regulations.
- .4 Disposal of old PCB filled ballasts.

Part 2 Products

2.1 LAMPS

- .1 Fluorescent lamps to be - T8, 32 Watt, medium bi-pin, rapid-start, 4100 K, 30,000 hour lamp life, 2950 initial lumens, CRI 80; or as indicated.
- .2 Compact fluorescent lamps to be - 18 Watt, G24q-2 base, 12,000 hour lamp life, 12,000 initial lumens, 4100 K, CRI 80; or as indicated.

2.2 BALLASTS

- .1 Fluorescent ballast: CBM and CSA certified, energy efficient type, [IC electronic] [IC electronic dimmable].
 - .1 Rating: Voltage as indicated, for use with 2-32W, rapid start lamps.
 - .2 Totally encased and designed for 40 degrees Celsius ambient temperature.

- .3 Power factor: minimum 95% with 95% of rated lamp lumens.
- .4 Current crest factor: 1.7 maximum.
- .5 Harmonics: 10% maximum THD.
- .6 Operating frequency of electronic ballast: 20 kHz minimum.
- .7 Total circuit power: 62 Watts.
- .8 Ballast factor: greater than 0.90.
- .9 Sound rated: Class A.
- .10 Mounting: integral with luminaire.

2.3 FINISHES

- .1 Light fixture finish and construction to meet ULC listing[s] and CSA certification[s] related to intended installation.

2.4 LUMINAIRES

- .1 As indicated in luminaire schedule in Appendix B

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.

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.

END OF SECTION

Part 1 General

1.1 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.

1.2 SUBMITTALS

- .1 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 and as specified

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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

- .1 Refer to Appendix A for Public Works Augmented Cat 6 Specification for specification on horizontal cabling.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 Section Includes:
 - .1 Materials and installation for fire alarm systems.
 - .2 Automatic alarm initiating devices.
 - .3 Audible signal devices.

1.2 REFERENCES

- .1 Government of Canada
 - .1 TB OSH Chapter 3-03, [1997-01-28], Treasury Board of Canada, Occupational Safety and Health, Chapter 3-03, Standard for Fire protection Electronic Data Processing Equipment.
 - .2 TB OSH Chapter 3-04, [1994-12-22], Treasury Board of Canada, Occupational Safety and Health, Chapter 3-04, Standard for Fire Alarm Systems.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Underwriter's Laboratories of Canada (ULC)
 - .1 CAN/ULC-S524-[2001], Standard for the Installation of Fire Alarm Systems.
 - .2 CAN/ULC-S525-[1999], Audible Signal Device for Fire Alarm Systems.
 - .3 CAN/ULC-S530-[M1991], Heat Actuated Fire Detectors for Fire Alarm Systems.
- .4 National Fire Protection Agency
 - .1 NFPA 72-[2002], National Fire Alarm Code.
 - .2 NFPA 90A-[2002], Installation of Air Conditioning and Ventilating Systems.

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].
 - .1 Submit [two] copies of Workplace Hazardous Materials Information System (WHMIS) Material Safety Data Sheets (MSDS) in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Shop Drawings:
 - .1 Submit shop drawings for all new fire alarm devices
- .3 Closeout Submittals:
 - .1 Submit maintenance and engineering data for incorporation into manual in accordance with ANSI/NFPA 20.
 - .2 Submit following:

- .1 Manufacturer's Data for:
 - .1 Alarm bells.

Part 2 Products

- .1 Equipment and devices: ULC listed and labelled and supplied by single manufacturer.
- .2 Audible signal devices: to CAN/ULC-S525.
- .3 Thermal detectors: to CAN/ULC-S530.

2.2 AUDIBLE SIGNAL DEVICES

- .1 Audible device(s):
 - .1 Bells: flush /recessed mounted, single stroke, polarized, 24 V dc, Sound Pressure UL dB rating greater than 85 db.

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 systems in accordance with CAN/ULC-S524.
- .2 Locate and install detectors and connect to alarm circuit wiring. Do not mount detectors within 1 m of 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.
- .3 Connect alarm circuits to main control panel.
- .4 Locate and install bells and connect to signalling circuits.

3.3 FIELD QUALITY CONTROL

- .1 Site Tests:
 - .1 Perform Verification and tests in accordance with CAN/ULC-S537.

END OF SECTION

APPENDIX A:
Horizontal Cabling Specification

Part 1 General

1.1 SUMMARY OF WORK

- .1 The work includes: Supply and installation of fibre optic and copper backbone cabling, supply and installation of Augmented Category 6 (Category 6A) Voice and Data Horizontal Distribution Cabling; Supply and installation of associated passive network equipment.

1.2 WORK NOT INCLUDED

- .1 The work not included in this contract is the supply of communications hub and switching equipment. Testing and energization of hub equipment and LAN communications to be carried out by others.

1.3 REFERENCES

- A. All workmanship and materials supplied shall be in full conformance with applicable building, electrical, and other codes, as determined by the authority having jurisdiction.
- B. All cabling system components shall be Underwriters Laboratories (UL) Listed and shall be marked as such. In cases where UL has no published standards for a component, any equivalent national independent testing standard shall apply and the item shall be appropriately marked.
- C. The product specifications, design considerations, and installation guidelines provided in this document are in part derived from recommendations found in recognized telecommunications industry standards. The following are used as reference:
 1. Spaces and Pathways
 TIA-569-B (2004) – *Commercial Building Standard for Telecommunications Pathways and Spaces*
 2. Grounding
 ANSI-J-STD-607-A (2002) – *Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications*
 3. Cabling Systems
 TIA/EIA-568-B.1 (2002) – *Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements*
 TIA/EIA-568-B.2 (2001) – *Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components*
 ANSI/TIA-568-B.2-10-2008 – *Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6*

*Cabling*ANSI/TIA/EIA-568-B.3-2000 - Optical Fiber Cabling
Components Standard

ANSI/TIA/EIA-568-B.3-1-2002 - Optical Fiber Cabling Components
Standard Addendum 1 – Additional Transmission Performance
Specifications for 50/125 μm Optical Fiber Cables

TIA/EIA-862 (2002) – *Building Automation Systems Cabling Standard
for Commercial Buildings*

4. Cabling Administration
TIA/EIA-606-A (2002) – *Administration Standard for Commercial
Telecommunications Infrastructure*
5. Networking
IEEE Standard 802.3an (2006) – *10GBASE-T* (10 Gb/s Ethernet
operations over balanced twisted-pair cabling)
6. Design
BICSI *Telecommunications Distribution Methods Manual (TDMM)* –
11th edition
7. Installation
BICSI *Information Transport Systems Installation Manual (ITSIM)* –
4th edition (2004)

1.5

SYSTEM DESCRIPTION

- .1 Structured system of communication cables, copper Augmented Category 6 UTP and 850 nm laser-optimized 50/125 μm optical fibre, installed within the building for distributing voice and data.
- .2 Connect each communication outlet in physical star configuration to communications closet.
- .3 Installed in physical star configuration with separate horizontal and backbone sub-systems.
- .4 To avoid network problems caused by impedance balance, and attenuation differences, all passive equipment being installed in the horizontal network shall be of the same type and from the same manufacturer.

1.6

QUALIFICATIONS

- .1 The Contractor shall be a Belden Certified System Vendor (CSV) experienced and trained by the manufacturing company, in all aspects of the placement, terminating, connecting and testing of products described herein and provide certificate of proof prior to start of work.
- .2 The Contractor shall have a minimum of one (1) RCDD “Registered Communications Distribution Designer” recognized by BICSI “Building Industry Consulting Services International” on staff at local offices (the term “Local offices” as applied to RCDD, Registered Communications Distribution Designers, refers to anywhere in the Province of Alberta) and provide certificate of proof prior to start of work.
- .3 Communications contractor shall supply and install a complete system for voice and data.
- .4 The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall demonstrate proven expertise in the implementation of network cabling. Expertise can be illustrated through the inclusion of details of at least three projects involving the design and installation of a Category 5e, Category 6, or Augmented Category 6 (Cat 6A) balanced twisted-pair cabling system within the past two-year period. Names and contact information for each of the three projects shall be included. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of optical and proposed Augmented Category 6A metallic premise distribution systems and have personnel who are adequately trained in the uses of such tools and equipment.
- .5 The communications installer shall be a Communications Cabling Specialist certified by the Dept. Of Labour and obtain all required permits.

1.7

SHOP DRAWINGS

- 1 Submit shop drawings and product data, for:
 - .2 UTP communication cable
 - .3 Communications Equipment Racks, Cable management
 - .4 Patch panels and patch cords
 - .5 Communication Outlets
 - .6 Bix mounts, connectors, adapters.

1.8

WARRANTY

- .1 The warranty period with regard to the project is for 25 years from the date of Substantial Performance of the Work or those periods specified in the Contract Documents for certain portions of the Work of Products.
- .2 The Contractor shall be responsible for the proper performance of the Work.
- .3 The Contractor shall correct promptly, at the Contractor's expense, defects or deficiencies in the Work which appear prior to and during the warranty periods specified in the Contract Documents.
- .4 The Owner, shall promptly give the Contractor notice in writing of observed defects and deficiencies that occur during the warranty period.
- .5 The Contractor shall correct or pay for damages resulting from corrections made under the requirements of paragraph 1.8.3.
- .6 The Contractor shall be responsible for obtaining Product warranties in excess of one year on behalf of the Owner from the manufacturer. These product warranties shall be issued by the manufacturer to the benefit of the Owner.
- .7 The Contractor shall provide a twenty-five (25) year Extended Product Warranty and Lifetime Application Assurance Warranty for the Communications Network. This warranty shall be backed up by the manufacturer and taken over by the manufacturer or his representative if the Contractor fails to follow through with the requirements of the warranty.
- .8 The Communications Network is defined as all required passive equipment and cabling, including hardware, terminations, and jacks, configured to provide data and voice connectivity from each data or voice outlet provided by the Contractor in this Contract.
- .9 The System Assurance shall cover the applications that the installed system is designed to support for a twenty-five (25) year period.
- .10 The copper system shall be constructed to conform to ANSI/TIA-568-B.2-10-2008 – *Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6 Cabling* Commercial Building Telecommunications Cabling Standards.

- .11 The fiber system shall be constructed to conform to ANSI/TIA/EIA-568-B.3-2000 - *Optical Fiber Cabling Components Standard* and ANSI/TIA/EIA-568-B.3-1-2002 - *Optical Fiber Cabling Components Standard Addendum 1 – Additional Transmission Performance Specifications for 50/125 (m Optical Fiber Cables)*
- .12 The Extended Product Warranty and the Systems Assurance together comprise the Structured Cabling System Quality Assurance Program.
- .13 Upon successful completion of the Structured Cabling System installation and subsequent testing by certified technical personnel the Contractor shall provide to the Owner a numbered certificate registering the installation.

PART 2 Products

2.1

GENERAL DESCRIPTION

- .1 The Government of Canada Building will be served by a Fibre Optic Data and Augmented Category 6 Data Riser System. This tender includes provision of all fibre optic and copper systems for the building.
- .2 All Horizontal Augmented Category 6 UTP Cable will be installed in conduit and cable tray as indicated. The principal cross-connection point for the riser system and for the voice network will be the LAN/Tel room.
- .3 All horizontal voice and data distribution cables shall be terminated at the user end on a communications (single, dual or quad, as specified in drawings) outlet. The Data RJ-45 jack shall be appropriately numbered and identified with a Belden or equal computer label; the voice RJ-45 jack shall be appropriately numbered and identified with a Belden or equal telephone label.
- .4 All products must be accompanied with 3rd party test results stating that each component is Augmented Category 6 compliant, and 3rd party test results that show the components when tested in a worst case channel configuration will exceed Category 6A channel requirements with additional margin (Clause 3.2.2,2) at both maximum length of 100 meters and minimum length of 12 meters as per ANSI/TIA-568-B.2-10-2008 – *Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6 Cabling*

2.2

MAIN COMMUNICATIONS ROOM

- .1 Data Cable Installation and Termination
 - .1 Supply and install adequate number of 24 or 48-port patch panels in data racks to service all data distribution, plus 25% spare capacity (see drawing).
 - .2 Supply, install and terminate the horizontal (DATA) 4pr Augmented Category 6 UTP copper Cables from Data Distribution Patch Panels in Data Rack to each Data and Data/Voice Outlet defined by the drawings. Each data jack and patch cables at the device end shall be identified with the corresponding data patch panel port. Supply and install patch cords for all terminated data ports for both ends of each run.
 - .3 Supply and install horizontal and vertical cable management Guides as per drawing.
 - .4 Data patch panels shall meet Augmented Category 6 requirements/standards. Connectors shall be Belden 10GX MDVO Style Modules or approved equal.

- .4 Voice/Riser Cabling Installation and Termination
 - .1 Supply and install 24/48 port patch panels for termination of incoming Telco cable.
 - .2 Supply and install adequate number of 24/48-port patch panels in voice racks to service all voice distribution, plus 25% spare capacity (see drawing).
 - .3 Supply, install and terminate the horizontal (VOICE), 4pr Augmented Category 6 UTP copper Cables from Voice Distribution Patch Panels in voice rack to each Voice and Data/Voice Outlet defined by the drawings. Each voice jack shall be identified with the corresponding number on the Voice Distribution Field. Supply and install patch cords for all terminated voice ports, both ends of each run.
 - .4 Supply and install horizontal and vertical cable management guides as per drawing.
 - .5 Voice patch panels shall meet Augmented Category 6 requirements/standards.
Connectors shall be Belden 10GX MDVO Style Modules or approved equal.

2.3

HORIZONTAL COMMUNICATIONS CABLE

- .1 4 pair, Augmented Category 6 , #23 AWG insulated copper conductor, 100 ohm, Unshielded Twisted Pair (UTP) riser cable (CMR) in separate outer jacket for voice/data service distribution to communications cabinets and all outlets. All cable to have a minimum FT-6 fire rated jacket, white colour for voice & data.

- .2 Provide Belden **10GX** 4-pair Augmented Category 6 cable
- .3 Augmented Category 6 cable shall be installed for all horizontal communications data and voice requirements. The balanced twisted-pair cabling system shall support 10 Gb/s networking and shall provide guaranteed performance up to 625 MHz for a 4-connector, 100 m (328 ft) channel.
- .4 All Augmented Category 6 cables shall conform to ANSI/TIA-568-B.2-10-2008 – *Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6 Cabling*, CAN/CSA T529-95 Commercial Building Telecommunications Cabling Standard, Horizontal Cable Section.

2.4 COMMUNICATIONS OUTLETS

- .1 Voice/Data Outlets to be: Augmented Category 6, modular, 8 pin for voice and data; single, dual or four port c/w SS face plates and mounting frame. Spare ports to be blanked off. Flush mounted. Belden 10GX or approved equal.
- .2 Provide labelling as specified.

2.5 PATCH/LINE CORDS

- .1 Patch and line cords shall be provided for all terminated voice and data ports, for both ends of each line. The cordage shall use 23 AWG solid copper conductors in a bonded pair configuration for reliable long-term channel performance to 625 MHz. The transmission characteristics of the cordage will be guaranteed to 625 MHz. The patch/line cords shall support 10 Gb/s, 7'-0" in length, FT-6, 23 AWG copper, Belden 10GX or approved equal.
- .2 **Cabling for end device**
Include patch cable from ceiling or wall jack to exit point in work area. Ensure cable is 8 ft (2.5 m) from exit point in cubicle/work area to end device

2.6 STANDARD OF ACCEPTANCE

- .1 Belden IBDN Certified Structured Cabling System is specified as Standard of Acceptance.

PART 3 Execution

3.1 INSTALLATION OF CABLES

- .1 General

- .1 Install communication cables in accordance with Manufacturer's recommendations and guidelines.
 - .2 Place all communication cables in conduits or cable tray as required, except within closets use conduits as available.
 - .3 Cable Labels:
 - .1 Electrovert Type "Z" cable markers sized to fit cables snugly.
 - .2 Self laminating, heat-shrink, one-piece, custom printed cable labels.
Cable labels can be self laminating embossed type in lieu of heat shrink.
 - .4 EMT type conduit "wall-stub" c/w flush installed device box shall be located in walls/partitions. Stubs shall be turned out into accessible ceiling space.
 - .5 Single and multi-gang type raised 4" square "tile" rings are also acceptable for use in new dry-wall type construction. Secure directly to face of metal studs. Multi-gang "tile" rings are to be adequately secured within partitions, on "both" left and right hand sides of same.
 - .6 Where the "grouping" of various systems outlets or multi type outlets in dry-wall type construction is desirable, the use of "box mounting brackets" are to be installed between, and secured to, both metal studs. To install suitably sized 4" square and/or 4 11/16" boxes c/w raised tile rings as may be required.
- .2 Installation of Unshielded Twisted Pair (UTP) Cable
- .1 Connect each outlet directly to a communications closets by a continuous UTP cable. There shall be no connector in the cable run between the communication outlet and the cable termination in the closet. Transition points between the communications closet and the communications outlet are disallowed.
 - .2 Horizontal cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundles, which will degrade the performance of those cables
 - .3 The maximum horizontal cable distance for data and voice circuits to be 90 m (295 ft.). This is the cable length from the mechanical termination of the UTP cable in the communications closet to the communications outlet. In establishing maximum distance, an allowance to be made for 3 additional meters (9.8 ft.) from the communications outlet to computer and 2 meters for patch cords at the closet.
 - .4 The following applies to cables installed in return air plenums without the use of tray.
 - .1 Where air plenum is accessible, adjustable cable straps may be used. Routing shall follow building grid lines.

- .2 Where air plenum is not accessible, conduit raceway shall be provided to span inaccessible ceiling space.
- .3 Cables crossing power cables or fluorescent light fixtures (outside conduit) must do so at right angles.
- .5 Install coaxial cables and outlets in accordance with manufacturer's recommendations.
- .6 When installing UTP cable, follow the separation distances from EMI sources detailed in the table:

Source of Electro-Magnetic Interference (EMI)	Minimum Separation Distance from a source Carrying:	
	< 2 kVA	2 – 5 kVA
Unshielded power lines, electrical equipment near open/non-metal pathways.	12.7 cm 5 in.	30.5 cm 12 in.
Unshielded power lines, electrical equipment near grounded metal pathways.	6.4 cm 2.5 in.	15.2 cm. 6 in.
Power lines enclosed in grounded conduit.	5.0 cm 2.0 in.	7.6 cm. 3 in.
Transformers and electric motors.	1.02 m 40 in.	
Fluorescent lights.	30.5 cm 12 in.	

- .7 When terminating cables, the length of cable twist (twist/cm) shall be identical to that of the remainder of the cable. This twist shall be maintained up to 10 mm from the termination point of the cable at the patch panel and the receptacle.
- .8 UTP Cable Terminations
 - .1 Terminate UTP cables at the work area outlet with an RJ 45 female connector.
 - .2 The cable colour code/jack pin assignments shall match (TIA jack-pin pair assignment) T568A.
 - .3 Terminate data cables directly to RJ-45 patch panels on equipment racks at the communications closet end and, connected to data hubs via patch chords.
 - .4 Maximum untwisted length of conductors shall not exceed 12mm (0.5 inch).
- .9 Identify each cable with a permanent indelible identification band which indicates the room and outlet number to which the cable is

connected. Both ends of each cable must have identical identifier bands.

- .10 Identify each communication outlet with a permanent indelible label using standard numbering scheme.
- .11 Identify each patch panel position with the room and outlet number to which the cable is connected.

3.2 ACCEPTABLE TESTING AND CERTIFICATION

- .1 Category 6A performance tests shall be in accordance with ANSI/TIA-568-B.2-10-2008 and must be performed with the wall plates in place.
- .2 Augmented Category 6A system testing.
 - .1 For connecting hardware with modular interface components (i.e. Plug and jack connectors) transmissions tests shall be performed with both components in a mated state on all 4 pairs, and shall meet the following performance criteria

PSANEXT	70 dB @ 100 MHz
Insertion Loss	0.2 dB @ 100 MHz 0.45 dB @ 100 MHz
Return loss	28 dB @ 100 MHz
TCL	34 dB @ 100 MHz
NEXT	54 dB @ 100 MHz 40 dB @ 500 MHz

- .2 At a minimum, the balanced twisted-pair cabling system will exceed the key performance parameters for Augmented Category 6A found in ANSI/TIA-568-B.2-10-2008 – *Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6 Cabling* over the specified frequency ranges by the values listed below.

Parameter	Worst Case Margin (1 – 500 MHz)	Worst Case Margin (500 – 625 MHz)
Insertion loss	3%	Beyond Standard (*)
Return loss	2.0 dB	Beyond Standard (*)

NEXT	2.5 dB	Beyond Standard (*)
PSNEXT	3.5 dB	1.5 dB(*)
PSANEXT	2.0 dB	2.0 dB(*)
PSACRF	10.0 dB	8.0 dB(*)
PSAACRF	Beyond Standard	Beyond Standard (*)

Note: The **Margin** is the additional headroom (in dB or %) compared to the minimum specified value for Category 6A at each frequency point over the specified frequency range. The **Worst Case Margin** is determined at the frequency where the measured data point is closest to the limit line. The Category 6A limit line equations are used to determine the **Worst Case Margin** over the frequency range from 500 MHz to 625 MHz.

NEXT = Near-end crosstalk

PSACRF = Power-sum attenuation-to-crosstalk ratio far-end

PSAACRF = Power-sum alien attenuation-to-crosstalk ratio far-end

PSANEXT = Power-sum alien near-end crosstalk

PSNEXT = Power-sum near-end crosstalk

NOTE: The values listed above are characterized as “Margin” or “Guaranteed Headroom” beyond the performance specified in standards, and serve as additional assurance of the cabling system’s performance after installation and over its operational lifespan.

(*) Value proposed or statement represent guaranteed margin against ANSI/TIA-568-B.2-10-2008 – *Transmission Performance Specifications for 4-pair 100 Ω Augmented Category 6 Cabling* extrapolated to 625MHz.

.3 Certification

- .1 Certify that all cabling and hardware meets the performance criteria in this specification and is free from any optical, electrical or mechanical defects as a result of the installation and termination practices for a period of twenty-five (25) years from the time of acceptance by the Owner.
- .2 Provide two (2) copies of all installation documentation and reports. The minimum documentation set shall include:
 - .1 As-built drawings in paper format, fully documenting the cabling infrastructure. Copies of the approved drawings in AutoCAD “DWG” format shall be provided by the Owner to form a basis for as-built drawings.
 - .2 Records of all test procedures and test results in a report format and detailed test results including graphical data in an electronic format.

APPENDIX B - LUMINAIRE SCHEDULE

Project Name: St. Paul RCMP Renovation

Project number: 12321.001



TYPE	VOLT.	LAMP(S)	DIMENSIONS	DESCRIPTION	MANUFACTURER/ CATALOGUE NUMBER
FLUORESCENT					
F1	120V	2xT8 (32W)	12"x48"x5"	Recessed static troffer with lens. Die formed one piece housing. Housing is multi stage phosphate treated for maximum corrosion resistance and finish coat is high reflectance baked white enamel. Mechanically designed interlocks eliminate light leaks. Lamp pin openings in housing for easy relamping. Flat steel door frame features smooth rolled edges and mitered corners.	<ul style="list-style-type: none"> • DayBrite: 1TC Series • Columbia: ST814-232 Series • Pioneer: TB14 Series • Lumax: RG2321 Series • CFI: AA248 Series • Lithonia: GT8 2 32 Series • Metalux: GR8-232 Series
F2	120V	2xT8 (32W)	12"x48"x5"	Recessed static troffer with lens. Die formed one piece housing. Housing is multi stage phosphate treated for maximum corrosion resistance and finish coat is high reflectance baked white enamel. Mechanically designed interlocks eliminate light leaks. Lamp pin openings in housing for easy relamping. Flat steel door frame features smooth rolled edges and mitered corners.	<ul style="list-style-type: none"> • DayBrite: 1TC Series • Columbia: ST814-232 Series • Pioneer: TB14 Series • Lumax: RG2321 Series • CFI: AA248 Series • Lithonia: GT8 2 32 Series • Metalux: GR8-232 Series
EMERGENCY LIGHTING					
X1	120/ 347V	LED		Commercial Extruded Aluminum Exit, slim housing, white baked powder coat finish, field removable chevrons (refer to drawings for face# and direction), universal mount wall, ceiling or end (refer to drawings for mounting), AC only.	<ul style="list-style-type: none"> • Lumacell: LER3__UNIV_LL • Emergi-Lite: LPEX4_W-U_LL • Beghelli: QUADRA QR-E-L-R-U-M • Aimlite: EXAL-U-M-WHT • Stranpro: SLEXX-C-1/2-WH

NOTES:

1. All luminaires need to be consistent on technology and must match reference standard description regardless of catalogue number. Where finishes are not indicated, allow for special finish. Manufacturer/Catalogue number not listed will not be considered.
2. All luminaires diameter and depth listed are the maximum size allowed. Luminaires provided can be smaller than the dimension listed.
3. Any additional time involved by Smith + Andersen will be billed at our hourly rates to the manufacturer or vendor.