Government of Canada

Project No. PTS 3043
Safety Access to Tarmac

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Prepared by

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SPECIFICATIONS

DRAWING NUMBER	DRAWING TITLE
A100	SITE PLAN
A101	DEMOLITION & CONSTRUCTION FLOOR PLANS
A102	REFLECTED CEILING PLANS & ROOF PLAN
A200	NEW ELEVATIONS
A300	BUILDING SECTION & WALL TYPES
A301	STAIR PLANS & SECTIONS
A302	CONSTRUCTION DETAILS & SCHEDULES
A303	INSULATED METAL WALL PANELS DETAILS
A400	INTERIOR ELEVATIONS & MILLWORK DETAILS
A401	INETRIOR ELEVATIONS& MILLWORK DETAILS
A402	ENLARGED PLANS & MILLWORK DETAILS
S001	STRUCTURAL GENERAL NOTES
S002	STRUCTURAL FLOOR PLANS
S003	STRUCTURAL SECTIONS AND DETAILS
S004	STRUCTURAL SECTIONS AND DETAILS
SS-1	NEW BUILDIG ADDITION - SITE SERVICES
M-1	Ground Floor Plan Plumbing
M-2	SECOND FLOOR PLAN PLUMBING
M-3	GROUND FLOOR PLAN H.V.A.C.
M-4	SECOND FLOOR PLAN H.V.A.C.
M-5	ROOF PLAN AND DETAILS
M-6	EXISTING BUILDING AND NEW ADDITION - WATER AND GAS PIPING CONNECTIONS
M-7	NEW BUILDING ADDITION SPRINKLER SYSTEM
E1	ELECTRICAL - DETAILS & SCHEDULES
E2	GROUND FLOOR PLAN ELECTRICAL DISTRIBUTION
E3	SECOND FLOOR PLANELECTRICAL DISTRIBUTION
E4	GROUND FLOOR PLAN R.C.P.
E5	SECOND FLOOR PLAN R.C.P.
E6	ROOF PLAN
E7	ELECTRICAL ROUTE

END OF SECTION

1 Time of Completion	.1	Commence work in accordance with notification of acceptance of your offer and complete the work within 24 **weeks** from the date of such notification.
	.2	Contractors are advised that a series of projects will be implemented at the above project location. Though each of these projects are independent from the other, cooperation and coordination is required in common service areas including, but not limited to the security check points, load dock facilities, site access and parking. No contractor will have exclusive use of any of these common services areas. The successful bidder for this project will be further briefed and provided with information on all other active projects at the project start-up meeting.
	.3	All correspondence to client shall include the project number, be in electronic format (signed documents & 3 copies of O&M manual excluded). Hard copies and faxes will not be accepted.
	.4	On occasion, work will not be allowed at the building, due the sensitivity of activity at the facility. For estimation purposes, this situation will occur up to four (4) times totaling up to two working days.
	.5	Include as part of the Contract, cost for labour to complete work in the existing building during off hours.
	.6	Contractor to include for winter heat.
2 Minimum Standards	.1	All materials shall be new and work shall conform to the minimum applicable standards of the Canadian General Standards Board, the Canadian Standards Association, the National Building Code of Canada 2010 (NBC), Ontario Building Code 2012 (OBC) and all other applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.
3 Shop Drawings	.1	Submit for the Departmental Representative's review, five (5) copies of each shop drawing or a clear precise electronic copy.
	.2	The review is for the sole purpose of ascertaining conformance with the general design concept, and does not mean approval of the design details inherent in the shop drawings, responsibility for which shall remain with the Contractor. Such review shall not relieve the Contractor of responsibility for errors or omissions in the shop drawings or of his responsibility for meeting all requirements of the Contract Documents.
	.3	Do not commence manufacture or order materials before shop drawings are reviewed.
4 Samples	.1	Samples: examples of materials, equipment, quality, finishes, workmanship.
	.2	Where colour, pattern or texture is criterion, submit full range of samples.
	.3	Reviewed and accepted samples will become standard of workmanship

and material against which installed work will be verified.

5 Product Data

.1 Product data: manufacturers catalogue sheets, brochures, literature, performance charts and diagrams, used to illustrate standard manufactured products.

.2 Submit five (5) copies of product data or a clear precise electronic copy.

.3 Delete information that is not applicable to project.

.4 Cross-reference product data information to applicable portions of Contract Documents.

6 Taxes

.1 Pay all taxes properly levied by law (including Federal, Provincial and Municipal).

7 Fees, Permits, and Certificates

.1 The Owner has the Building Permit in their possession. Pay all other fees and obtain all required permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

8 Fire Safety Requirements

.1 Comply with the National Building Code of Canada 2010 (NBC) for fire safety in construction and the National Fire Code of Canada 2010 (NFC) for fire prevention, fire fighting and life safety in building in use.

.2 Welding and cutting:

.1 At least 48 hours prior to commencing cutting, welding or soldering procedure, provide to Departmental Representative:

.1 Notice of intent, indicating devices affected, time and duration of isolation or bypass.

.2 Completed welding permit as defined by Brookfield GIS Departmental Representative.

.3 Return welding permit to Departmental Representative immediately upon completion of procedures for which permit was issued.

.2 A fire watcher shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 10m may be ignited by conduction or radiation.

.3 Where work requires interruption of fire alarms or fire suppression, extinguishing or protection systems:

.1 Provide watchman service. In general, watchman service is defined as an individual conversant with Fire Emergency Procedures, performing fire picket duty within an unprotected and unoccupied (no workers) area once per hour.

.2 Retain services of manufacturer for fire protection systems on daily basis or as approved by Departmental Representative, to isolate and protect all devices relating to:

.1 modification of fire alarms, fire suppression, extinguishing or protection systems; and/or

.2 cutting, welding, soldering or other construction activities which might activate fire protection systems.

.4 Immediately upon completion of work, restore fire protection systems to normal operation and verify that all devices are fully operational.

.5 Inform fire alarm system monitoring agency and local Fire Department immediately prior to isolation and immediately upon restoration of normal operation.

9 Field Quality Control

.1 Carry out Work using qualified licenced workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.

.2 Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licenced workers.

.3 Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

10 Hazardous Materials

.1 Comply with the requirements of the Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and the provision of Material Safety Data Sheets (MSDS) acceptable to Human Resources Development Canada, Labour Program.

.2 For work in occupied buildings give the Departmental Representative 48 hours notice for work involving designated substances (Ontario Bill 208), hazardous substances (Canada Labour Code Part II Section 10), and before painting, caulking, installing carpet or using adhesives.

11 Temporary Utilities

.1 Existing services required for the work, excluding power required for space heating, may be used by the Contractor without charge. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility.

.2 Notify the Departmental Representative and utility companies of intended interruption of services, obtain requisite permission.

.4 Give the Departmental Representative 48 hours notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Keep duration of these interruptions to a minimum. Carry out all interruptions after normal working hours of the occupants, preferably on weekends.

12 Removed Materials

.1 Unless otherwise specified, materials for removal become the Contractor's property and shall be taken from site.

13 Protection

.1 Protect finished work against damage until take-over.

.2 Protect adjacent work against the spread of dust and dirt beyond the work areas.

.3 Protect operatives and other users of site from all hazards.

14 Use of Site and Facilities

.1 Execute work with least possible interference or disturbance to the normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated. Refer to article 33 Scheduling below for work that must be done during "off hours".

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

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

.4 Where elevators, dumbwaiters, conveyors or escalators exist Contractor may use these at Departmental Representative's discretion. Protect from damage, safety hazards and overloading of existing equipment.

.5 Contractor to include for site trailer for site office and meeting place including required services, on site temporary washroom facilities and material storage facility. Contractor to keep sanitary clean. Contractor to provide temporary power.

.6 Closures: Protect work temporarily until permanent enclosures completed.

15 Site Storage

.1 Do not unreasonably encumber site with materials or equipment.

.2 Move stored products or equipment which interferes with operations of Departmental Representative or other contractors.

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

16 Cut, Patch and Make Good

.1 Cut existing surfaces as required to accommodate new work.

.2 Remove all items so shown or specified.

.3 Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.

.4 Install firestops and smoke seals in accordance with ULC-S115-1995(R2001), around pipe, ductwork, cables, and other objects penetrating fire separations to provide fire resistance not less than the fire resistance rating of surrounding floor, ceiling, and wall assembly. Provide proof of manufactures training for installation of fire stop materials.

17 Sleeves, Hangers and Inserts	.1	Co-ordinate setting and packing of sleeves and supply and installation of hangers and inserts. Obtain Departmental Representative's approval before cutting into structure.
18 Examination	.1	Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.
	.2	Provide photographs of surrounding properties, objects and structures liable to be damaged or be the subject of subsequent claims.
19 Signs	.1	Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etcetera, in both official languages or by the use of commonly understood graphic symbols to the Departmental Representative's approval.
	.2	No advertising will be permitted on this project.
20 Access and Egress	.1	Design, construct and maintain temporary "access to" and "egress from" work areas, including stairs, runways, ramps or ladders [and scaffolding], independent of finished surfaces and in accordance with relevant municipal, provincial and other regulations.
21 Scaffolds and Work Platforms	.1	Design, install, and inspect scaffolds and work platforms required for work in accordance with relevant municipal, provincial and other regulations.
	.2	Provide design drawings, signed and sealed by qualified Professional Engineer licensed in the province of Ontario where prescribed.
	.3	Additions or modifications to scaffolding must be approved by Departmental Representative in writing.
22 Public Way Protection	.1	Design, erect and maintain hoarding and covered pedestrian walkways to support all loads including windloads and provide protection, complete with signs and electrical lighting as required by authority having jurisdiction.
23 Waste Management	.1	Submit complete records of all removals from site for both "materials designated for alternative disposal" and "general waste" including: .1 Time and date of removal .2 Description of material and quantities. .3 Proof that materials have been received at an Approved Waste Processing Site or certified Waste Disposal Site as required.
24 Operations and Maintenance Manuals	.1	Two (2) weeks prior to any scheduled training, submit to Departmental Representative three (3) hard copies and 1 electronic of approved Operations Data and Maintenance Manual, compiled as follows: .1 Bind data in vinyl hard cover 3 "D" ring type loose leaf binders for 212 x 275 mm size paper. Binders must not exceed 75 mm thick or be more than 2/3 full. .2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must

appear on binder face and spine.
.3 Organize contents into applicable sections of work to parallel project specifications breakdown. Mark each section by labelled tabs protected with celluloid covers fastened to hard paper dividing sheets.

.2 Include following information plus data specified.
.1 Maintenance instruction for finished surface and materials.
.2 Copy of hardware and paint schedules.
.3 Description: Operation of the equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set points that affect the efficiency of the operation. Include nameplate information such as make, size, capacity and serial number.
.4 Maintenance: Use clear drawings, diagrams or manufacturers' literature which specifically apply and detail the following:
.1 lubrication products and schedules.
.2 trouble shooting procedures.
.3 adjustment techniques.
.4 operational checks.
.5 Suppliers names, addresses and telephone numbers and components supplied by them must be included in this section. Components must be identified by a description and manufacturers part number.
.5 Guarantees showing:
.1 Name and address of projects.
.2 Guarantee commencement date (date of Interim Certificate of Completion).
.3 Duration of guarantee.
.4 Clear indication of what is being guaranteed and what remedial action will be taken under guarantee.
.5 Signature and seal of Guarantor.
.6 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.

.3 Spare parts: List all recommended spares to be maintained on site to ensure optimum efficiency. List all special tools appropriate to unique application. All parts/tools detailed must be identified as to manufacturer, manufacturer part number and supplier (including address).

.4 Include one complete set of final shop drawings (bound separately) indicating corrections and changes made during fabrication and installation.

.5 Profac will withhold at their discretion a minimum of $5,000.00 until approved O & M manuals are received. Substantial completion will not be obtained if the O & M manuals have not been submitted for approval.

25 Records

.1 As work progresses, maintain accurate records to show deviations from contract drawings. Just prior to Departmental Representative's inspection for issuance of substantial certificate of completion, supply to the Departmental Representative one (1) set of white prints with all deviations neatly inked in. The Departmental Representative will provide two sets of clean white prints for this purpose.

.2 Client will withhold at their discretion a minimum of $5,000.00 until as-build drawings are received and approved by the consultant. Substantial completion will not be obtained if the as-build drawings have not been submitted for approval.

26 Guarantees and Warranties

.1 Before completion of work collect all manufacturer's guarantees and warranties and deposit with Departmental Representative.

27 Clean Up

.1 Clean up work area as work progresses. At the end of each work period, and more often if ordered by the Departmental Representative, remove debris from site, neatly stack material for use, and clean up generally.

.2 Upon completion remove scaffolding, temporary protection and surplus materials. Make good defects noted at this stage.

.3 Wash and polish glass, mirrors, ceramic tile, aluminum, chrome, stainless steel, baked or porcelain enamel, plastic laminate and other plastic surfaces, floors, hardware and washroom fixtures. Clean manufactured articles in accordance with manufacturer's directions.

.4 Clean areas under contract to a condition at least equal to that previously existing and to approval of Departmental Representative.

27 Security Clearances

N/A – See clause within Invitation to Tender (ITT) document

~~work to be carried out during periods outside of the above normal working hours.~~

29 Contract Documents

.1 Drawings and specifications are complementary, items shown or mentioned in one and not in the other are deemed to be included in the contract work.

30 Building Smoking Environment

.1 Smoking is not permitted in the Building. Obey smoking restrictions on building property.

31 Dust Control

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

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

32 Testing Laboratory Services

.1 Where tests indicate non-compliance with specifications, contractor to pay for initial test and all subsequent testing of work to verify acceptability of corrected work.

33 Scheduling

.1 On award of contract submit bar chart construction schedule for work, indicating anticipated progress stages within time of completion. When schedule has been reviewed by the Departmental Representative, take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.

.2 Carry out work during "regular hour" Monday to Friday from 07:00 to 18:00 hours and on Saturdays, Sundays and statutory holidays.

.3 Carry out work of any power interruptions, noise generating activities or odorous work during "off hours" Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays.

.4 Give the Departmental Representative 48 hours notice for work to be carried out during "off hours".

.5 The substantial completion date is set for 50 calendar days after award of contract. The awarded contractor is to adhere to this date.

34 Cost Breakdown

.1 Before submitting first progress claim submit breakdown of Contract Amount in detail as directed by Departmental Representative and aggregating the Contract Amount. Scan and Email Ross@rossboylearchitect.com. After approval by the cost breakdown will be used as the basis of progress payments.

Steps for Invoice Approval Once Cost Breakdown is Approved.

a) All invoicing must be submitted and verified by the consultant for approval at which point a certificate of payment will be issued to the contractor. A copy of the invoice must also be sent to the following location when sending the invoice to the Consultant for approval.

b) The contractor will send the Consultant's approved invoice to:

"NHQ Assets Performance & Accounting Officer"
73 Leikin Drive, M1-4
Room 202-37, Mailstop #1

Ottawa, Ontario
K1A 0R2
Project #: PTS 3043
Purchase order #:
Project Name: Safety Access to Tarmac
Project Manager: Anna Chow
Invoice must include Consultant certificate of payment, current WSIB and Insurance. Include Statutory Declaration after first progress payment and subsequent invoices. Any iformation missing on invoices will be returned.

35 Administration .1 All correspondence shall be electronic pdf format and include the Client's project number in the subject line.

End of Section

1 GENERAL

1.01 REFERENCES

.1 Public Works and Government Services Canada (PWGSC)Contract Documents.

1.02 CASH ALLOWANCES

.1 Include in Contract Price specified cash allowances.

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

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

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

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

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

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

.8 Amount of each allowance, for Work specified in respective specification Sections is as follows:

.1 Include allowance of $ 7,500.00 to cover testing expenditures for soil compacting testing, concrete testing and other miscellaneous testing as so directed by the Departmental Representative. Payments will be issued in the form of a Cash Allowance Expenditure on an as directed basis. Full details of each expenditure are to be provided by the Contractor.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 45 00 – Quality Control.

.2 Section 01 78 00 – Closeout Submittals.

1.2 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 is co-ordinated.

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

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

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

1.3 SHOP DRAWINGS AND PRODUCT DATA

.1 Refer to General Instructions.

.2 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.

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

.4 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.

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

.6 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.

.7 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.

.8 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.

.9 Submissions include:

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

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

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

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

.13 Submit electronic copy of test reports for requirements requested in specification Sections and as requested by Departmental Representative.

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

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

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

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

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

.15 Submit electronic copy of manufacturer's instructions for requirements requested in specification Sections and as requested by Departmental Representative.

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

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

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

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

.19 Delete information not applicable to project.

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

.21 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.

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

.1 This review shall not mean that Departmental Representative approves detail design inherent in shop drawings, responsibility for which shall remain with Contractor submitting same, and such review shall not relieve Contractor of

responsibility for errors or omissions in shop drawings or of responsibility for meeting requirements of construction and Contract Documents.

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

1.4 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.

1.5 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

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 00 10 – General Instructions.

.2 Section 01 33 00 - Submittal Procedures.

.3 Section 01 41 00 – Regulatory Requirements.

1.2 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 Ontario

.1 Occupational Health and Safety Act, R.S.O. 1990, Updated 2005.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

.1 Results of site specific safety hazard assessment.

.2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.

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

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

.5 Submit copies of incident and accident reports.

.6 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 – Submittal Procedures.

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

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

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

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

.1 Accident with and without injury.

.2 Equipment failure.

1.4 FILING OF NOTICE

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

1.5 SAFETY ASSESSMENT

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

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

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

1.8 PROJECT/SITE CONDITIONS

.1 Work at site will involve contact with:

.1 Client's Health and Safety officer.

.2 Client's Departmental Representative.

1.9 GENERAL REQUIREMENTS

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

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

1.10 RESPONSIBILITY

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

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

1.11 COMPLIANCE REQUIREMENTS

.1 Comply with Ontario Health and Safety Act, R.S.O.

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

1.12 UNFORSEEN HAZARDS

.1 When unforeseen or peculiar safety-related factor, hazard, or condition occur 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 Departmental Representative verbally and in writing.

1.13 HEALTH AND SAFETY CO-ORDINATOR

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

.1 Have site-related working experience specific to activities associated with roadwork.

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

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

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

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

1.14 POSTING OF DOCUMENTS

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

1.15 CORRECTION OF NON-COMPLIANCE

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

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

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

1.16 BLASTING

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

1.17 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.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 00 10 – General Instructions.

1.2 REFERENCES AND CODES

.1 Perform Work in accordance with National Building Code of Canada 2010 (NBC) including amendments up to tender closing date and Ontario Building Code 2012 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.

1.3 HAZARDOUS MATERIAL DISCOVERY

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

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

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

1.4 BUILDING SMOKING ENVIRONMENT

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 00 10 – General Instructions.

.2 Section 01 35 29.06 – Health and Safety Requirements.

.3 Section 01 41 00 – Regulatory Requirements.

1.2 REFERENCES

.1 Public Works and Government Services Canada (PWGSC) Contract Documents.

1.3 INSPECTION

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

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

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

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

1.4 INDEPENDENT INSPECTION AGENCIES

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

.2 Allocated costs: to General Instructions - Allowances.

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

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

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

1.5 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.

1.6 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.

1.7 REJECTED WORK

.1 Refer to general Instructions.

.2 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.

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

.4 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Client 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 .

1.8 REPORTS

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

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

1.9 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.06 – Health and Safety Requirements.

1.2 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.

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around road excavations.

.2 Provide barriers for traffic control, and to prevent damaging traffic over exterior areas, as well as safety barricades and otherwise, including safety signage, as may be required, to ensure safety around work areas. Use snow fencing as temporary barricades for safety control or temporary steel fencing.

.3 Refer to Section 32 31 13 Chain Link Fences and Gates and provide temporary fence security at perimeter as fence replacement work is done progressively and site security is to be maintained.

1.5 ACCESS TO SITE

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

1.6 PUBLIC TRAFFIC FLOW

.1 Provide and maintain competent signal flag operators, traffic signals, barricades and flares, lights, or lanterns as required to perform Work and protect public. Follow any special instructions issued by Departmental Health & Safety Representative in terms of traffic control provisions, including warning signs, safety cones and/or safety barriers.

1.7 FIRE ROUTES

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

1.8 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

1.9 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

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

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

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials from grinded asphalt surface material salvaged for reuse.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 Safety Access to Tarmac Contract Documents.

.2 Within text of each specifications section, reference may be made to reference standards.

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

.4 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.

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

1.03 QUALITY

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

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

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

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

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

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

1.04 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.

1.05 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 doors 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.

1.06 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 Departmental Representative. Unload, handle and store such products.

1.07 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.

1.08 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 HGMH 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.

1.09 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.

1.10 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.

1.11 REMEDIAL WORK

.1 Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable. Co-ordinate adjacent affected Work as required.

.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.

1.12 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.

1.13 FASTENINGS

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

.2 Prevent electrolytic action between dissimilar metals and materials.

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

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

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

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

1.14 FASTENINGS - EQUIPMENT

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

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

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

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

1.15 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 HGMH Representative.

1.16 EXISTING UTILITIES

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

.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.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 35 29.06 – Health and Safety.

1.2 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris, including 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 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

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

.5 Provide and use marked separate bins for recycling.

.6 Dispose of waste materials and debris off site.

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

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

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

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

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

.12 Clear snow and ice from access to building, bank/pile snow in designated area.

1.3 FINAL CLEANING

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

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

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

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

.5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative.

.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, floors and ceilings.

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

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

.11 Seal, or prepare floor finishes, as recommended by manufacturer.

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

.13 Wax, seal and prepare floor finishes, as recommended by manufacturer.

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

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

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

.17 Clean roof area where work was carried out, including gutters, areaways and sunken wells, downspouts and drainage system.

.18 Remove dirt and other disfiguration from exterior surfaces.

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

.20 Separate waste materials for reuse and recycling.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 00 10 – General Instructions.

.2 Section 01 78 00 – Closeout Submittals.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Acceptance of Work Procedures:

.1 Contractor's Inspection: Contractor: conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.1 Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.

.2 Request Departmental Representative's inspection.

.2 Departmental Representative Inspection:

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

.2 Contractor to correct Work as directed.

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

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

.2 Defects: corrected and deficiencies completed.

.3 Work: complete and ready for final inspection.

.4 Final Inspection:

.1 When completion tasks are done, request final inspection of Work by Departmental Representative, and Contractor.

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

.5 Declaration of Substantial Performance: when Departmental Representative considers deficiencies and defects corrected and requirements of Contract substantially performed, make application for Certificate of Substantial Performance.

.6 Commencement of Lien and Warranty Periods: date of Owner's acceptance of submitted declaration of Substantial Performance to be date for commencement for warranty period and commencement of lien period unless required otherwise by lien statute of Place of Work.

.7 Final Payment:

.1 When Departmental Representative considers final deficiencies and defects corrected and requirements of Contract met, make application for final payment.

.2 Refer to General Instructions: when Work deemed incomplete by Departmental Representative, complete outstanding items and request re-inspection.

.8 Payment of Holdback: after issuance of Certificate of Substantial Performance of Work, submit application for payment of holdback amount in accordance with contractual agreement.

1.3 FINAL CLEANING

.1 Clean as follows.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 00 10 – General Instructions.

.2 Section 01 77 00 – Closeout Procedures.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Two weeks prior to Substantial Performance of the Work, submit to the Departmental Representative, four final copies of operating and maintenance manuals in English.

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

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

1.3 FORMAT

.1 Organize data as instructional manual.

.2 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 219 x 279 mm with spine and face pockets.

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

.1 Identify contents of each binder on spine.

.4 Cover: identify each binder with type or printed title 'Project Record Documents'; list title of project and identify subject matter of contents.

.5 Arrange content by systems, under 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: provide with reinforced punched binder tab.

.1 Bind in with text; fold larger drawings to size of text pages.

.9 Provide 1:1 scaled CAD files in dwg format on CD.

1.4 CONTENTS - PROJECT RECORD DOCUMENTS

.1 Table of Contents for Each Volume: provide title of project;

.1 Date of submission; names.

.2 Addresses, and telephone numbers of Consultant 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.

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

1.5 AS -BUILT DOCUMENTS AND SAMPLES

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

.1 Contract Drawings.

.2 Specifications.

.3 Addenda.

.4 Change Orders and other modifications to Contract.

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

.6 Field test records.

.7 Inspection certificates.

.8 Manufacturer's certificates.

.2 Store record documents and samples in field office apart from documents used for construction.

.1 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.

.1 Label each document "PROJECT RECORD" in neat, large, printed letters.

.4 Maintain record documents in clean, dry and legible condition.

.1 Do not use record documents for construction purposes.

.5 Keep record documents and samples available for inspection by Departmental Representative.

1.6 RECORDING INFORMATION ON PROJECT RECORD DOCUMENTS

.1 Record information on set of black line opaque drawings, and in copy of Project Manual, provided by Departmental Representative.

.2 Use felt tip marking pens, maintaining separate colours for each major system, for recording information.

.3 Record information concurrently with construction progress.

.1 Do not conceal Work until required information is recorded.

.4 Contract Drawings and shop drawings: mark each item to record actual construction, including:

.1 Measured depths of elements of foundation in relation to finish first floor datum.

.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

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

.4 Field changes of dimension and detail.

.5 Changes made by change orders.

.6 Details not on original Contract Drawings.

.7 References to related shop drawings and modifications.

.5 Specifications: mark each item to record actual construction, including:

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

.2 Changes made by Addenda and change orders.

.6 Other Documents: maintain manufacturer's certifications, inspection certifications, field test records, required by individual specifications sections.

1.7 EQUIPMENT AND SYSTEMS

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

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

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

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

.3 Include installed colour coded wiring diagrams.

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

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

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

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

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

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

.8 Include sequence of operation by controls manufacturer.

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

.10 Provide installed control diagrams by controls manufacturer.

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

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

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

.14 Include test and balancing reports as specified in Section 01 45 00 - Quality Control.

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

1.8 MATERIALS AND FINISHES

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

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

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

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

1.9 MAINTENANCE MATERIALS

.1 Spare Parts:

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

.2 Extra Stock Materials:

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

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

.3 Special Tools:

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

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

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

.4 Receive and catalogue items.

.1 Submit inventory listing to Departmental Representative.

.2 Include approved listings in Maintenance Manual.

1.10 DELIVERY, STORAGE AND HANDLING

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

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

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

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

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

1.11 WARRANTIES AND BONDS

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

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

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

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

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

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

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

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

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

.5 Co-execute submittals when required.

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

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

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

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

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

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

.1 Name of item.

.2 Model and serial numbers.

.3 Location where installed.

.4 Name and phone numbers of manufacturers or suppliers.

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

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

.7 Cross-reference to warranty certificates as applicable.

.8 Starting point and duration of warranty period.

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

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

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

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

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

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

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

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

.10 Written verification to follow oral instructions.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 General requirements relating to commissioning of project's components and systems, specifying general requirements to PV of components, equipment, sub-systems, systems, and integrated systems.

.2 Related Requirements

.1 Sections of Divisions 21, 23, 25 & 26.

.3 Acronyms:

.1 AFD - Alternate Forms of Delivery, service provider.
.2 BMM - Building Management Manual.
.3 Cx - Commissioning.
.4 EMCS - Energy Monitoring and Control Systems.
.5 O M - Operation and Maintenance.
.6 PI - Product Information.
.7 PV - Performance Verification.
.8 TAB - Testing, Adjusting and Balancing.

1.2 GENERAL

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

.1 Verify installed equipment, systems and integrated systems operate in accordance with contract documents and design criteria and intent.
.2 Ensure appropriate documentation is compiled into the BMM.
.3 Effectively train O M staff.

.2 Contractor assists in Cx process, operating equipment and systems, troubleshooting and making adjustments as required.

.1 Systems to be operated at full capacity under various modes to determine if they function correctly and consistently at peak efficiency. Systems to be interactively with each other as intended in accordance with Contract Documents and design criteria.
.2 During these checks, adjustments to be made to enhance performance to meet environmental or user requirements.

.3 Design Criteria: as per client's requirements or determined by designer. To meet Project functional and operational requirements.

.4 AFD managed projects the term Departmental Representative in Cx specifications to be interpreted as AFD Service Provider.

1.3 COMMISSIONING OVERVIEW

.1 Section 01 91 31 - Commissioning (Cx) Plan.

.2 For Cx responsibilities refer to Section 01 91 31 - Commissioning (Cx) Plan.

.3 Cx to be a line item of Contractor's cost breakdown.

.4 Cx activities supplement field quality and testing procedures described in relevant technical sections.

.5 Cx is conducted in concert with activities performed during stage of project delivery. Cx identifies issues in Planning and Design stages which are addressed during Construction and Cx stages to ensure the built is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities include transfer of critical knowledge to facility operational personnel.

.6 Departmental Representative will issue Interim Acceptance Certificate when:

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

.2 Equipment, components and systems have been commissioned.

.3 O M training has been completed.

1.4 NON-CONFORMANCE TO PERFORMANCE VERIFICATION REQUIREMENTS

.1 Should equipment, system components, and associated controls be incorrectly installed or malfunction during Cx, correct deficiencies, re-verify equipment and components within the unfunctional system, including related systems as deemed required by Departmental Representative, to ensure effective performance.

.2 Costs for corrective work, additional tests, inspections, to determine acceptability and proper performance of such items to be borne by Contractor. Above costs to be in form of progress payment reductions or hold-back assessments.

1.5 PRE-CX REVIEW

.1 Before Construction:

.1 Review contract documents, confirm by writing to Departmental Representative.

.1 Adequacy of provisions for Cx.

.2 Aspects of design and installation pertinent to success of Cx.

.2 During Construction:

.1 Co-ordinate provision, location and installation of provisions for Cx.

.3 Before start of Cx:

.1 Have completed Cx Plan up-to-date.

.2 Ensure installation of related components, equipment, sub-systems, and systems is complete.

.3 Fully understand Cx requirements and procedures.

.4 Have Cx documentation shelf-ready.

.5 Understand completely design criteria and intent and special features.

.6 Submit complete start-up documentation to Departmental Representative.

.7 Have Cx schedules up-to-date.

.8 Ensure systems have been cleaned thoroughly.

.9 Complete TAB procedures on systems, submit TAB reports to Departmental Representative for review and approval.

.10 Ensure "As-Built" system schematics are available.

.4 Inform Departmental Representative in writing of discrepancies and deficiencies on finished works.

1.6 CONFLICTS

.1 Report conflicts between requirements of this section and other sections to Departmental Representative before start-up and obtain clarification.

.2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.7 ACTION AND INFORMATIONAL SUBMITTALS

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

.1 Submit no later than 2 weeks after award of Contract:

.1 Name of Contractor's Cx agent.

.2 Draft Cx documentation.

.3 Preliminary Cx schedule.

.2 Request in writing to Departmental Representative for changes to submittals and obtain written approval at least 4 weeks prior to start of Cx.

.3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 4 weeks prior to start of Cx.

.4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.8 COMMISSIONING DOCUMENTATION

.1 Refer to Section 01 91 33 - Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms for requirements and instructions for use.

.2 Departmental Representative to review and approve Cx documentation.

.3 Provide completed and approved Cx documentation to Departmental Representative.

1.9 COMMISSIONING SCHEDULE

.1 Provide detailed Cx schedule as part of construction schedule.

.2 Provide adequate time for Cx activities prescribed in technical sections and commissioning sections including:

- .1 Approval of Cx reports.
- .2 Verification of reported results.
- .3 Repairs, retesting, re-commissioning, re-verification.
- .4 Training.

1.10 COMMISSIONING MEETINGS

.1 Convene Cx meetings following project meetings.

.2 Purpose: to resolve issues, monitor progress, identify deficiencies, relating to Cx.

.3 Continue Cx meetings on regular basis until commissioning deliverables have been addressed.

.4 At 60% construction completion stage. Departmental Representative to call a separate Cx scope meeting to review progress, discuss schedule of equipment start-up activities and prepare for Cx. Issues at meeting to include:

- .1 Review duties and responsibilities of Contractor and subcontractors, addressing delays and potential problems.
- .2 Determine the degree of involvement of trades and manufacturer's representatives in the commissioning process.

.5 Thereafter Cx meetings to be held until project completion and as required during equipment start-up and functional testing period.

.6 Meeting will be chaired by Departmental Representative, who will record and distribute minutes.

.7 Ensure subcontractors and relevant manufacturer representatives are present at 60% and subsequent Cx meetings and as required.

1.11 STARTING AND TESTING

.1 Contractor assumes liabilities and costs for inspections. Including disassembly and re-assembly after approval, starting, testing and adjusting, including supply of testing equipment.

1.12 WITNESSING OF STARTING AND TESTING

.1 Provide 14 days' notice prior to commencement.

.2 Departmental Representative to witness of start-up and testing.

.3 .3 Contractor's Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.13 MANUFACTURER'S INVOLVEMENT

.1 Factory testing: manufacturer to:

- .1 Coordinate time and location of testing.
- .2 Provide testing documentation for approval by Departmental Representative.
- .3 Arrange for Departmental Representative to witness tests.
- .4 Obtain written approval of test results and documentation from Departmental Representative before delivery to site.

.2 Obtain manufacturers installation, start-up and operations instructions prior to start-up of components, equipment and systems and review with Departmental Representative:

- .1 Compare completed installation with manufacturer's published data, record discrepancies, and review with manufacturer.
- .2 Modify procedures detrimental to equipment performance and review same with manufacturer before start-up.

.3 Integrity of warranties:

- .1 Use manufacturer's trained start-up personnel where specified elsewhere in other divisions or required to maintain integrity of warranty.
- .2 Verify with manufacturer that testing as specified will not void warranties.

.4 Qualifications of manufacturer's personnel:

- .1 Experienced in design, installation and operation of equipment and systems.
- .2 Ability to interpret test results accurately.
- .3 To report results in clear, concise, logical manner.

1.14 PROCEDURES

.1 Verify that equipment and systems are complete, clean, and operating in normal and safe manner prior to conducting start-up, testing and Cx.

.2 Conduct start-up and testing in following distinct phases:

- .1 Included in delivery and installation:
  - .1 Verification of conformity to specification, approved shop drawings and completion of PI report forms.
  - .2 Visual inspection of quality of installation.
- .2 Start-up: follow accepted start-up procedures.
- .3 Operational testing: document equipment performance.
- .4 System PV: include repetition of tests after correcting deficiencies.
- .5 Post-substantial performance verification: to include fine-tuning.

.3 Correct deficiencies and obtain approval from Departmental Representative after distinct phases have been completed and before commencing next phase.

.4 Document require tests on approved PV forms.

.5 Failure to follow accepted start-up procedures will result in re-evaluation of equipment by an independent testing agency selected by Departmental Representative. If results

reveal that equipment start-up was not in accordance with requirements, and resulted in damage to equipment, implement following:

.1 Minor equipment/systems: implement corrective measures approved by Departmental Representative.

.2 Major equipment/systems: if evaluation report concludes that damage is minor, implement corrective measures approved by Departmental Representative.

.3 If evaluation report concludes that major damage has occurred, Departmental Representative shall reject equipment.

.1 Rejected equipment to be remove from site and replace with new.

.2 Subject new equipment/systems to specified start-up procedures.

1.15 START-UP DOCUMENTATION

.1 Assemble start-up documentation and submit to Departmental Representative for approval before commencement of commissioning.

.2 Start-up documentation to include:

.1 Factory and on-site test certificates for specified equipment.

.2 Pre-start-up inspection reports.

.3 Signed installation/start-up check lists.

.4 Start-up reports,

.5 Step-by-step description of complete start-up procedures, to permit Departmental Representative to repeat start-up at any time.

1.16 OPERATION AND MAINTENANCE OF EQUIPMENT AND SYSTEMS

.1 After start-up, operate and maintain equipment and systems as directed by equipment/system manufacturer.

.2 With assistance of manufacturer develop written maintenance program and submit Departmental Representative for approval before implementation.

.3 Operate and maintain systems for length of time required for commissioning to be completed.

.4 After completion of commissioning, operate and maintain systems until issuance of certificate of interim acceptance.

1.17 TEST RESULTS

.1 If start-up, testing and/or PV produce unacceptable results, repair, replace or repeat specified starting and/or PV procedures until acceptable results are achieved.

.2 Provide manpower and materials, assume costs for re-commissioning.

1.18 START OF COMMISSIONING

.1 Notify Departmental Representative at least 14 days prior to start of Cx.

.2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.19 INSTRUMENTS / EQUIPMENT

.1 Submit to Departmental Representative for review and approval:

.1 Complete list of instruments proposed to be used.

.2 Listed data including, serial number, current calibration certificate, calibration date, calibration expiry date and calibration accuracy.

.2 Provide the following equipment as required:

.1 2-way radios.

.2 Ladders.

.3 Equipment as required to complete work.

1.20 COMMISSIONING PERFORMANCE VERIFICATION

.1 Carry out Cx:

.1 Under accepted simulated operating conditions, over entire operating range, in all modes.

.2 On independent systems and interacting systems.

.2 Cx procedures to be repeatable and reported results are to be verifiable.

.3 Follow equipment manufacturer's operating instructions.

.4 EMCS trending to be available as supporting documentation for performance verification.

1.21 WITNESSING COMMISSIONING

.1 Departmental Representative to witness activities and verify results.

1.22 AUTHORITIES HAVING JURISDICTION

.1 Where specified start-up, testing or commissioning procedures duplicate verification requirements of authority having jurisdiction, arrange for authority to witness procedures so as to avoid duplication of tests and to facilitate expedient acceptance of facility.

.2 Obtain certificates of approval, acceptance and compliance with rules and regulation of authority having jurisdiction.

.3 Provide copies to Departmental Representative within 5 days of test and with Cx report.

1.23 COMMISSIONING CONSTRAINTS

.1 Since access into secure or sensitive areas will be very difficult after occupancy it is necessary to complete Cx of occupancy, weather, and seasonal sensitive equipment and systems in these areas before issuance of the Interim Certificate, using, if necessary, simulated thermal loads.

1.24 EXTRAPOLATION OF RESULTS

.1 Where Cx of weather, occupancy, or seasonal-sensitive equipment or systems cannot be conducted under near-rated or near-design conditions, extrapolate part-load results to design conditions when approved by Departmental Representative in accordance with

equipment manufacturer's instructions, using manufacturer's data, with manufacturer's assistance and using approved formulae.

1.25 EXTENT OF VERIFICATION

.1 Laboratory areas:

.1 Provide manpower and instrumentation to verify up to 100 % of reported results.

.2 Elsewhere:

.1 Provide manpower and instrumentation to verify up to 30 % of reported results, unless specified otherwise in other sections.

.3 Number and location to be at discretion of Departmental Representative.

.4 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.

.5 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.

.6 Perform additional commissioning until results are acceptable to Departmental Representative.

1.26 REPEAT VERIFICATIONS

.1 Assume costs incurred by Departmental Representative for third and subsequent verifications where:

.1 Verification of reported results fail to receive Departmental Representative's approval.

.2 Repetition of second verification again fails to receive approval.

.3 Departmental Representative deems Contractor's request for second verification was premature.

1.27 SUNDRY CHECKS AND ADJUSTMENTS

.1 Make adjustments and changes which become apparent as Cx proceeds.

.2 Perform static and operational checks as applicable and as required.

1.28 DEFICIENCIES, FAULTS, DEFECTS

.1 Correct deficiencies found during start-up and Cx to satisfaction of Departmental Representative.

.2 Report problems, faults or defects affecting Cx to Departmental Representative in writing. Stop Cx until problems are rectified. Proceed with written approval from Departmental Representative.

1.29 COMPLETION OF COMMISSIONING

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

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

.3 Cx to be considered complete when contract Cx deliverables have been submitted and accepted by Departmental Representative.

1.30 ACTIVITIES UPON COMPLETION OF COMMISSIONING

.1 When changes are made to baseline components or system settings established during Cx process, provide updated Cx form for affected item.

1.31 TRAINING

.1 In accordance with Section [01 91 41 - Commissioning (Cx) - Training].

1.32 MAINTENANCE MATERIALS, SPARE PARTS, SPECIAL TOOLS

.1 Supply, deliver, and document maintenance materials, spare parts, and special tools as specified in contract.

1.33 OCCUPANCY

.1 Cooperate fully with Departmental Representative during stages of acceptance and occupancy of facility.

1.34 INSTALLED INSTRUMENTATION

.1 Use instruments installed under Contract for TAB and PV if:

.1 Accuracy complies with these specifications.

.2 Calibration certificates have been deposited with Departmental Representative.

.2 Calibrated EMCS sensors may be used to obtain performance data provided that sensor calibration has been completed and accepted.

1.35 PERFORMANCE VERIFICATION TOLERANCES

.1 Application tolerances:

.1 Specified range of acceptable deviations of measured values from specified values or specified design criteria. Except for special areas, to be within +/- 10% of specified values.

.2 Instrument accuracy tolerances:

.1 To be of higher order of magnitude than equipment or system being tested.

.3 Measurement tolerances during verification:

.1 Unless otherwise specified actual values to be within +/- 2 % of recorded values.

1.36 OWNER'S PERFORMANCE TESTING

.1 Performance testing of equipment or system by Departmental Representative will not relieve Contractor from compliance with specified start-up and testing procedures.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

1 GENERAL

1.01 SUMMARY

.1 Section Includes:
- .1 Description of overall structure of Cx Plan and roles and responsibilities of Cx team.

.2 Related Requirements
- .1 Section 01 91 13 - General Commissioning (Cx) Requirements,
- .2 Section 23 05 93 - Testing, Adjusting and Balancing for HVAC,
- .3 Section 28 31 00 - Fire Detection and Alarm.

1.02 REFERENCES

.1 American Water Works Association (AWWA)

.2 National Fire Protection Association (NFPA)
- .1 NFPA-13-02, Installation of Sprinkler Systems Handbook.
- .2 NFPA-14-13, Automatic Sprinkler Systems Handbook.

.3 Underwriters' Laboratories of Canada (ULC)

1.03 GENERAL

.1 Provide a fully functional facility:
- .1 Systems, equipment and components meet user's functional requirements before date of acceptance, and operate consistently at peak efficiencies and within specified energy budgets under normal loads.
- .2 Facility user and O&M personnel have been fully trained in aspects of installed systems.
- .3 Optimized life cycle costs.
- .4 Complete documentation relating to installed equipment and systems.

.2 Term "Cx" in this section means "Commissioning".

.3 Use this Cx Plan as master planning document for Cx:
- .1 Outlines organization, scheduling, allocation of resources, documentation, pertaining to implementation of Cx.
- .2 Communicates responsibilities of team members involved in Cx Scheduling, documentation requirements, and verification procedures.
- .3 Sets out deliverables relating to O&M, process and administration of Cx.
- .4 Describes process of verification of how built works meet design requirements.
- .5 Produces a complete functional system prior to issuance of Certificate of Occupancy.
- .6 Management tool that sets out scope, standards, roles and responsibilities, expectations, deliverables, and provides:
  - .1 Overview of Cx.
  - .2 General description of elements that make up Cx Plan.
  - .3 Process and methodology for successful Cx.

.4 Acronyms:

.1 Cx - Commissioning.
.2 BMM - Building Management Manual.
.3 EMCS - Energy Monitoring and Control Systems.
.4 MSDS - Material Safety Data Sheets.
.5 PI - Product Information.
.6 PV - Performance Verification.
.7 TAB - Testing, Adjusting and Balancing.
.8 WHMIS - Workplace Hazardous Materials Information System.

.5 Commissioning terms used in this Section:
.1 Bumping: short term start-up to prove ability to start and prove correct rotation.
.2 Deferred Cx - Cx activities delayed for reasons beyond Contractor's control due to lack of occupancy, weather conditions, need for heating/cooling loads.

1.04 DEVELOPMENT OF 100% CX PLAN

.1 Cx Plan to be 95% completed before added into Project Specifications.

.2 Cx Plan to be 100% completed within 6 weeks of award of contract to take into account:
.1 Approved shop drawings and product data.
.2 Approved changes to contract.
.3 Contractor's project schedule.
.4 Cx schedule.
.5 Contractor's, sub-contractor's, suppliers' requirements.
.6 Project construction team's and Cx team's requirements.

.3 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.05 REFINEMENT OF CX PLAN

.1 During construction phase, revise, refine and update Cx Plan to include:
.1 Changes resulting from Client program modifications.
.2 Approved design and construction changes.

.2 Revise, refine and update every week during construction phase. At each revision, indicate revision number and date.

.3 Submit each revised Cx Plan to Departmental Representative for review and obtain written approval.

.4 Include testing parameters at full range of operating conditions and check responses of equipment and systems.

1.06 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

.1 Departmental Representative to maintain overall responsibility for project and is sole point of contact between members of commissioning team.

.2 Project Manager will select Cx Team consisting of following members:
.1 Design Quality Review Team: during construction, will conduct periodic site reviews to observe general progress.
.2 Commissioning Manager: ensures Cx activities are carried out to ensure

delivery of a fully operational project including:
.1 Review of Cx documentation from operational perspective.
.2 Review for performance, reliability, durability of operation, accessibility, maintainability, operational efficiency under conditions of operation.
.3 Protection of health, safety and comfort of occupants and O&M personnel.
.4 Monitoring of Cx activities, training, development of Cx documentation.
.5 Work closely with members of Cx Team.

.3 Departmental Representative is responsible for:
.1 Organizing Cx.
.2 Monitoring operations Cx activities.
.3 Witnessing, certifying accuracy of reported results.
.4 Witnessing and certifying TAB and other tests.
.5 Developing BMM.
.6 Ensuring implementation of final Cx Plan.
.7 Performing verification of performance of installed systems and equipment.
.8 Implementation of Training Plan.

.4 Construction Team: contractor, sub-contractors, suppliers and support disciplines, is responsible for construction/installation in accordance with contract documents, including:
.1 Testing.
.2 TAB.
.3 Performance of Cx activities.
.4 Delivery of training and Cx documentation.
.5 Assigning one person as point of contact with Consultant and Cx Manager for administrative and coordination purposes.

.5 Contractor's Cx agent implements specified Cx activities including:
.1 Demonstrations.
.2 Training.
.3 Testing.
.4 Preparation, submission of test reports.

.6 Property Manager: represents lead role in Operation Phase and onwards and is responsible for:
.1 Receiving facility.
.2 Day-To-Day operation and maintenance of facility.

1.07 CX PARTICIPANTS

.1 Employ the following Cx participants to verify performance of equipment and systems:
.1 Installation contractor/subcontractor:
.1 Equipment and systems except as noted.

.2 Equipment manufacturer: equipment specified to be installed and started by manufacturer.
.1 To include performance verification.

.3 Specialist subcontractor: equipment and systems supplied and installed by specialist subcontractor.

.4 Specialist Cx agency:
.1 Possessing specialist qualifications and installations providing environments essential to client's program but are outside scope or

expertise of Cx specialists on this project.

.5 Client: responsible for intrusion and access security systems.

.6 Ensure that Cx participant:
.1 Could complete work within scheduled time frame.
.2 Available for emergency and troubleshooting service during first year of occupancy by user for adjustments and modifications outside responsibility of O&M personnel, including:
.1 Modify ventilation rates to meet changes in off-gassing.
.2 Changes to heating or cooling loads beyond scope of EMCS.
.3 Changes to EMCS control strategies beyond level of training provided to O&M personnel.
.4 Redistribution of electrical services.
.5 Modifications of fire alarm systems.
.6 Modifications to voice communications systems.

.7 Provide names of participants to Departmental Representative and details of instruments and procedures to be followed for Cx 3 months prior to starting date of Cx for review and approval.

1.08 EXTENT OF CX

.1 Cx Structural and Architectural Systems:
.1 Architectural and structural:
.1 Accessibility and operational safety:
.1 Entry doors with activators.

.2 Commission mechanical systems and associated equipment:
.1 Plumbing systems:
.1 Domestic CWS and HWS.
.2 Regular sanitary waste systems.
.3 Storm water systems.
.2 HVAC and exhaust systems:
.1 HVAC systems.
.2 Exhaust systems and related systems.
.3 Fire and life safety systems:
.1 Wet pipe sprinkler systems.
.2 Standpipe and hose systems.
.3 Fire extinguishers.
.4 Noise and vibration control systems for mechanical systems.
.5 Seismic restraint and control measures.

.3 Commission electrical systems and equipment:
.1 Low voltage below 750 V:
.1 Low voltage equipment.
.2 Low voltage distribution systems.
.3 Lighting systems:
.1 Lighting equipment.
.2 Distribution systems.
.3 Emergency lighting systems, including battery packs.
.4 Fire exit emergency signage.
.4 Fire alarm systems, equipment:
.1 Annunciators.
.2 Control panels.
.3 Fire alarm battery banks.

1.9 DELIVERABLES RELATING TO O&M PERSPECTIVES

.1 General requirements:
- .1 Compile English and French documentation.
- .2 Documentation to be computer-compatible format ready for inputting for data management.

.2 Provide deliverables:
- .1 Warranties.
- .2 Project record documentation.
- .3 Inventory of spare parts, special tools and maintenance materials.
- .4 Maintenance Management System (MMS) identification system used.
- .5 WHMIS information.
- .6 MSDS data sheets.
- .7 Electrical Panel inventory containing detailed inventory of electrical circuitry for each panel board. Duplicate of inventory inside each panel.

1.10 DELIVERABLES RELATING TO THE CX PROCESS

.1 General:

.1 Start-up, testing and Cx requirements, conditions for acceptance and specifications form part of relevant technical sections of these specifications.

.2 Definitions:

.1 Cx as used in this section includes:
- .1 Cx of components, equipment, systems, subsystems, and integrated systems.
- .2 Factory inspections and performance verification tests.

.3 Deliverables: provide:
- .1 Cx Specifications.
- .2 Startup, pre-Cx activities and documentation for systems, and equipment.
- .3 Completed installation checklists (ICL).
- .4 Completed product information (PI) report forms.
- .5 Completed performance verification (PV) report forms.
- .6 Results of Performance Verification Tests and Inspections.
- .7 Description of Cx activities and documentation.
- .8 Description of Cx of integrated systems and documentation.
- .9 Cx Reports.
- .10 Prescribed activities during warranty period.

.4 Departmental Representative to witness and certify tests and reports of results provided to Departmental Representative.

1.11 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Items listed in this Cx Plan include the following:
- .1 Pre-Start-Up inspections: by Departmental Representative prior to permission to start up and rectification of deficiencies to Departmental Representative satisfaction.
- .2 Departmental Representative will monitor these pre-start-up inspections.
- .3 Include completed documentation with Cx report.

.4 Conduct pre-start-up tests: conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be witnessed and certified by Departmental Representative and does not form part of Cx specifications.
.5 Departmental Representative will monitor these inspections and tests.
.6 Include completed documentation in Cx report.

.2 Pre-Cx activities - MECHANICAL:

.1 Plumbing systems:
.1 "Bump" each item of equipment in its "stand-alone" mode.
.2 Complete pre-start-up checks and complete relevant documentation.
.3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
.2 HVAC equipment and systems:
.1 "Bump" each item of equipment in its "stand-alone" mode.
.2 At this time, complete pre-start-up checks and complete relevant documentation.
.3 After equipment has been started, test related systems in conjunction with control systems on a system-by-system basis.
.4 Perform TAB on systems. TAB reports to be approved by Departmental Representative.

.3 EMCS:
.1 EMCS trending to be available as supporting documentation for performance verification.
.2 Perform point-by-point testing in parallel with start-up.
.3 Carry out point-by-point verification.
.4 Demonstrate performance of systems, to be witnessed by Departmental Representative prior to start of [30] day Final Acceptance Test period.
.5 Perform final Cx and operational tests during demonstration period and 30 day test period.
.6 Only additional testing after foregoing have been successfully completed to be "Off-Season Tests".

.4 Pre-Cx activities - LIFE SAFETY SYSTEMS
.1 Include equipment and systems identified above.
.2 Reports of test results to be witnessed and certified by Departmental Representative before verification.

.5 Pre-Cx activities - ELECTRICAL:
.1 Low voltage distribution systems under 750 V:
.1 Requires independent testing agency to perform pre-energization.
.2 Lighting systems:
.1 Emergency lighting systems:
.1 Tests to include verification of lighting levels and coverage, initially by disrupting normal power.

.6 Fire alarm systems: test after other safety and security systems are completed. Testing to include a complete verification in accordance with ULC requirements. Departmental Representative has witnessed and

certified report, demonstrate devices and zones to Departmental Representative.

1.12 START-UP

.1 Start up components, equipment and systems.

.2 Equipment manufacturer, supplier, installing specialist sub-contractor, as appropriate, to start-up, under Contractor's direction.

.3 Departmental Representative to monitor these start-up activities.
- .1 Rectify start-up deficiencies to satisfaction of Departmental Representative.

.4 Performance Verification (PV):
- .1 Approved Cx Agent to perform.
  - .1 Repeat when necessary until results are acceptable to Departmental Representative.
- .2 Use procedures modified generic procedures to suit project requirements.
- .3 Departmental Representative to witness and certify reported results using approved PI and PV forms.
- .4 Departmental Representative to approve completed PV reports and provide to Departmental Representative.
- .5 Departmental Representative reserves right to verify up to 30% of reported results at random.
- .6 Failure of randomly selected item shall result in rejection of PV report or report of system startup and testing.

1.13 CX ACTIVITIES AND RELATED DOCUMENTATION

.1 Perform Cx by specified Cx agency using procedures developed by Departmental Representative and approved by Departmental Representative.

.2 Departmental Representative to monitor Cx activities.

.3 Upon satisfactory completion, Cx agency performing tests to prepare Cx Report using approved PV forms.

.4 Departmental Representative to witness, certify reported results of, Cx activities and forward to Departmental Representative.

.5 Departmental Representative reserves right to verify a percentage of reported results at no cost to contract.

1.14 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

.1 Cx to be performed by specified Cx specialist, using procedures developed by Departmental Representative and approved by Departmental Representative.

.2 Tests to be witnessed by Departmental Representative and documented on approved report forms.

.3 Upon satisfactory completion, Cx specialist to prepare Cx Report, to be certified by Departmental Representative and submitted to Departmental Representative for review.

.4 Departmental Representative reserves right to verify percentage of reported results.

.5 Integrated systems to include:
.1 HVAC and associated systems forming part of integrated HVAC systems.
.2 Indoor air quality.
.3 Fire alarm systems.
.4 Emergency lighting systems.

.6 Identification:
.1 In later stages of Cx, before hand-over and acceptance Contractor, Project Manager, Property Manager and Cx Manager to co-operate to complete inventory data sheets and provide assistance to Departmental Representative in full implementation of MMS identification system of components, equipment, sub-systems, systems.

1.15 INSTALLATION CHECK LISTS (ICL)

.1 Commissioning (Cx) Forms: Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms. Submit sample of each form to be used to Departmental Representative prior to start of commissioning exercise.

1.16 PRODUCT INFORMATION (PI) REPORT FORMS

.1 Submit samples of forms to be used, to Departmental Representative for approval prior to start of commissioning exercise, for Installation Check Lists and Product Information (PI) / Performance Verification (PV) Forms.

1.17 PERFORMANCE VERIFICATION (PV) REPORT

.1 Use forms approved by Departmental Representative.

1.18 DELIVERABLES RELATING TO ADMINISTRATION OF CX

.1 General:
.1 Because of risk assessment, complete Cx of occupancy, weather and seasonal-sensitive equipment and systems in these areas before building is occupied.

1.19 CX SCHEDULES

.1 Prepare detailed Cx Schedule and submit to Departmental Representative for review and approval same time as project Construction Schedule. Include:
.1 Milestones, testing, documentation, training and Cx activities of components, equipment, subsystems, systems and integrated systems, including:
.1 Design criteria, design intents.
.2 Pre-TAB review: 28 days after contract award, and before construction starts.
.3 Cx agents' credentials: 60 days before start of Cx.

.4 Cx procedures: 2 months after award of contract.
.5 Cx Report format: 2 months after contract award.
.6 Discussion of heating/cooling loads for Cx: 2 months before start-up.
.7 Submission of list of instrumentation with relevant certificates: 21 days before start of Cx.
.8 Notification of intention to start TAB: 21 days before start of TAB.
.9 TAB: after successful start-up, correction of deficiencies and verification of normal and safe operation.
.10 Notification of intention to start Cx: 14 days before start of Cx.
.11 Notification of intention to start Cx of integrated systems: after Cx of related systems is completed 14 days before start of integrated system Cx.
.12 Identification of deferred Cx.
.16 Cx reports: immediately upon successful completion of Cx.

.2 Detailed training schedule to demonstrate no conflicts with testing, completion of project and hand-over to Property Manager.

.3 6 months in Cx schedule for verification of performance in all seasons and wear conditions.

.2 After approval, incorporate Cx Schedule into Construction Schedule.

.3 Consultant, Contractor, Contractor's Cx agent, and Departmental Representative will monitor progress of Cx against this schedule.

1.20 CX REPORTS

.1 Submit reports of tests, witnessed and certified by Departmental Representative to Departmental Representative who will verify reported results.

.2 Include completed and certified PV reports in properly formatted Cx Reports.

.3 Before reports are accepted, reported results to be subject to verification by Departmental Representative.

1.21 ACTIVITIES DURING WARRANTY PERIOD

.1 Cx activities must be completed before issuance of Interim Certificate, it is anticipated that certain Cx activities may be necessary during Warranty Period, including:
.1 Fine tuning of HVAC systems.
.2 Adjustment of ventilation rates to promote good indoor air quality and reduce deleterious effects of VOCs generated by off-gassing from construction materials and furnishings.

1.22 TESTS TO BE PERFORMED BY OWNER/USER

.1 None is anticipated on this project.

1.24 FINAL SETTINGS

.1 Upon completion of Cx to satisfaction of Departmental Representative lock control devices in their final positions, indelibly mark settings marked

and include in Cx Reports.

2 PRODUCTS

2.01 NOT USED

.1 Not Used.

3 EXECUTION

3.01 NOT USED

.1 Not Used.

END OF SECTION

General

1.1 **RELATED SECTIONS**

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 56 00 - Temporary Barriers and Enclosures.

.3 Section 01 35 29.06 - Health and Safety Requirements.

1.2 **REFERENCES**

.1 Canadian Standards Association (CSA International).

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

1.3 **DEFINITIONS**

.1 Hazardous Materials: dangerous substances, dangerous goods, hazardous commodities and hazardous products, may include but not limited to: poisons, corrosive agents, flammable substances, ammunition, explosives, radioactive substances, or other material that can endanger human health or well being or environment if handled improperly.

1.4 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for reuse and recycling.

1.5 **EXISTING CONDITIONS**

.1 Should material resembling spray or trowel applied asbestos or other designated substance listed as hazardous be encountered in course of demolition, stop work, take preventative measures, and notify Departmental Representative immediately. Do not proceed until written instructions have been received.

.2 Portions of Structure to be demolished to be based on their condition at time of examination prior to tendering.

1.6 **SCHEDULING**

.1 Employ necessary means to meet project time lines.

.1 In event of unforeseen delay notify Departmental Representative in writing.

Products

1.7 **EQUIPMENT**

.1 Equipment and heavy machinery to:

.1 Complete the work.

Execution

1.8 **PROTECTION**

.1 Prevent movement, settlement or damage of adjacent structure, services, tarmac paving, trees, landscaping, adjacent grades and parts of existing building to remain.

.1 Provide bracing, shoring and underpinning as required.

.2 Repair damage caused by demolition as directed by Departmental Representative.

.2 Prevent debris from damaging mechanical and electrical systems which must remain in operation.

1.9 **PREPARATION**

.1 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.2 Disconnect and re-route electrical and telephone service lines entering where portions of building to be demolished.

.1 Post warning signs on electrical lines and equipment which must remain energized to serve other properties during period of demolition.

1.10 **SAFETY CODE**

.1 Do demolition work in accordance with Section 01 35 29.06 – Health and Safety requirements.

.2 Blasting operations not permitted during demolition.

1.11 **DEMOLITION**

.1 Demolish parts of building as indicated, including but not limited to existing metal siding, portion of parapet, chain link fencing and miscellaneous items in order to proceed with the work. Coordinate with the scope of work outlined on the drawings and based on site conditions.

.2 To permit construction of addition and as indicated.

.3 At end of each day's work, leave Work in safe and stable condition.

.1 Protect interiors of parts not to be demolished from exterior elements at all times.

.4 Demolish to minimize dusting.

.5 Remove and dispose of demolished materials except where noted otherwise and in accordance with authorities having jurisdiction.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 20 00 – Concrete Reinforcement

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

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

- .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.
- .3 CSA O121-M1978(R2003), Douglas Fir Plywood.
- .4 CSA O151-04, Canadian Softwood Plywood.
- .5 CAN/CSA-O325.0-92(R2003), Construction Sheathing.
- .6 CSA O437 Series-93(R2006), Standards for OSB and Waferboard.
- .7 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

1.3 DESIGN

.1 Design of concrete formwork shall be the responsibility of the Contractor.

1.4 SUBMITTALS

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

.2 Submit shop drawings for formwork.

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

.3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

.4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 Use wood and wood product formwork materials to CAN/CSA-O86.1.

.2 Rigid insulation board: to CAN/ULC-S701.

.2 Form ties:

.1 Use removable or snap-off metal ties, fixed or adjustable length, free of devices leaving holes larger than 25 mm diameter in concrete surface.

.3 Form liner:

.1 Plywood: Canadian Softwood Plywood to CSA O151

.4 Form release agent: non-toxic

.5 Form stripping agent: colourless mineral oil, non-toxic

.6 Sealant: to Section 07 92 10 - Joint Sealing

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Engineer approval for use of earth forms framing openings not indicated on drawings.

.3 Hand trim sides and bottoms and remove loose earth from earth forms before placing concrete.

.4 Refer to architectural drawings for concrete members requiring architectural exposed finishes.

.5 Do not place shores and mud sills on frozen ground.

.6 Provide site drainage to prevent washout of soil supporting mud sills and shores.

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

.8 Align form joints and make watertight.

.1 Keep form joints to minimum.

.9 Use 20 mm chamfer strips on external corners and/or 20 mm fillets at interior corners, joints, unless specified otherwise.

.10 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.11 Build in anchors, sleeves, and other inserts required to accommodate work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

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

.13 Finished concrete exhibiting excessive form displacement and/or excessive deflection shall be cause for rejection of the work and its removal and replacement at the Contractor's expense.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for following minimum periods of time after placing concrete.

.1 3 days for walls and sides of beams.

.2 7 days for columns.

.3 3 days for footings and abutments.

.2 Remove formwork when concrete has reached 75 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000 mm apart.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 10 00 – Concrete forms and Accessories

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

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

- .1 ASTM A143/A143M-03, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.
- .2 ASTM A185/A185M-05a, Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- .3 ASTM A497/A497M-05a, Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
- .4 ASTM A775/A775M-04a, Standard Specification for Epoxy-Coated Reinforcing Steel Bars.

.2 Canadian Standards Association (CSA International)

- .1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.
- .2 CSA-A23.3-04, Design of Concrete Structures.
- .3 CAN/CSA-G30.18-M92(R2002), Billet-Steel Bars for Concrete Reinforcement, A National Standard of Canada.
- .4 CSA-G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .5 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles, A National Standard of Canada.
- .6 CSA W186-M1990(R2002), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.3 Reinforcing Steel Institute of Canada (RSIC)

- .1 RSIC-2004, Reinforcing Steel Manual of Standard Practice.

1.3 SUBMITTALS

.1 Submittals in accordance with Section 01 33 00 - Submittal Procedures, at least ten (10) days before fabrication.

.2 Prepare reinforcement drawings in accordance with RSIC Manual of Standard Practice and ACI 315.

.3 Submit shop drawings including placing of reinforcement and indicate:

.1 Bar bending details.

.2 Lists.

.3 Quantities of reinforcement.

.4 Sizes, spacings, locations of reinforcement and mechanical splices if approved by Engineer, with identifying code marks to permit correct placement without reference to structural drawings.

.4 Detail lap lengths and bar development lengths to CSA-A23.3 unless otherwise indicated.

Part 2 Products

2.1 MATERIALS

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

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

.3 Reinforcing steel: weldable low alloy steel deformed bars to CAN/CSA-G30.18.

.4 Cold-drawn annealed steel wire ties: to ASTM A497/A497M.

.5 Epoxy Coating of non-prestressed reinforcement: to ASTM A775/A775M.

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

2.2 FABRICATION

.1 Fabricate reinforcing steel in accordance with CSA-A23.1/A23.2, ACI 315 and Reinforcing Steel Manual of Standard Practice by the Reinforcing Steel Institute of Canada.

.1 ACI 315R unless indicated otherwise.

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

.3 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

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

.1 Ship epoxy coated bars in accordance with ASTM A775A/A775M.

Part 3 Execution

3.1 FIELD BENDING

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

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

.3 Replace bars, which develop cracks or splits.

3.2 PLACING REINFORCEMENT

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

.2 Prior to placing concrete, obtain Departmental Representative's approval of reinforcing material and placement.

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

.4 Clean reinforcing steel bars prior to placing concrete.

.5 Welding of reinforcement will not be permitted.

.6 Protect epoxy coated portions of bars with covering during transportation and handling.

.7 Support reinforcement as follows:

- .1 Do not use supports that will be forced into the supporting formwork or soil by the weight of the reinforcement or other construction loads.
- .2 Separate layers of bars by precast mortar blocks, bars or equally suitable devices. Do not use pebbles, pieces of broken stone or brick, metal pipe or wooden blocks.
- .3 Do not place bars on layers of fresh concrete as the work progresses or install bars during placing of concrete.

.8 Corner Bars: Install corners bars in walls and beams to match the larger size of normal reinforcement unless otherwise noted on the drawings.

.9 Where reinforcement is drilled and grouted into existing concrete, reinforcement shall be secured using injectable adhesive in strict accordance with manufacturer's published recommendations, ensuring that reinforcing bars in existing concrete are not cut.

- .1 Unless noted on Construction Drawings or elsewhere in these Specifications, obtain Consultant's approval before drilling and grouting reinforcement.

3.3 FIELD TOUCH-UP

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 03 10 00 – Concrete forms and Accessories.

.2 Section 03 20 00 – Concrete Reinforcement

1.2 REFERENCES

.1 American Concrete Institute (ACI):

.1 ACI-350M-01: Code Requirements For Environmental Engineering Concrete Structures

.2 American Society for Testing and Materials (ASTM):

.1 ASTM C309-93: Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-A3000-03: Cementitious Materials Compendium.

.2 CAN/CSA-A23.1-04: Concrete Materials and Methods of Concrete Construction.

.3 CAN/CSA-A23.2-04: Methods of Test for Concrete.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-19.24-M90: Multicompound, Chemical Curing Sealing Compound.

1.3 SUBMITTALS

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

.1 Submit mix design for review at least 10 days in advance of concreting.

.2 Submit samples of aggregates, water and cement to be used to an approved testing agency, if required by the Departmental Representative.

.3 Submit details of proposed product substitutions (if any) with technical data sheets to demonstrate equivalency to product specified before proceeding with the work.

1.4 MATERIALS

.1 Portland cement: to CAN/CSA-A3001.

.2 Blended hydraulic cements: to CAN/CSA A3001-03.

.3 Other cementing materials: to CAN/CSA-A3000 & A23.1.

.4 Grout: SIKA 212 or equivalent, unless noted otherwise.

.5 Premoulded joint filler: SEALTIGHT asphalt expansion joint filler or equivalent.

.6 Joint Sealer: Duoflex NS for vertical or overhead control joints, Duoflex SL for slab control joints (or equivalent).

.7 Bonding Agent: Sikatop Armatec 110 EpoCem or approved equivalent.

.8 Patching mortar: Rapid setting cementitious patching mortar.

.1 Acceptable product: Euco-Speed or approved equivalent.

1.5 MIXES

.1 Contractor shall be responsible for concrete mix design.

.2 Proportion concrete in accordance with CAN/CSA-A23.1 and as noted below:

Description	Exposure Class	Minimum 28 day compressive strength	Air content	Cement Type
Slab-on-Grades and other interior concrete	N	30 MPa	None	GU or GUb
Foundations, ,and other exterior concrete	F-2	30 MPa	4 - 7%	GU or GUb
Lean concrete mudslab / Leveling pad / Non shrink fill	N	15 MPa	None	GU or GUb

.3 Air content: concrete to contain purposely entrained air in accordance with CSA-A23.1, Table 10.

.4 Admixtures: to CAN/CSA-A23.1.

.5 Do not change concrete mix without prior revision by Consultant. Should change in material source be proposed, Consultant shall review new mix design.

Part 2 Execution

2.1 Inspection

.1 The Consultant may inspect forms, foundations, reinforcing steel, construction joints, mixing, conveying and placing equipment before concreting.

.1 Provide minimum of 48 hours' notice prior to placing concrete.

.2 Inform consultant of proposed method(s) for protection of concrete during placing and curing of concrete during adverse weather prior to placing of concrete.

2.2 PREPARATION

.1 Do not place concrete on soil that has been softened by mechanical disturbance, moisture or freezing.

.2 Retighten forms at construction joints.

.3 Roughen, thoroughly remove foreign matter and laitance, and saturate the hardened concrete at construction joints with water prior to concreting.

.4 Saturate granular subgrade prior to placing concrete and maintain in damp state until completion of placement operation. Do not place concrete into standing water.

.5 Make suitable arrangements to prevent damage to fresh concrete by adverse weather conditions, such as rain, wind or extreme temperatures.

.6 Concrete shall not be poured against frozen ground, frozen concrete or into frosted formwork.

.7 Prepare all sleeves and ducts to be cast into concrete at the same time as the concrete formwork to ensure that correct assembly and fit is obtained.

.8 Check process, mechanical and electrical drawings for sleeves, inserts, etc.

.9 Set sleeves, ties, anchor bolts, pipe hangers and other inserts and openings in concrete floors and walls as required.

2.3 INSERTS

.1 Place all inserts and embedded hardware in accordance with Section 13 of CSA-A23.3 (unless noted).

.2 Do not eliminate or displace reinforcement to accommodate hardware.

.3 Set anchor bolts to templates under supervision of appropriate trade prior to placing concrete.

2.4 PLACING OF CONCRETE

.1 According to CSA-A23.1, and as specified herein.

.2 All formwork shall be cleaned of all debris, loose material, snow and ice immediately prior to pouring.

.3 Ensure proper placement and support of reinforcement and embedded material immediately ahead of a pour.

.4 Do not displace reinforcement for convenience in placing concrete.

.5 Do not use wood or other temporary spreaders or spacers.

.6 Do not insert reinforcement into fresh concrete.

.7 Pumping of concrete shall be permitted only after review of equipment and mix.

.8 Confine concrete in a suitable vertical drop pipe to within 1.0 m or less of the concrete in place.

.9 Set screeds accurately for level surfaces or to maintain cambers as required.

.10 Ensure that concrete is adequately consolidated in the forms.

.11 Place concrete in such a manner that the concrete in the form is still plastic and can be integrated with fresh concrete.

.12 To prevent segregation, deposit concrete in approximately horizontal layers of 300 to 450 mm thickness, as near as possible to its final position.

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

.14 Do not place load upon new concrete until adequate strength has been attained.

2.5 PLACING GROUT

.1 Grout under baseplates in accordance with manufacturer's written recommendations to ensure 100% contact over grouted area.

2.6 COLD WEATHER

.1 When the air temperature is at or below 5°C, or when there is a possibility of it falling to that limit within 24 hours of placing, the requirements according to CSA-A23.1 shall be met.

.2 Calcium chloride to 2% may not be used.

.3 Withdraw protection and heat gradually so that air temperature around the concrete does not drop more than 15 ^{O}C per day.

.4 Concrete shall be protected from alternate freezing and thawing for 14 days.

.5 Provide enclosures for heating such that air circulation is maintained.

.6 Frozen concrete will be rejected.

2.7 JOINTS

.1 Construction, and/or control joints shall be provided where required and as shown on the plans or according to CSA-A23.1. Control joints should be spaced at maximum 6 meters or less unless otherwise indicated.

.2 Carefully finish all face edges exposed to view true to line and elevation. Apply a neat cement paste or approved bonding agent to the hardened concrete immediately in advance of the fresh concrete.

.3 Make all construction, or control joints in accordance with details shown on the drawings, layout to be submitted by Contractor for approval by Consultant.

.4 Cut control joints in slab on grade at locations indicated in accordance with CSA-A23.1 and install specified joint sealer/filler in accordance with manufacturers written recommendations.

.5 Construction joint layouts shown on the drawings take precedence over above requirements.

2.8 FIELD QUALITY CONTROL

.1 Inspection and testing of concrete and concrete materials shall be carried out by an independent Certified Testing Laboratory in accordance with CAN/CSA-A23.1 & A23.2.

.2 Contractor shall provide and maintain adequate facilities for safe storage and proper curing of concrete test specimens on the project site for the initial curing period.

.1 Adequate facilities shall include a protected, designated area with provision for a continuous power supply to comply with CSA Test Method A23.2-3C.

.3 Concrete Testing Laboratory will be retained and paid for by the Owner.

.4 Consultant may request additional cylinders. Cure cylinders on job site under same conditions as concrete which they represent.

.1 Cost of testing additional cylinders that comply with contract specifications will be paid for by the owner.

.2 Cost of testing additional cylinders that do not comply with contract specifications will be paid for by the contractor.

.5 Inspection and/or testing by Departmental Representative will not augment or replace Contractor Quality Control, nor relieve him of contractual responsibilities.

2.9 FINISHING & PATCHING

.1 To CSA-A23.1 and as specified herein:

.1 Slab & Floor surfaces: To CSA A23.1 (Class A) hand screeded and trowel finished as follows:

.1 Interior or non-air-entrained concrete: Two or more passes of the trowel shall be made at suitable time intervals to obtain a dense, hard, smooth surface free of trowel marks.

.2 Exterior or air-entrained concrete: One or more passes of a magnesium float or concrete broom shall be made at suitable time intervals to obtain a level finish free of float marks.

.2 Formed surfaces: To CSA A23.1-04 Clause 7.7.

2.10 CURING

.1 Cure and protect concrete in accordance with CSA-A23.1.

.2 Do not use curing compounds where bond is required by subsequent pours or topping.

2.11 FORM REMOVAL

.1 Forms shall not be removed until removal operations will cause no damage to concrete surfaces.

.2 See Clause 11 CSA-A23.1 for specific requirements.

2.12 FLOOR PATCHING

.1 Patch existing concrete floors level and flush with surrounding surfaces as indicated on contract drawings in strict accordance with manufacturer's written recommendations.

.1 Sawcut edges of repair area to minimum 6mm below topping thickness.

.2 Apply epoxy bonding agent to existing concrete surface.

.3 Apply rapid setting patching mortar. Note recommendations regarding curing to avoid surface cracking.

END OF SECTION

General

1.1 **RELATED SECTIONS**

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 03 30 00 - Cast-in-Place Concrete.

.4 Section 04 05 12 - Mortar and Masonry Grout.

.5 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.6 Section 04 22 00 - Concrete Unit Masonry.

.7 Section 05 50 00 - Metal Fabrications.

.8 Section 07 95 13 - Expansion Joint Cover Assembles.

.9 Section 07 21 13 - Board Insulation.

.10 Section 07 92 10 - Joint Sealing.

1.2 **REFERENCES**

.1 Canadian Standards Association (CSA International).

.1 CSA-A165 Series-94(R2000), Standards on Concrete Masonry Units.

.2 CSA A179-94(R1999), Mortar and Grout for Unit Masonry.

.3 CSA-A371-94 (R1999), Masonry Construction for Buildings.

1.3 **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.

1.4 **QUALITY ASSURANCE**

.1 Test Reports.

.1 Certified test reports showing compliance with specified performance characteristics and physical properties.

.2 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.

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Deliver materials to job site in dry condition.

.2 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.

1.6 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials.

1.7 **SITE CONDITIONS**

.1 Site Environmental Requirements.

.1 Cold weather requirements.

.1 Supplement Clause 5.15.2 of CSA-A371 with following requirements.

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

.2 Maintain ambient temperature between 5 degrees C and 50 degrees C and protect site from windchill.

.2 Hot weather requirements.

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

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

Products

1.8 **MATERIALS**

.1 Masonry materials are specified in Related Sections.

Execution

1.9 **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.

1.10 **PREPARATION**

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

.2 Bracing approved by Departmental Representative.

1.11 **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.

1.12 **CONSTRUCTION**

.1 Exposed masonry.

.1 Remove chipped, cracked, and otherwise damaged units, in accordance with CSA A-165, Clause 82.1, 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 Strike flush joints concealed in walls and joints in walls to receive plaster, tile, insulation, or other applied material except paint or similar thin finish coating.

.3 Cutting.

.1 Cut out for electrical switches, outlet boxes, and other recessed or built-in objects.

.2 Make cuts straight, clean, and free from uneven edges.

.4 Building-In.

.1 Build in items required to be built into masonry.

.2 Prevent displacement of built-in items during construction. Check plumb, location and alignment frequently, as work progresses.

.3 Brace door jambs to maintain plumb. Fill spaces between jambs and masonry with mortar.

.5 Support of loads.

.1 Use 35 MPa concrete to Section 03 30 00 - Cast-in-Place Concrete, where concrete fill is used in lieu of solid units.

.2 Use grout to CSA A179 where grout is used in lieu of solid units.

.3 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 Control joints.

.1 Construct continuous control joints as indicated.

.9 Expansion joints.

.1 Build-in continuous expansion joints as indicated.

.10 Interface with other work.

.1 Cut openings in existing work as indicated.

.2 Openings in walls: approved by Departmental Representative.

.3 Make good existing work. Use materials to match existing.

1.13 **SITE TOLERANCES**

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

1.14 **FIELD QUALITY CONTROL**

.1 Inspection and testing will be carried out by Testing Laboratory designated by Departmental Representative.

1.15 **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.

1.16 **PROTECTION**

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

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA-A23.1/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CAN/CSA A179-04, Mortar and Grout for Unit Masonry.

.3 CAN/CSA A371-04, Masonry Construction for Buildings.

.4 CAN/CSA-A3000-03, Cementitious Materials Compendium; CAN/CSA-A3002-03, Masonry and Mortar Cement.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

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

.2 Provide manufacturer's printed product literature, specifications and datasheets. Include product characteristics, performance criteria, and limitations.

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

.2 Manufacturer's Instructions:

.1 Provide manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

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

.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 and handles masonry mortar and grout materials in accordance with Section 01 61 00 - Common Product Requirements, supplemented as follows:

.1 Deliver pre-packaged, dry-blended mortar mix to project site in labelled plastic-lined bags each bearing name and address of manufacturer, production codes or batch numbers, and colour or formula numbers.

.2 Maintain mortar, grout and packaged materials clean, dry, and protected against dampness, freezing, traffic and contamination by foreign materials.

.2 Packaging Waste Management: remove for reuse.

1.5 SITE CONDITIONS

.1 Ambient Conditions: maintain materials and surrounding air temperature to:

.1 Minimum 5 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Maximum 32 degrees C prior to, during, and 48 hours after completion of masonry work.

.2 Weather Requirements: CAN/CSA A371.

Part 2 Products

2.1 MATERIALS

.1 Use same brands of materials and source of aggregate for entire project.

.2 Cement:

.1 Portland Cement: to CAN/CSA-A3000, Type GU - General use hydraulic cement (Type 10), gray colour.

.2 Masonry Cement: to CAN/CSA-A3002 and CAN/CSA A179, Type S.

.3 Mortar Cement: to CAN/CSA-A3002 and CAN/CSA A179, Type S.

.4 Packaged Dry Combined Materials for mortar: to CAN/CSA A179, Type S, using gray colour cement.

.3 Aggregate: supplied by one supplier.

.1 Fine Aggregate: to CAN/CSA A179, natural sand.

.2 Course Aggregate: to CAN/CSA A179.

.4 Water: clean and potable.

.5 Lime:

.1 Hydrated Lime: to CAN/CSA A179, Type S.

2.2 MORTAR MIXES

.1 Mortar for exterior masonry above grade:

.1 Mortar: type S based on proportion specifications.

.2 Mortar for interior masonry:

.1 Mortar: type S based on proportion specifications.

.3 Following applies regardless of mortar types and uses specified above:

.1 Mortar for grouted reinforced masonry: type S based on proportion specifications.

2.3 MORTAR MIXING

.1 Mix mortar ingredients in accordance with CAN/CSA A179 in quantities needed for immediate use.

.2 Maintain sand uniformly damp immediately before mixing process.

.3 Use a batch type mixer in accordance with CAN/CSA A179.

.4 Use mortar within 2 hours after mixing at temperatures of 32 degrees C, or 2-1/2 hours at temperatures under 5 degrees C.

2.4 GROUT MIXES

.1 Bond Beams: grout mix 10 to 15 MPa strength at 28 days; 200-250 mm slump; to CAN/CSA A179.

.2 Grout: Minimum compressive strength of 15 MPa at 28 days. Maximum aggregate size and grout slump: CAN/CSA A179.

2.5 GROUT MIXING

.1 Mix batched and delivered grout in accordance with CAN/CSA-A23.1 transit mixed.

.2 Mix grout ingredients in quantities needed for immediate use in accordance with CAN/CSA A179 coarse grout.

.3 Add admixtures in accordance with manufacturer's instructions; mix uniformly.

.4 Do not use calcium chloride or chloride based admixtures.

2.6 MIX TESTS

.1 Testing Mortar Mix:

.1 Test mortar to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA A179, for [mortar based on proportion specification. Test during construction for:

.1 Compressive strength.

.2 Consistency.

.3 Mortar aggregate ratio.

.4 Sand/cement ratio.

.5 Water content and water/cement ratio.

.6 Air content.

.7 Splitting tensile strength.

.2 Testing Grout Mix:

.1 Test grout to requirements of Section 01 45 00 - Quality Control, and in accordance with CAN/CSA A179, for grout based on proportion specification. Test prior to construction and during construction for:

.1 Compressive strength.

.2 Sand/cement ratio.

.3 Water content and water/cement ratio.

.4 Slump.

Part 3 Execution

3.1 EXAMINATION

.1 Request inspection of spaces to be grouted.

3.2 PREPARATION

.1 Apply bonding agent to existing concrete surfaces.

3.3 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.

3.4 CONSTRUCTION

.1 Do masonry mortar and grout work in accordance with CAN/CSA A179 except where specified otherwise.

3.5 MIXING

.1 Only electric motor mixers are permissible. Mixers run on hydrocarbons are not permitted, due to fumes.

.2 Clean all mixing boards and mechanical mixing machine between batches.

.3 Mortar must be weaker than the units it is binding.

.4 Contractor to appoint one individual to mix mortar, for duration of project. In the event that this individual must be changed, mortar mixing must cease until the new individual is trained, and mortar mix is tested.

3.6 MORTAR PLACEMENT

.1 Install mortar to manufacturer's instructions.

.2 Install mortar to requirements of CAN/CSA A179.

.3 Remove excess mortar from grout spaces.

3.7 GROUT PLACEMENT

.1 Install grout in accordance with manufacturer's instructions.

.2 Install grout in accordance with CAN/CSA A179.

.3 Work grout into masonry cores and cavities to eliminate voids.

.4 Do not install grout in lifts greater than 400 mm, without consolidating grout by rodding.

.5 Do not displace reinforcement while placing grout.

3.8 FIELD QUALITY CONTROL

.1 Site Tests, Inspection: in accordance with Section 04 05 00 - Common Work Results for Masonry supplemented as follows:

.1 Test and evaluate mortar prior to construction and during construction in accordance with CAN/CSA A179.

.2 Test and evaluate grout prior to construction and during construction to CAN/CSA A179; test in conjunction with masonry unit sections specified.

3.9 CLEANING

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

.2 Remove droppings and splashings using clean sponge and water.

.3 Clean masonry with low pressure clean water and soft natural bristle brush.

.4 Waste Management: separate waste materials for reuse and recycling.

3.10 PROTECTION OF COMPLETED WORK

.1 Cover completed and partially completed work not enclosed or sheltered with waterproof covering at end of each work day. Anchor securely in position.

.1 Mortar:

.1 Concrete Masonry Units: CMU.

END OF SECTION

General

1.1 **RELATED SECTIONS**

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 04 05 00 - Common Work Results for Masonry.

1.2 **REFERENCES**

.1 Canadian Standards Association (CSA International).

.1 CAN/CSA-A23.1/A23.2-00, Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete.

.2 CSA-A370-94(R1999), Connectors for Masonry.

.3 CSA-A371-94(R1999), Masonry Construction for Buildings.

.4 CSA G30.14-M1983(R1998), Deformed Steel Wire For Concrete Reinforcement.

.5 CAN/CSA G30.18-M92, Billet-Steel Bars for Concrete Reinforcement.

.6 CSA-S304.1-94(R2001), Masonry Design for Buildings.

.7 CSA W186-M1990(R1998), Welding of Reinforcing Bars in Reinforced Concrete Construction.

.8 CSA A179-94, Mortar and Grout For Unit Masonry.

1.3 **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 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.4 **QUALITY ASSURANCE**

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

1.5 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials.

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

Products

1.6 **MATERIALS**

.1 Vertical and horizontal reinforcement to 190 mm concrete block walls as follows:

.1 Vertical reinforcement: 15 M at maximum 800 mm centers into grout filled cores.

.2 Dowels: provide 15M vertical bars dowelled into supporting concrete elements. Dowels may by drilled and epoxy grouted into concrete but reinforcement must not be cut.

.2 Provide reinforced core fills as follows:
.1 Openings: Grout cores solid and reinforce with 1-15M each side adjacent to door, or other openings.
.2 Intersections: Grout cores solid and reinforce with 1-15M at each corner or wall intersection.

.3 Vertical reinforcing shall have a minimum clearance from the masonry and between bars of one bar diameter.

.4 Reinforcing bars may be cast into reinforced concrete walls/slab or drilled and grouted after concrete placement. Drilling and grouting or reinforcing bars shall be performed as follows:
.1 It is imperative that reinforcing bars must not be cut, particularly during drilling.

.2 Reinforcing bars shall be grouted into concrete using injection adhesive in strict accordance with manufacturer's published recommendations.

Bond Beams and Lintel Beams: Install reinforced concrete block lintels over openings up to 1800 mm wide in masonry where steel or reinforced concrete lintels are not specified. Install Bond Beams in Load bearing masonry walls at maximum 1200 mm spacing vertically.
.1 Bond and Lintel beams shall be filled with grout with 28 day compressive strength of 20 MPa.
.2 Bond and Lintel beams shall be reinforced with 2-15M reinforcing bars.
.3 Lintel beams shall extend minimum 400 mm on each side of opening.

.5 Solid courses: First two and last two courses of concrete block wall shall be grouted solid.

.6 Connectors: to CSA-A370 and CSA-S304.

.7 Corrosion protection: to CSA-S304, galvanized to CSA-S304 and CSA-A370.

.8 Injectable Adhesive: shall be hybrid adhesive formulated to include resin and hardener to provide optimal curing speed as well as high strength and stiffness.
.1 Acceptable product: Hilti HIT HY-150 (by Hilti Canada Ltd), or approved equivalent.

.9 Accessories:

.1 Bond breaker: 6 mil thick polyethylene film.

.2 Cleaning Compound: As recommended by respective concrete block manufacturers and having no harmful after effects or adverse chemical reactions.

.3 Control Joint Sealant: Multi-component, chemical-curing sealing compound having minimum of 40% polymer content and conforming to CAN/CGSB-19.24.
.1 Acceptable product: Duoflex NS (by Sika Canada Inc) or equivalent.

.4 Control Joint Filler (Backer Rod): Closed cell, extruded polyethylene non-outgassing plastic foam filler as recommended by sealant manufacturer. Joint filler shall be non-staining, compressible, self-restoring filler.

1.7 **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 Fabricate connectors in accordance with CSA-A370.

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

.4 Upon approval of Departmental Representative, weld reinforcement in accordance with CSA W186.

.5 Ship reinforcement and connectors, clearly identified in accordance with drawings.

1.8 **SOURCE QUALITY CONTROL**

.1 Upon request inform Departmental Representative of proposed source of material to be supplied.

Execution

1.9 **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.

1.10 **GENERAL**

.1 Supply and install masonry connectors and reinforcement in accordance with CSA-A370, CSA-A371, CAN/CSA-A23.1 and CSA-S304.1 unless indicated otherwise.

.2 Prior to placing mortar, obtain Departmental Representative's approval of placement of reinforcement and connectors.

.3 Supply and install additional reinforcement to masonry as indicated.

1.11 **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.

1.12 **GROUTING**

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

1.13 **ANCHORS**

.1 Supply and install metal anchors as indicated.

1.14 **LATERAL SUPPORT AND ANCHORAGE**

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

1.15 **MOVEMENT JOINTS**

.1 Reinforcement will not be continuous across movement joints unless otherwise indicated.

1.16 **FIELD TOUCH-UP**

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

1.17 **CLEANING**

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

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 CSA Group
- .1 CAN/CSA-A165 Series-04(R2009), CSA Standards on Concrete Masonry Units consists: A165.1, A165.2, A165.3.
- .2 CAN/CSA-A371-04(R2009), Masonry Construction for Buildings.
- .3 CSA S304.1-04(R2010), Design of Masonry Structures.

.2 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S101-07(R2010), Standard Methods of Fire Endurance Tests of Building Construction and Materials.

1.02 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for concrete masonry units and include product characteristics, performance criteria, physical size, finish and limitations.

1.03 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .1 Offload concrete unit masonry packages using equipment that will not damage the surfaces.
- .2 Do not use brick tongs to move or handle masonry.

2 PRODUCTS

2.01 MATERIALS

.1 Standard concrete block units Type CMU: to CAN/CSA-A165 Series (CAN/CSA-A165.1), and to be used at non-rated partitions.
- .1 Classification: H/15/C/M.
- .2 Dimensions Nominal: 200 mm wide x 200 mm high x 400 mm long.
- .3 Special shapes: provide purpose-made shapes for lintels, beams and bond beams. Provide additional special shapes as indicated.

.2 Fire rated concrete block units(CMU): to CAN/CSA-A165 Series (CAN/CSA-A165.1) as modified below. Fire rated concrete blocks are to be used at rated partitions such as stairwells.
- .1 Classification: H/15/B/M except as modified by fire resistance requirements specified below.
- .2 Fire resistant characteristics: aggregate used in units and

equivalent thickness of units to the National Building Code of Canada 2010, and in accordance with CAN/ULC-S101, for fire-resistance ratings indicated.

.3 Size: modular.

.4 Special shapes: provide purpose-made shapes for lintels and bond beams and provide additional shapes as indicated.

2.02 REINFORCEMENT

.1 Reinforcement in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing .

2.03 CONNECTORS

.1 Connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing .

2.04 MORTAR MIXES

.1 Mortar and mortar mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

2.05 GROUT MIXES

.1 Grout and grout mixes in accordance with Section 04 05 12 - Masonry Mortar and Grout.

2.06 CLEANING COMPOUNDS

.1 Cleaning compounds compatible with concrete unit masonry and in accordance with manufacturer's written recommendations and instructions.

2.07 TOLERANCES

.1 Tolerances for standard concrete unit masonry tolerances in accordance with CAN/CSA-A165.1, supplemented as follows:

.1 Maximum variation between units within specific job lot not to exceed 2 mm.

.2 No parallel edge length, width or height dimension for individual unit to differ by more than 2 mm.

.3 Out of square tolerance not to exceed 2 mm.

3 EXECUTION

3.01 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete unit masonry installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions

immediately upon discovery.

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

3.02 PREPARATION

.1 Protect adjacent finished materials from damage due to masonry work.

3.03 INSTALLATION

.1 Concrete block units:

.1 Bond: running.

.2 Coursing height: 200 mm for one block and one joint.

.3 Jointing: flush where exposed or where paint or other finish coating is specified.

3.04 REINFORCEMENT

.1 Install reinforcing in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.05 CONNECTORS

.1 Install connectors in accordance with Section 04 05 19 - Masonry Anchorage and Reinforcing.

3.6 MORTAR PLACEMENT

.1 Place mortar in accordance with Section 04 05 12 - Masonry Mortar and Grout.

3.07 GROUT PLACEMENT

.1 Place grout in accordance with Section 04 05 12 - Masonry Mortar and Grout.

3.08 CONSTRUCTION

.1 Cull out masonry units, in accordance with CAN/CSA-A165 and reviewed range of colour samples, with chips, cracks, broken corners, excessive colour and texture variation.

.2 Build in miscellaneous items such as bearing plates, steel angles, bolts, anchors, inserts, sleeves and conduits.

.3 Construct masonry walls using running bond unless otherwise noted.

.4 Build around frames previously set and braced. Fill behind hollow frames within masonry walls with mortar or grout and embed anchors.

.5 Fit masonry closely against electrical and plumbing outlets so collars, plates and covers overlap and conceal cuts.

.6 Install movement joints and keep free of mortar where indicated.

.7 Hollow Units: spread mortar setting bed from outside edge of face shells. Gauge amount of mortar on top and end of unit to create full joints, equivalent to shell thickness. Avoid excess mortar.

.8 Ensure compacted head joints. Use full or face-shell joint as indicated.

.9 Tamp units firmly into place.

.10 Do not adjust masonry units after mortar has set. Where resetting of masonry is required, remove, clean and reset units in new mortar.

.11 Tool exposed joints concave [weathered/raked for interior work]; strike concealed joints flush.

.12 After mortar has achieved initial set up, tool joints.

.13 Do not interrupt bond below or above openings.

.14 Include as part of the scope of work, new opening for the installation of new door D112 in the existing concrete block wall. Provide lintel in order to span opening.

3.9 REPAIR/RESTORATION

.1 Upon completion of masonry, fill holes and cracks, remove loose mortar and repair defective work.

3.11 CLEANING

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

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

.2 Standard Concrete Unit Masonry:

.1 Allow mortar droppings on masonry to partially dry then remove by means of trowel, followed by rubbing lightly with small piece of block. Clean wall surface with suitable brush or burlap.

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

3.12 PROTECTION

.1 Brace and protect concrete unit masonry in accordance with Section 04 05 00 - Common Work Results for Masonry.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 - Shop drawings, Product Data, Samples and Markups.

.2 Section - 09 91 23 Painting and Finishing.

1.2 REFERENCES

.1 ASTM International Inc.

- .1 ASTM A36/A36M-08, Standard Specification for Carbon Structural Steel.
- .2 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A325-07a, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- .4 ASTM A325M-08, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength, Metric.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-85.10-99, Protective Coatings for Metals.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturers Association (CPMA).

- .1 Handbook of the Canadian Institute of Steel Construction.
- .2 CISC/CPMA Standard 2-75, Quick-Drying Primer for use on Structural Steel.

.4 Canadian Standards Association (CSA International)

- .1 CSA G40.20/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.
- .3 CAN/CSA-S16-01(R2007), Limit States Design of Steel Structures.
- .4 CAN/CSA-S136-07, North American Specifications for the Design of Cold Formed Steel Structural Members.
- .5 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.5 Master Painters Institute

- .1 MPI-INT 5.1-08, Structural Steel and Metal Fabrications.

.6 The Society for Protective Coatings (SSPC) and National Association of Corrosion Engineers (NACE) International

- .1 NACE No. 3/SSPC SP-6-06, Commercial Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Provide drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.3 Fabricator Reports:

.1 Provide structural steel fabricator's affidavit stating that materials and products used in fabrication conform to applicable material and products standards specified and indicated.

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 in manufacturer's original, undamaged containers with identification labels intact.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.

.2 Shear connections:

.1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.

.2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

2.2 MATERIALS

.1 Structural steel: to CAN/CSA-G40.20/G40.21 Grade 350W.

.2 Anchor bolts: to CAN/CSA-G40.20/G40.21, Grade 300W.

.3 Bolts, nuts and washers: to ASTM A307.

.4 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.5 Shop paint primer: to SC/CPMA1.

.6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of [600] g/m^2.

2.3 FABRICATION

.1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

2.4 SHOP PAINTING

.1 Clean, prepare surfaces and shop prime structural steel in accordance with CAN/CSA-S16

.2 Clean members, remove loose mill scale, rust, oil, dirt and other foreign matter. Prepare surface according to SSPC-SP-6.

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

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

.5 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

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 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16.

.2 Welding: in accordance with CSA W59.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

3.3 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work, report discrepancies and potential problem areas Consultant for direction before commencing fabrication.

3.4 MARKING

.1 Mark materials in accordance with CSA G40.20/G40.21. Do not use die stamping. When steel is to be left in unpainted condition, place marking at locations not visible from exterior after erection.

.2 Match marking: shop mark bearing assemblies and splices for fit and match.

3.5 ERECTION

.1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 and in accordance with reviewed erection drawings.

.2 Field cutting or altering structural members: to approval of Departmental Representative.

.3 Clean with mechanical brush and touch up shop primer to bolts, rivets, welds and burned or scratched surfaces at completion of erection.

.4 Continuously seal members by continuous welds where indicated. Grind smooth.

3.6 FIELD QUALITY CONTROL

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

.2 Provide safe access and working areas for testing on site, as required by testing agency and as authorized by Departmental Representative.

.3 Submit test reports to Departmental Representative.

3.7 FIELD PAINTING

.1 Paint in accordance with Section 09 91 23.

.1 Touch up damaged surfaces and surfaces without shop coat with primer to NACE No.3/SSPC-SP-6 except as specified otherwise. Apply in accordance: MPI Architectural Painting Specification Manual.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 31 00 - Steel Deck.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.40-97, Anticorrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.105-M91, Quick Drying Primer.
- .3 CAN/CGSB-85.10-99, Protective Coatings for Metals.
- .4 CAN/CGSB-85.100-93, Painting.

.2 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA)

- .1 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.
- .2 CISC/CPMA 1-73a, Quick-Drying, One-Coat Paint for Use on Structural Steel.

.3 Canadian Standards Association (CSA International)

- .1 CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CAN/CSA-S16-01, Limit States Design of Steel Structures.
- .3 CSA-S136-94(R2001), Cold Formed Steel Structural Members.
- .4 CSA-W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA-W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 CSA-W59-M1989(R2001), Welded Steel Construction (Metal Arc Welding) Metric.

1.3 DESIGN OF STEEL JOISTS AND BRIDGING

.1 Design steel joists and bridging to carry loads indicated in joist schedule shown on drawings in accordance with CAN/CSA-S16.

.2 Design joists and anchorages for uplift forces as indicated.

.3 Ensure joists are manufactured to consider load effects due to fabrication, erection and handling.

.4 Limit roof joist deflection due to specified live load to L/180 of span and deflection due to specified total load to L/240 of span.

.5 Submit 4 copies of calculations and joist design drawings for typical joists for Engineer approval and review at least 4 weeks prior to fabrication and/or delivery.

1.4 SHOP DRAWINGS

.1 Submit shop details and erection drawings in accordance with Section 01 33 00 - Submittal Procedures.

.2 Submit drawings stamped and signed by qualified professional engineer licensed in province of Ontario, Canada.

.3 Indicate on erection drawings, relevant details such as joist mark, depth, spacing, bridging lines, bearing, anchorage and details.

.4 Provide particulars, on shop drawings, relative to joist geometry, framed openings, splicing details, bearing and anchorage. Include member size, properties, specified and factored member loads, and stresses under various loadings, deflection and camber.

Part 2 Products

2.1 MATERIALS

.1 Structural steel: to CSA-G40.20/G40.21.

.2 Welding materials: to CSA-W59 with CSA-W59S1.

.3 Shop paint primer: to CAN/CGSB-1.40, CAN/CGSB-1.105, CISC/CPMA-1, CISC/CPMA-2.

2.2 FABRICATION

.1 Fabricate steel joists and accessories as indicated in accordance with CAN/CSA-S16.1 and in accordance with approved and reviewed shop drawings.

.2 Weld in accordance with CSA-W59 and with CSA-W59S1.

.3 Provide diagonal and horizontal bridging and anchorages as indicated.

2.3 SHOP PAINTING

.1 Clean, prepare and shop prime surfaces of steel joists to CAN/CSA-S16 CAN/CGSB-85.100.

.2 Clean members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare surfaces in accordance with SSPC SP1 brush blast.

.3 Apply one coat of CISC/CPMA 2 primer to steel surfaces to achieve maximum dry film thickness of .065 mm to .080 mm except:

.1 Surfaces to be encased in concrete.

.2 Surfaces to receive field installed stud shear connectors and steel decks.

.3 Surfaces and edges to be field welded.

.4 Faying surfaces of friction-type connections.

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

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

.6 Strip paint bolts, nuts, sharp edges and corners before prime coat is dry.

Part 3 Execution

3.1 GENERAL

.1 Structural steel work: in accordance with CAN/CSA-S16.

.2 Welding: in accordance with CSA-W59 and with CSA-W59S1.

.3 Companies to be certified under Division 1 or 2.1 of CSA-W47.1 for fusion welding and/or CSA-W55.3 for resistance welding.

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

3.2 CONNECTION TO EXISTING WORK

.1 Verify dimensions and condition of existing work; report discrepancies and potential problem areas to Engineer for direction before commencing fabrication.

3.3 ERECTION

.1 Erect steel joists and bridging as indicated in accordance with CAN/CSA-S16.

.2 Complete installation of all bridging and anchorages before placing construction loads on joists.

.3 Field cutting or altering joists or bridging that are not shown on shop drawings: to approval of Departmental Representative.

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

3.4 FIELD PAINTING

.1 Paint: in accordance with Section 09 91 23 - Interior Painting.

.2 Touch up all damaged surfaces and surfaces without shop coat with CISC/CPMA-1, CISC/CPMA-2, CAN/CGSB-1.105, CAN/CGSB-1.40 in accordance with manufacturers' recommendations to CAN/CGSB-85.10.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 05 21 00 - Steel Joist Framing.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

- .1 ASTM A653/A653M-01a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- .2 ASTM A792/A792M-01a, Specification for Steel Sheet, 55%Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

- .1 CSA C22.2 No.79-1978(R1999), Cellular Metal and Cellular Concrete Floor Raceways and Fittings.
- .2 CAN/CSA-S16.1-94(R2000), Limit States Design of Steel Structures.
- .3 CSA-S136-94(R2001), Cold Formed Steel Structural Members.
- .4 CSA W47.1-92(R2001), Certification of Companies for Fusion Welding of Steel Structures.
- .5 CSA W55.3-1965(R1998), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
- .6 CSA W59-M1989(R2001), Welded Steel Construction, (Metal Arc Welding) [Metric].

.4 Canadian Sheet Steel Building Institute (CSSBI)

- .1 CSSBI 10M-96, Standard for Steel Roof Deck.
- .2 CSSBI 12M-96, Standard for Composite Steel Deck.

1.3 DESIGN REQUIREMENTS

.1 Design steel deck using limit states design in accordance with CSA S136 and, CSSBI 10M and CSSBI 12M.

.2 Steel deck and connections to steel framing to carry dead, live and other loads including lateral loads, diaphragm action, composite deck action, and uplift as indicated.

.3 Deflection under specified live load not to exceed 1/180 of span, except that when gypsum board ceilings are hung directly from deck, live load deflection not to exceed 1/360 of span.

.4 Where vibration effects are to be controlled as indicated, dynamic characteristics of decking system to be designed to be in accordance with CAN/CSA-S16.1, Appendix 'G'.

1.4 SHOP DRAWINGS

.1 Submit shop drawings erection and shoring drawings in accordance with Section 01 33 00 - Submittal Procedures.

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

.3 Submit design calculations if requested by Departmental Representative.

.4 Indicate deck plan, profile, dimensions, base steel thickness, metallic coating designation, connections to supports and spacings, projections, openings, reinforcement details and accessories.

.5 Indicate details of temporary shoring of steel deck, such as location, time and duration of placement and removal of shoring for concrete fill decks.

Part 2 Products

2.1 MATERIALS

.1 Zinc-iron Alloy (ZF) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75 coating.

.2 Decks to be painted: zinc-iron alloy coated decks suitable for finish painting.

.3 Zinc (Z) coated steel sheet: to ASTM A653/A653M structural quality Grade 230, with ZF75 coating.

.4 Primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.2 TYPES OF DECKING

.1 Steel roof deck: 38 mm maximum deep profile, interlocking side laps.

.2 Minimum nominal thickness (gauge) as indicated on Contract Drawings.

.3 Acceptable material: CANAM P-3615 or approved equivalent.

Part 3 Execution

GENERAL

.1 Design, detail, fabricate and erect in accordance with CAN/CSA-S136 and CSSBI 10M.

.2 Welding: in accordance with CSA W59, except where specified otherwise.

.3 Companies to be certified under Division 1 or 2.1 of CSA W47.1 for fusion welding of steel and/or CSA W55.3 for resistance welding.

3.2 ERECTION

.1 Erect steel deck as indicated and in accordance with CSA S136 and CSSBI 10M.

.2 Lap ends: to 50 mm minimum, or as recommended by deck manufacturer.

.3 Deck must be continuous over a minimum of three spans (i.e. four supports).

.4 Deck connections shall be:

1. Transverse weld to all supporting members with 20mm diameter fusion welds in a 39/9 pattern (9 welds per 36" sheet width).
2. Button punch side laps at 230mm centers.
3. Perimeter welds at maximum 150mm centers.

.5 Weld to intermediate supports between joists on beam lines.

.6 Provide continuous L76x76x6.4 supporting decking edges unless noted otherwise.

.7 Immediately after deck is permanently secured in place, touch up metallic coated top surface with compatible primer where burned by welding.

3.3 CLOSURES

.1 Install closures in accordance with approved details to ensure effective closures against weather, thermal and acoustic effects.

.2 For details not indicated, follow manufacturer's recommendations.

3.4 OPENINGS AND AREAS OF CONCENTRATED LOADS

.1 No reinforcement required for openings cut in deck which are smaller than 100 mm square.

.2 Frame deck openings with any one dimension between 100 to 300 mm as recommended by manufacturer, except as otherwise indicated.

.3 For deck openings with any one dimension greater than 300 mm and for areas of concentrated load, reinforce in accordance with structural framing details, except as otherwise indicated.

3.5 CONNECTIONS

.1 Install connections in accordance with CSSBI recommendations as indicated.

END OF SECTION

General

1.1 **RELATED SECTIONS**

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 04 05 19 - Masonry Anchorage and Reinforcing.

.3 Section 04 05 00 - Common Work Results for Masonry.

.4 Section 05 12 23 - Structural Steel.

.5 Section 05 21 00 - Steel Joist Framing.

.6 Section 05 31 00 - Steel Deck.

.7 Section 05 51 29 - Metal Stairs and Internal Ladder for Roof Hatch.

.8 Section 09 91 23 - Interior Painting.

1.2 **REFERENCES**

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Steamless.

.2 ASTM A269-02, Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.181-92, Ready-Mixed, Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)

.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.

.2 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA W48-01, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.4 CSA W59-1989(R2001),Welded Steel Construction (Metal Arc Welding) (Imperial Version).

1.3 **SUBMITTALS**

.1 Product Data:

.1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings

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

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

1.4 **QUALITY ASSURANCE**

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

1.5 **DELIVERY, STORAGE, AND HANDLING**

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials.

1.6 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials.

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

Products

1.7 **MATERIALS**

.1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.

.2 Steel pipe: to ASTM A53/A53M extra strong, galvanized finish.

.3 Stainless Steel tube: to ASTM A269, type 302 commercial grade, seamless welded with AISI No. 4 finish.

.4 Welding materials: to CSA W59.

.5 Welding electrodes: to CSA W48 Series.

.6 Bolts and anchor bolts: to ASTM A307.

.7 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.

1.8 **FABRICATION**

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

.2 Use self-tapping shake-proof round headed screws on items requiring assembly by screws or as indicated.

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

.4 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

1.9 **FINISHES**

.1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m^2 to CAN/CSA-G164.

.2 Chromium plating: chrome on steel with plating sequence of 0.009 mm thickness of copper 0.010 mm thickness of nickel and 0.0025 mm thickness of chromium.

.3 Shop coat primer: to CAN/CGSB-1.40.

.4 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

1.10 **ISOLATION COATING**

.1 Isolate aluminum from following components, by means of bituminous paint:

.1 Dissimilar metals except stainless steel, zinc, or white bronze of small area.

.2 Concrete, mortar and masonry.

.3 Wood.

1.11 **SHOP PAINTING**

.1 Apply one shop coat of primer to metal items, with exception of galvanized or concrete encased items.

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

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

1.12 **CURVED STEEL CANOPY**

.1 Steel plates: prime painted, sizes indicated. Provide support coupling for attaching steel tubing to canopy and wall.

.2 Weld couplings to steel canopy profile as indicated.

.3 Finish: shop painted.

1.13 **ACCESS LADDERS**

.1 Stringers: 50 x 9 x 6 mm thick, steel.

.2 Steel Rungs: 20 mm diameter, welded to stringers at 300 mm on centre.

.3 Brackets: sizes and shapes as indicated, weld to stringers at 450 mm on centre, complete with fixing anchors.

.4 Finish: shop painted.

Execution

1.14 **ERECTION**

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Provide components for building by other sections in accordance with shop drawings and schedule.

.6 Make field connections with bolts to CAN/CSA-S16.1, or weld.

.7 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

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

1.15 **ACCESS LADDERS**

.1 Install access ladders in location as indicated.

.2 Erect ladder 150 mm clear of wall on bracket supports.

1.16 **LINTELS**

.1 Install lintels in locations of openings as indicated.

1.17 **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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - General Instructions.

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

.3 Section 09 91 23 - Interior Painting.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

- .1 ASTM A53/A53M-02, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A307-02, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A325M-02, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.2 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.
- .2 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.
- .3 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel.
- .4 CAN/CSA-G164-M92(R1998), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 Canadian Standards Association (CSA International)

- .1 CSA W59-1989(R2001), Welded Steel Construction (Metal Arc Welding/Imperial Version).

.4 National Association of Architectural Metal Manufactures (NAAMM)

- .1 AMP 510-92, Metal Stair Manual.

.5 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements: design guardrails and connections to NBC vertical and horizontal love load requirements.

.2 Design metal stair, balustrade and landing construction and connections to NBC vertical and horizontal live load requirements.

.3 Detail and fabricate stairs to NAAMM Metal Stairs Manual.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with General Instructions - Submittal Procedures.

.2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with General Instructions - Submittal Procedures. Indicate VOC's:

.1 For finishes, coatings, primers and paints.

.2 Shop Drawings

.1 Submit shop drawings in accordance with General Instructions - Submittal Procedures.

.2 Indicate construction details, sizes of steel sections and thickness of steel sheet.

.3 Submit shop drawing bearing stamp of a qualified professional engineer registered in Province of Ontario.

1.5 QUALITY ASSURANCE

.1 Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

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

Part 2 Products

2.1 MATERIALS

.1 Steel sections: to CAN/CSA-G40.20/G40.21 Grade 350 W.

.2 Steel pipe: to ASTM A53/A53M, standard weight, schedule 40 seamless black.

.3 Welding materials: to CSA W59.

.4 Bolts: to ASTM A307.

.5 High strength bolts: to ASTM A325M.

2.2 FABRICATION

.1 Fabricate to NAAMM, Metal Stair Manual.

.2 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.3 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.

.4 Grind or file exposed welds and steel sections smooth.

.5 Shop fabricate stairs in sections as large and complete as practicable.

2.3 STEEL PAN STAIRS

.1 Fabricate stairs with open riser 50 mm steel V Pan steel construction.

.2 Form treads from 3 mm thick steel plate. Secure treads welded to stringers.

.3 Form stringers from C 250 x 23.

.4 Form landings from 3 mm thick steel plate, reinforced by C250 x 23 mm spaced as shown.

.5 Extend stringers around mid landings to form steel base.

.6 Close ends of stringers where exposed.

2.4 PIPE/TUBING BALUSTRADES

.1 Construct balusters and handrails from steel pipe.

.2 Cap and weld exposed ends of balusters and handrails.

.3 Terminate at abutting wall with end flange.

2.5 FINISHES

.1 Galvanizing: hot dipped galvanizing with zinc coating 600g/$m^2$to CAN/CSA-G164.

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

.3 Zinc primer: zinc rich, ready mix to CAN/CGSB-1.181.

2.6 SHOP PAINTING

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.

.2 Apply one coat of shop primer except interior surfaces of pans.

.3 Apply two coats of primer of different colours to parts inaccessible after final assembly.

.4 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.5 Do not paint surfaces to be field welded.

Part 3 Execution

3.1 INSTALLATION

.1 Install in accordance with NAAMM, Metal Stair Manual.

.2 Install guardrails in accordance with NBC and as per details on drawings.

.3 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting stairs to structure.

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

.5 Do welding work in accordance with CSA W59 unless specified otherwise.

.6 Touch up shop primer to bolts, welds, and burned or scratched surfaces at completion of erection.

3.2 CLEANING

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

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

END OF SECTION

General

1.1 **REFERENCES**

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM A653/A653M-05a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.

.2 ASTM D1761-88(2000), Standard Test Methods for Mechanical Fasteners in Wood.

.2 Canadian Standards Association (CSA International)

.1 CSA A123.2-03, Asphalt Coated Roofing Sheets.

.2 CAN/CSA-A247-M86, 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 O141-05, Softwood Lumber.

.6 CSA O151-04, Canadian Softwood Plywood.

.3 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2005.

1.2 **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.

1.3 **DELIVERY, STORAGE, AND HANDLING**

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

Products

1.4 **FRAMING AND STRUCTURAL MATERIALS**

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

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

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

.1 S2S is acceptable.

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

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

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

1.5 **ACCESSORIES**

.1 Nails, spikes and staples: to CSA B111.

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

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

1.6 **FASTENER FINISHES**

.1 Galvanizing: to ASTM A653, use galvanized fasteners for exterior work.

1.7 **WOOD PRESERVATIVE**

.1 SCAQMD Rule #1113 - Architectural Coatings.

.2 Maximum allowable VOC limit 350g/L.

Execution

1.8 **PREPARATION**

.1 Store wood products.

1.9 **INSTALLATION**

.1 Comply with requirements of NBC 2005 Part 9 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

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

.4 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized steel fasteners.

.5 Install sleepers as indicated.

.6 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

1.10 **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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC)

.1 AWMAC Quality Standards for Architectural Woodwork 1994.

.2 Canadian Standards Association (CSA)

.1 CSA B111-74(R1998), Wire Nails, Spikes and Staples.

.2 CSA O112.4-M1977(R1999), Standards for Wood Adhesives.

.3 CSA O121-M89(R1998), Douglas Fir Plywood.

.3 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2000.

1.3 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.

.3 Indicate materials, thicknesses, finishes and hardware.

.4 Indicate locations of service outlets in casework, and connections, attachments, anchorage and location of exposed fastenings.

1.4 DELIVERY, STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials.

.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.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Do not burn scrap at the project site.

Part 2 Products

2.1 MATERIALS

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

.1 CAN/CSA-O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 AWMAC premium grade, moisture content as specified.

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

.3 Laminated plastic for flatwork: to NEMA LD3, Grade VGL, Type HD, 1.2 mm thick; based on integral colour throughout, colour range with furniture finish.

.4 Laminated plastic backing sheet: Grade BK, Type HD not less than 0.5 mm thick or same thickness and colour as face laminate.

.5 Wood screws: stainless steel, type and size to suit application.

.6 Splines: wood.

.7 Sealant: Section 07 92 10.

.8 Laminated plastic adhesive: urea resin adhesive to CSA O112.5.

2.2 MANUFACTURED UNITS

.1 Vanities.

.1 Fabricate caseworks to AWMAC premium quality grade.

.2 Framing pine species, NLGA premium grade.

.3 Tops.

Hardwood plywood:

.1 Thickness: 19 mm.

.2 Number of plies: 7.

.3 Face veneer: Douglas fir.

.4 Fronts.

.1 Douglas fir plywood premium grade, square edge, 19 mm thick.

2.3 FABRICATION

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

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

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

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

.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.

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 vanities.

.4 Use draw bolts in countertop 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 vanity top and adjacent wall finish, apply small bead of sealant.

.7 Install vanities where shown on drawings.

3.2 CLEANING

.1 Clean vanities surfaces and fronts.

3.3 PROTECTION

.1 Protect millwork from damage until final inspection.

3.4 SCHEDULES

.1 Refer to drawings.

END OF SECTION

General

1.1 **REFERENCES**

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C612-04, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.

.2 ASTM E96/E96M-05, Standard Test Methods for Water Vapour Transmission of Materials.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 71-GP-24M-77(R1983), Adhesive, Flexible, for Bonding Cellular polystyrene Insulation.

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

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

.1 Material Safety Data Sheets (MSDS).

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 insulation products and adhesives.

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.3 **QUALITY ASSURANCE**

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for reuse and recycling.

Products

1.5 **INSULATION**

.1 Extruded polystyrene (XPS): to CAN/ULC-S701 (for cavity applications over masonry backup).

.1 Type: 3.

.2 Thickness: as indicated, RSI of 0.88 per 25.4 mm.

.3 Edges: shiplapped.

.4 Size: 1220 x 2440 mm.

.2 Mineral fibre board: to CAN/ULC-S702.

.1 Type: 3.

.2 Density: 48 kg/m^3.

.3 Surfaces: unsurfaced.

.4 Thickness: as indicated.

.5 Size: 610 x 1220 mm.

.6 Breather membrane for type 2: minimum permeance 300 ng/(Pa.s.m^2).

.7 Vapour barrier for type 3: maximum permeance 60 ng/(Pa.s.m^2).

1.6 **ADHESIVE**

.1 Adhesive (for polystyrene): to CGSB 71-GP-24.

.1 Type: only as approved by insulation manufacturer, and that has a perm rating of 2.01 metric perm. Provide primer as required.

1.7 **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.

Execution

1.8 **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.

1.9 **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 other protrusions.

.4 Keep insulation minimum 75 mm from heat emitting devices.

.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 and approved by Departmental Representative.

1.10 **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.

1.11 **RIGID INSULATION INSTALLATION**

.1 Apply adhesive to substrate by notched trowel in accordance with manufacturer's recommendations.

.2 Imbed insulation boards into vapour barrier type adhesive, applied as specified, prior to skinning of adhesive.

.3 In addition to adhesive, install mineral fibre insulation boards with insulation clips and disk, 2 per 600 x 1200 mm board minimum, fit boards tight, and cut off fastener spindle 3 mm beyond disk.

.4 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.

1.12 **PERIMETER FOUNDATION INSULATION**

.1 Interior application: extend boards vertically below bottom of finish floor slab as indicated] , installed on inside face of perimeter foundation walls.

.2 Under slab application: extend boards in from perimeter foundation wall as indicated. Lay boards on level compacted fill.

1.13 **CAVITY WALL INSTALLATION**

.1 Install polystyrene insulation boards on outer surface of inner wythe of wall cavity on bed of adhesive.

1.14 **ROOF INSTALLATION**

.1 Refer to Section 07 52 00.

1.15 **CLEANING**

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

END OF SECTION

General

1.1 **REFERENCES**

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM C553-02, Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.

.2 Underwriters Laboratories of Canada (ULC)

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

.2 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.4 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate waste materials for reuse and recycling.

Products

1.5 **INSULATION**

.1 Batt and blanket mineral fibre: to ASTM C553.

.1 Type: 1.

.2 Thickness: as indicated.

1.6 **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.

Execution

1.7 **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.

1.8 **INSULATION INSTALLATION**

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces and to ASTM C1320.

.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.

.5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

1.9 **CLEANING**

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

END OF SECTION

General

1.1 **RELATED SECTIONS**

.1 Section 01 45 00 - Quality Control.

1.2 **REFERENCES**

.1 Canadian Urethane Foam Contractors' Association Inc. (CUFCA)

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S101-1989, Fire Endurance Tests of Building Construction and Materials.

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

.3 CAN/ULC-S705.1-01, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Material Specification.

.4 CAN/ULC-S705.2-02, Standard for Thermal Insulation Spray Applied Rigid Foam, Medium Density, Installer's Responsibilities-Specification.

1.3 **TEST REPORTS**

.1 Submit test reports, verifying qualities of insulation meet or exceed requirements of this specification, in accordance with Section 01 45 00 - Quality Control.

.2 Submit test reports in accordance with CAN/ULC-S101 for fire endurance and CAN/ULC-S102 for surface burning characteristics.

1.4 **QUALITY ASSURANCE**

.1 Applicators to conform to CUFCA Quality Assurance Program.

1.5 **SAFETY REQUIREMENTS**

.1 Protect workers as recommended by CAN/ULC-S705.2 and manufacturer's recommendations:

.1 Workers must wear gloves, dust masks, long sleeved clothing, eye protection when applying foam insulation.

.2 Workers must not eat, drink or smoke while applying foam insulation.

1.6 **PROTECTION**

.1 Ventilate area to receive insulation by introducing fresh air and exhausting air continuously during and 24 hour after application to maintain non-toxic, unpolluted, safe working conditions.

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

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

1.7 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials.

1.8 **ENVIRONMENTAL REQUIREMENTS**

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

Products

1.9 **MATERIALS**

.1 Insulation: spray polyurethane to CAN/ULC-S705.1.

.2 Primers: in accordance with manufacturer's recommendations for surface conditions.

Execution

1.10 **APPLICATION**

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

.2 Apply sprayed foam insulation in thickness as indicated.

END OF SECTION

1 GENERAL

1.01 REFERENCES

.1 The Aluminum Association, Inc. (AA)
  .1 AA DAF45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International (ASTM)
  .1 ASTM A 167-99(2004), Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  .2 ASTM A 240/A 240M-05a, Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
  .3 ASTM A 480/A 480M-05, Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
  .4 ASTM D 523-89(R1999), Standard Test Method for Specular Gloss.
  .5 ASTM D 822-01, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.3 Canadian General Standards Board (CGSB)
  .1 CGSB 19-GP-14M-76(R1984), Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing.

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

1.02 DESIGN REQUIREMENTS

.1 Design metal cladding to allow for thermal movement of component materials caused by variation in ambient temperature range of 80 degrees C without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects.

.2 Maximum deviation from vertical and horizontal alignment of erected panels: 1 to 1000.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
  .1 Submit manufacturer's printed product literature for cladding system materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  .2 Submit two copies WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

.3 Shop Drawings:
  .1 Shop drawings: submit drawings stamped and signed by professional engineer registered or licensed in Province Ontario, Canada.
  .2 Indicate dimensions and thickness of panels, fastening and anchoring

methods, detail and location of joints and gaskets, thermal movement provision, wall openings, head, jamb and sill details, materials and finish, compliance with design criteria and requirements of related work.

.4 Samples:
.1 Submit duplicate 100 x 100 mm samples of wall system, representative of materials, finishes and colours.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
.1 Certificates: submit certificates signed by manufacturer certifying that composite wall panels comply with specified performance characteristics and physical properties.
.2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
.3 Manufacturer's Field Reports: submit to manufacturer's written reports within [3] days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.04 QUALIFICATIONS

.1 Manufacturer: company specializing in producing composite wall panels [with 5 years experience with sufficient capacity to produce and deliver required units without causing delay in work.

.2 Installer: person specializing in composite wall panel installations with 5 years experience approved by manufacturer.

.3 Mock-ups: construct mock-ups in accordance with Section [01 45 00 - Quality Control] and to requirements supplemented as follows:
.1 Provide mock-up for evaluation of surface finishes and workmanship.
.2 Provide initial production units for job-site assembly with other materials for [review] [approval].
.3 Co-ordinate type and location of mock-ups with project requirements.
.4 Accepted units will be used as standard for acceptance of production units.

1.05 DELIVERY, STORAGE AND HANDLING

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

.2 Deliver, store and protect material in accordance with panel manufacturer's recommendations.

.3 Do not expose panels with strippable film to direct sunlight or extreme heat.

.4 Waste Management and Disposal:
.1 Separate waste materials for reuse and recycling.

2 PRODUCTS

2.01 MATERIALS

.1 Composite panels:
- .1 Thickness: fabricated from 6 mm (22 ga) steel. Overall panel thickness is 75mm (3").
- .2 Core: closed cell polyisocyanurate insulation.
- .3 Flat (FL40) profile wall system by Vic West or equivalent (custom order).
- .4 Double interlocking tongue and groove joints with concealed fasteners.
- .5 Panel width: 1020 mm (40").
- .6 Panel length: to suit requirements, range from 2440 15,240 mm.

.2 Concealed sealants: one-component, butyl-polyisobutylene polymer base, solvent curing to CGSB 19-GP-14M.
- .1 Maximum VOC limit 250 g/L.

.3 Exposed sealants: one-component, silicone base, solvent curing, colour to match panel.
- .1 Maximum VOC limit 250 g/L.

.4 Accessories:
- .1 Fasteners: steel extrusion, type, concealed in accordance with manufacturer's recommendations.

2.03 FABRICATION

.1 Composition: two sheets of prefinished steel sandwiching core of polyisocyanurate insulation formed in continuous process with no glues or adhesives.

.2 Factory fabricated.

.3 Tolerances:
- .1 Panel bow: maximum 0.8% of panel dimension in width and length.
- .2 Panel dimensions: where final dimensions cannot be established by field measurement before completion of panel manufacturing, make allowance for field adjustments as recommended by manufacturer.
- .3 Panel lines, breaks and angles: sharp, true and surfaces free from warp or buckle.

2.04 PAINTED FINISHES

.1 Prefinished sheet with factory applied polyvinylidene fluoride. Wall panel finish is to match the existing insulated panel system on the building which has a smooth finish.
- .1 Class F1S.
- .2 Colour is to match imperial white colour that is on the building..
- .3 Specular gloss: 30 units +/- in accordance with ASTM D 523.
- .4 Coating thickness: not less than 22 micrometres.
- .5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20% to ASTM D 822 as follows:
  - .1 Outdoor exposure period 2500 hours.

.2 Humidity resistance exposure period 5000 hours.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 EXAMINATION

.1 Before installation examine alignment of substrate and notify Departmental Representative in writing if substrate does not comply with requirements of panel installer.

3.03 INSTALLATION

.1 Install composite panels in accordance with manufacturer's written instructions and shop drawings.
- .1 Allow for thermal movement.
- .2 The prefinished wall system is a horizontal application, similar design to details shown on the drawings.

.2 Maintain following installation tolerances:
- .1 Maximum variation from plane or location shown on shop drawings: 10 mm/10 m of length and up to 20 mm/100 m.
- .2 Maximum deviation for vertical member: 3 mm in an 8.5 m run.
- .3 Maximum deviation for a horizontal member: 3 mm in an 8.5 m run
- .4 Maximum offset from true alignment between two adjacent members abutting end to end, in line: 0.75 mm.

.3 Remove strippable coating from panels as they are erected.

3.04 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
- .1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.05 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 06 10 00 - Rough Carpentry.

.4 Section 07 62 00 - Sheet Metal Flashings and Trim.

.5 Section 07 92 10 - Joint Sealing.

1.02 REFERENCES

.1 ASTM International Inc.
- .1 ASTM D 6162-00a, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fibre Reinforcements.
- .2 ASTM D 6163-00e1, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fibre Reinforcements.
- .3 ASTM D 6164-05, Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements.

.2 Canadian General Standards Board (CGSB)
- .1 CGSB 37-GP-56M-80b(A1985), Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing.
- .2 CAN/CGSB-51.33-M89, Vapour Barrier Sheet, Excluding Polyethylene, for Use in Building Construction.

.3 Canadian Roofing Contractors Association (CRCA)
- .1 CRCA Roofing Specifications Manual-1997 .

.4 Canadian Standards Association (CSA International)
- .1 CSA O151-[04], Canadian Softwood Plywood.

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

.6 Underwriters Laboratories' of Canada (ULC)
- .1 CAN/ULC-S704-[03], Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.

1.04 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Provide two copies of most recent technical roofing components data sheets describing materials' physical properties and include product

characteristics, performance criteria, physical size, finish and limitations.
.2 Provide two copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements:
.1 Primers.
.2 Asphalt.
.3 Sealers.
.4 Filter fabric.

.3 Provide shop drawings:
.1 Indicate flashing, tapered insulation details.

.2 Provide layout for tapered insulation.

.4 Manufacturer's Certificate: certify that products meet or exceed specified requirements.

.5 Test and Evaluation Reports: submit laboratory test report certifying compliance of bitumens and membrane with specification requirements.

.6 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

.7 Manufacturer's field report: in accordance with Section 01 45 00 - Quality Control.

1.05 QUALITY ASSURANCE

.1 Installer qualifications: company or person specializing in application of modified bituminous roofing systems with 5 years' experience approved by manufacturer.

1.06 FIRE PROTECTION

.1 Fire Extinguishers:
.1 Maintain one ULC labelled for A, B and C class protection.
.2 Size 4.5 kg on roof per torch applicator, within 6 m of torch applicator.

.2 Maintain fire watch for 1 hour after each day's roofing operations cease.

1.07 DELIVERY, STORAGE, AND HANDLING

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

.2 Storage and Handling Requirements:
.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.
.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.
.4 Remove only in quantities required for same day use.
.5 Place plywood runways over completed Work to enable movement of material and other traffic.
.6 Store sealants at +5 degrees C minimum.
.7 Store insulation protected from daylight and weather and deleterious materials.

.3 Packaging Waste Management: remove for reuse.

1.08 SITE CONDITIONS

.1 Ambient Conditions
.1 Do not install roofing when temperature remains below -18 degrees C for torch application, or -5 degrees C confirmed by manufacturers' recommendations for mop application.
.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.09 WARRANTY

.1 For Work of this Section 07 52 00 - Modified Bituminous Membrane Roofing, 12 months warranty period is extended to 60 months.

2 PRODUCTS

2.01 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. Provide written declaration to Departmental Representative stating that materials and components, as assembled in system, meet this requirement.

2.02 DECK COVERING

.1 Cementitious Board: to 15.9 mm thick.

2.03 DECK PRIMER

.1 Asphalt primer: to ASTM D 41.
.1 As per manufacturer recommendation.

2.04 VAPOUR RETARDER

.1 Self adhesive air/vapour barrier modified bitumen membrane.

2.05 MEMBRANE

.1 Base sheet: polyester fibres to ASTM D 6164.
.1 Styrene-Butadiene-Styrene (SBS) elastomeric polymer prefabricated

sheet, polyester reinforcement, having nominal weight of 180 g/mý.
.2 Type fully adhered.
.3 Class A - granule surfaced.
.4 Grade 1 - standard service.
.5 Top and bottom surfaces:
.1 sanded/polyethylene.
.6 Base sheet membrane properties: to CGSB 37-GP-56M.
.1 Strain energy (longitudinal/transversal): 9.0/7.0 kN/m.
.2 Breaking strength (longitudinal/transversal): 17.0/18.0 N/5 cm.
.3 Ultimate elongation (longitudinal/transversal): 60/65 %.
.4 Tear resistance: 85 N.
.5 Cold bending at -30 degrees C : no cracking.
.6 Softening point: ò 110 degrees C.
.7 Static puncture resistance: > 400.
.8 Dimensional Stability: -0.3 / 0.3 %.
.7 ULC certification: Class A.

.2 Cap sheet membrane: to ASTM D 6164.
.1 Styrene-Butadiene-Styrene(SBS) elastomeric polymer, prefabricated sheet, polyester reinforcement, having nominal weight of 250 g/mý.
.2 Type fully adhered.
.3 Class A-granule surfaced.
.1 Colour for granular surface: gray.
.4 Grade 1-standard service.
.5 Bottom surface polyethylene.
.6 Cap sheet membrane properties: to CGSB 37-GP-56M.
.1 Strain energy (longitudinal/transversal): 13.0/10.0 kN/m.
.2 Breaking strength (longitudinal/transversal): 25.0/16.0 kN/m.
.3 Ultimate elongation (longitudinal/transversal): 60/65 %.
.4 Tear resistance: 80 N.
.5 Cold bending at -30 degrees C: No cracking.
.6 Softening point: ò 110 degrees C.
.7 Static puncture resistance: > 400.
.8 Dimensional Stability: -0.2 / 0.2 %.
.7 ULC certification: Class A.

2.06 ADHESIVE

.1 Adhesive for securing overlay board and insulation: asphalt extended vulcanized adhesive, two component unit, consisting of two liquids mixed on site to produce pourable adhesive.

2.07 OVERLAY BOARD

.1 Overlay Board: 6 mm thick asphalt based recovery board with non-woven glass facers, as recommended by the membrane manufacturer.
.1 Install over insulation to provide torch safe surface.

2.08 BITUMEN

.1 Asphalt: to ASTM D 312, Type 3.

2.9 POLYISOCYANURATE INSULATION

.1 To CAN/ULC-S704, Type rigid roof insulation, flame spread classification: less than 500, minimum thickness at low point 50 mm and other thicknesses as indicated.

.2 Include tapered insulation to provide drainage slope as noted on the drawings.

2.10 SEALERS

.1 Sealants: Caulking - see Section 07 92 00 - Joint Sealants.

2.11 WALKWAYS

.1 Walkways to be 600 x 600 x70 mm thick, natural precast concrete, having non-slip finish, minimum weight per unit 45 kg, conforming to CSA A231.1.

.2 Pedestals: Pav-El 5X by Envirospec Inc. or equivalent. Provide levelling plates as required and provide pedestals at each corner of paving slab and splash pads. Provide Styrofoam High Load 60 under pedestals to build up height where required.

2.12 CARPENTRY

.1 Refer to Section 06 10 00.01 - Rough Carpentry.

2.13 CANT STRIPS

.1 Cut from prefabricated fibreboard material, to measure 140 mm on slope.

2.14 FASTENERS

.1 Covering to steel deck: No. 10 flat head, self tapping, Type A or AB, cadmium plated screws. Recommend FM Approved screw and plate assemblies.

2.15 FILTER FABRIC

.1 UV resistant, black woven water pervious polyolefin fabric for installation between insulation and stone ballast in protected membrane system. Fabric to meet approval of insulation manufacturer.
.1 Product weight 93.5 gm/mý.

2.23 BALLAST

.1 Stone: 19 to 32 mm size, well graded crushed stone opaque, non-porous, washed, free from fines, long splinters, moisture, ice and snow.

3 EXECUTION

3.01 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and Provincial Roofing Association

Manual, particularly for fire safety precautions, and to Design.

.2 Do priming in accordance with manufacturers written recommendations.

.3 The interface of the walls and roof assemblies will be fitted with durable rigid material sheet metal providing connection point for continuity of air barrier.

.4 Assembly, component and material connections will be made in consideration of appropriate design loads.

3.02 EXAMINATION OF ROOF DECKS

.1 Verification of Conditions:
.1 Inspect with Departmental Representative deck conditions including parapets, construction joints, roof drains, plumbing vents and ventilation outlets to determine readiness to proceed.

.2 Evaluation and Assessment:
.1 Prior to beginning of work ensure:
.1 Decks are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris. Do not use calcium or salt for ice or snow removal.
.2 Curbs have been built.
.3 Roof drains have been installed at proper elevations relative to finished roof surface.
.4 Plywood and lumber nailer plates have been installed to deck, walls and parapets as indicated.

.3 Do not install roofing materials during rain or snowfall.

3.03 PROTECTION OF IN-PLACE CONDITIONS

.1 Cover walls, walks and adjacent work where materials hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of Work.

.3 Clean off drips and smears of bituminous material immediately.

.4 Dispose of rain water off roof and away from face of building until roof drains or hoppers installed and connected.

.5 Protect roof from traffic and damage. Comply with precautions deemed necessary by Departmental Representative.

.6 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed Work and materials out of storage.

.7 Metal connectors and decking will be treated with rust proofing or galvanization.

3.04 DECK SHEATHING

.1 Mechanically fasten to steel deck Cementitious Board with screws to steel deck's upper rib surfaces, spaced 400 mm on centre each way.

.2 Place with long axis of each sheet transverse to steel deck ribs, with end joints staggered and fully supported on ribs.

3.05 PRIMING DECK

.1 Apply deck primer to cementitious board roofing substrate at the rate recommended by manufacturer.

3.06 (EXPOSED) CONVENTIONAL MEMBRANE ROOFING (CMR) APPLICATION

.1 Insulation: fully adhered, adhesive application:
- .1 Adhere insulation to cementitious board using solvent-based adhesive.
- .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .3 Cut end pieces to suit.
- .4 Apply adhesive in continuous ribbons at 300 mm on centre.
- .5 Separate the membrane and insulation with a drainage layer or slipsheet.

.2 Insulation: fully adhered, bitumen application:
- .1 Embed insulation in 1 to 1.5 kg/mý mopping of bitumen.
- .2 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .3 Cut end pieces to suit.

.3 Insulation: mechanically fastened application:
- .1 Mechanically fasten insulation using screws and pressure distribution plates.
- .2 Fasten insulation as per manufacturer's written recommendations.
- .3 Place boards in parallel rows with ends staggered, and in firm contact with one another.
- .4 Cut end boards to suit.

.4 Tapered insulation application:
- .1 Mop insulation to vapour retarder and top layer of insulation to bottom layer with hot asphalt at rate of 1 kg/mý.
- .2 Install tapered insulation as second insulation layer, in accordance with shop drawings. Stagger joints between layers 150 mm minimum.

.5 Overlay Board: adhesive application:
- .1 Adhere overlay board to insulation with vulcanized adhesive at the rate of one litre per mý.
- .2 Place boards in parallel rows with end joints staggered. Cap joints approximately 25 mm.
- .3 Cut ends to suit and apply adhesive in continuous ribbons at 300 mm on centre.

.6 Base sheet application:
- .1 Starting at low point of roof, perpendicular to slope, unroll base sheet, align and reroll from both ends.
- .2 Unroll and embed base sheet in uniform coating of asphalt applied at rate of 1.2 kg/mý, at 230 degrees C.
- .3 Unroll and torch base sheet onto substrate taking care not to burn membrane or its reinforcement or substrate.
- .4 Lap sheets 75 mm minimum for side and 150 mm minimum for end laps.
- .5 Application to be free of blisters, wrinkles and fishmouths.

.7 Cap sheet application:
.1 Starting at low point on roof, perpendicular to slope, unroll cap sheet, align and reroll from both ends.

.2 Unroll and embed cap sheet in uniform coating of asphalt applied at rate of 1.2 kg/mý, EVT at point of contact.

.3 Unroll and torch cap sheet onto base sheet taking care not to burn membrane or its reinforcement.
.4 Lap sheets 75 mm minimum for side laps and 150 mm minimum for end laps. Offset joints in cap sheet 300 mm minimum from those in base sheet.
.5 Application to be free of blisters, fishmouths and wrinkles.
.6 Do membrane application in accordance with manufacturer's recommendations.

.8 Flashings:
.1 Complete installation of flashing base sheet stripping prior to installing membrane cap sheet.
.2 Torch base and cap sheet onto substrate in 1 metre wide strips.
.3 Lap flashing base sheet to membrane base sheet minimum 150 mm and seal by mopping or torch welding.
.4 Lap flashing cap sheet to membrane cap sheet 250 mm minimum and torch weld.
.5 Provide 75 mm minimum side lap and seal.
.6 Properly secure flashings to their support, without sags, blisters, fishmouths or wrinkles.
.7 Do work in accordance with manufacturer's recommendations.

.9 Roof penetrations:
.1 Install roof drain pans, vent stack covers and other roof penetration flashings and seal to membrane in accordance with manufacturer's recommendations and details.

3.7 BALLAST AND PROTECTIVE COVERING

.1 Apply stone ballast, dry, as soon as possible after placement of fabric, at minimum rate of 50 kg/mý, following insulation manufacturer's recommendations.

.2 Spread stone ballast to an even thickness over entire roof area.

.3 Spread additional stone ballast around perimeter of roof for width of 1200 mm to increase ballast weight to 100 kg/mý.

.4 Install paving slabs over fabric on paver levelling pads.
.1 Allow slight space between slabs to permit drainage of surface water.
.2 Shim up as required to obtain smooth surface transition from slab to slab.

3.8 CANTS

.1 Install prefabricated fibre cants over rigid insulation.

.2 Angle cut cants to fit tightly on back and bottom where roof to wall angle varies from 90 degrees.

3.9 WALKWAYS

.1 Install walkway concrete paving slabs in accordance with manufacturer's instructions and as indicated.

.2 Install pavers, level on insulation pads, as indicated.

3.10 FIELD QUALITY CONTROL

.1 Inspections:

.1 Inspection and testing of roofing application will be carried out by testing laboratory designated by Departmental Representative.
.2 Costs of tests will be paid under cash allowance.

3.11 CLEANING

.1 Remove bituminous markings from finished surfaces.

.2 In areas where finished surfaces are soiled caused by work of this section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.

.3 Repair or replace defaced or disfigured finishes caused by work of this section.

.4 Waste Management: separate waste materials for reuse and recycling.

END OF SECTION

General

1.1 **REFERENCES**

.1 American Society for Testing and Materials (ASTM International)

.1 ASTM A606-01, Standard Specification for Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance.

.2 ASTM D523-89(1999), Standard Test Method for Specular Gloss.

.2 Canadian Roofing Contractors Association (CRCA)

.1 Roofing Specifications Manual 1997.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-37.5-M89, Cutback Asphalt Plastic Cement.

1.2 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials.

Products

1.3 **PREFINISHED STEEL SHEET**

.1 Prefinished steel with factory applied polyvinyl chloride.

.1 Class F1S.

.2 Colour to match wall siding.

.3 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.

.4 Coating thickness: not less than 200 micrometres.

.5 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:

.1 Outdoor exposure period 5000 hours.

.2 Humidity resistance exposure period 5000 hours.

1.4 **ACCESSORIES**

.1 Isolation coating: alkali resistant bituminous paint.

.2 Plastic cement: to CAN/CGSB 37.5.

.3 Underlay for metal flashing: dry sheathing to CAN/CGSB-51.32.

.4 Sealants: Section 07 92 10.

.5 Cleats: of same material, and temper as sheet metal, minimum 50 mm wide. Thickness same as sheet metal being secured.

.6 Fasteners: of same material as sheet metal, to CSA B111, ring thread flat head roofing nails of length and thickness suitable for metal flashing application.

.7 Washers: of same material as sheet metal, 1 mm thick with rubber packings.

.8 Solder: to ASTM B32, alloy composition Sn 50/50 Lead/Tin.

.9 Flux: rosin, cut hydrochloric acid, or commercial preparation suitable for materials to be soldered.

.10 Touch-up paint: as recommended by prefinished material manufacturer.

1.5 **FABRICATION**

.1 Fabricate metal flashings and other sheet metal work as indicated.

.2 Form pieces in 2400 mm maximum lengths. Make allowance for expansion at joints.

.3 Hem exposed edges on underside 12 mm. Mitre and seal corners with sealant.

.4 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.5 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

1.6 **METAL FLASHINGS**

.1 Form flashings, copings and fascias to profiles indicated of 0.76 mm thick prefinished steel.

1.7 **SCUPPERS**

.1 Form scuppers from 0.76 mm thick prefinished steel sheet metal.

.2 Sizes and profiles as indicated.

.3 Provide necessary fastenings.

.4 Form 600 x 600 mm splash pans from 0.76 mm thick prefinished steel.

Execution

1.8 **INSTALLATION**

.1 Install sheet metal work as detailed.

.2 Use concealed fastenings except where approved before installation.

.3 Provide underlay under sheet metal. Secure in place and lap joints 100 mm.

.4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

.6 Caulk flashing at cap flashing with sealant.

1.9 **SCUPPERS**

.1 Install scuppers as indicated.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 07 92 10 - Joint Sealing.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM A506-00, Specification for Alloy and Structural Alloy Steel, Sheet and Strip, Hot-Rolled and Cold-Rolled.

.2 ASTM A653/A653M-03, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.3 ASTM D2369-03, Test Method for Volatile Content of Coatings.

.2 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.105-M91, Quick-Drying Primer.

.3 Canadian Standards Association (CSA International).

.1 CSA B111-1974(R2005), Wire Nails, Spikes and Staples.

1.3 SYSTEM DESCRIPTION

.1 Design Requirements:

.1 Roof hatches to withstand snow load of 2.3 kN/m^2 and wind uplift of 1.0 kNm/m^2 and temperature range of 100 degrees C without damage to unit or permanent deformation to seals.

1.4 SUBMITTALS

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

.1 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures. Indicate VOC's for caulking materials during application and curing.

.2 Shop Drawings:

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

.2 Indicate size and description of components, materials, attachment devices, description of frame and finish, and construction details.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

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

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for hardware complete with pertinent details, spare parts lists and warnings against harmful maintenance materials and practices for incorporation into manual specified in 01 78 00 - Closeout Submittals.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

Part 2 Products

2.1 MATERIALS

.1 Steel sheet: regular quality alloy steel to ASTM A506.

.2 Galvanized steel sheet: commercial quality to ASTM A653, Z275 designation zinc coating.

.3 Gaskets: extruded resilient vinyl, with full recovery after 50% compression.

.4 Fasteners: stainless steel.

.5 Sealants: Section 07 92 10.

.6 Cover and Frame: 2mm thick (14 ga) G-90 paint bond galvanized sheet.

.7 Isolation coating: alkali resistant bituminous paint or epoxy solution.

2.2 HATCH COVER

.1 Metal Cover:

.1 Preformed, galvanized steel, insulated sandwich construction 76 mm overall thickness.

2.3 CURBED FRAME

.1 Preformed metal curb: 40 mm thick x 305 mm high insulated sandwich construction, fibreglass insulation , with deck flange for attachment.

2.4 ACCESSORIES

.1 Screws: galvanized steel for curb to structure and for hatch lip frame to outer attachment.

.2 Hinges: heavy duty pintle type of galvanized steel.

.3 Latch: positive snap with turn handles inside and out and padlock hasps inside.

.4 Securing latch: hold open operating arm with vinyl grip handle to permit one-handed release.

.5 Resilient gasket/seal to inner face of lid in contact with hatch lid support frame.

.6 Size of hatch: 914 x 914 mm (36" x 36"), overlapping cover design. Acceptable product: Bilco type E roof hatch or equivalent.

2.5 FABRICATION

.1 Fabricate components free of twists, bends, or visual distortion and insulated. Weld corners and joints.

.2 Assemble roof hatch components as indicated.

.3 Ensure continuity of weather-tight seal.

.4 Design flashings to collect and lead off accumulated condensation.

.5 Zinc plate hardware and attachments and shop prime ready for field painting.

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 Erect components plumb, level and in proper alignment.

.2 Ensure continuity of building envelope air barrier and vapour retarder systems.

.3 Adjust and seal assembly with provision for expansion and contraction of components.

.4 Secure prefabricated curb assembly to structure.

.5 Secure and seal frame to curb.

3.3 CLEANING

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

END OF SECTION

1 GENERAL

1.01 REFERENCES

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

.2 Underwriter's Laboratories of Canada (ULC)
  .1 CAN-ULC-S101-04, Standard Methods of fire Endurance Tests of Building Construction and Materials.
  .2 CAN-ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.02 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.

.3 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.
  .1 Test Reports:
    .1 Submit product data including certified copies of test reports verifying fireproofing applied to substrate as constructed on project will meet or exceed requirements of Specification.
    .2 Submit test results in accordance with CAN- ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.
    .3 For assemblies not tested and rated, submit proposals based on related designs using accepted fireproofing design criteria.
  .2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.

1.03 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
  .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
  .2 Deliver packaged materials in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
  .1 Store materials in dry location.
  .2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

.3 Damaged or opened containers will be rejected.
.4 Packaging to indicate shelf-life and materials to be applied prior to expiration of shelf-life.
.5 Provide temporary enclosures to prevent spray from contaminating air beyond application area.
.6 Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting of fireproofing materials.

.3 Waste Management and Disposal:
.1 Separate waste materials for recycling.

1.04 AMBIENT CONDITIONS

.1 At temperatures less than 5 degrees C, ensure that 5 degrees C air and substrate temperature is maintained during and for 24 hours after application. Ensure that natural ventilation to properly dry the fireproofing during and subsequent to its application is provided. In enclosed areas lacking openings for natural ventilation, ensure that interior air is circulated and exhausted to the outside.

.2 Maintain relative humidity within limits recommended fireproofing manufacturer.

.3 Ensure that natural ventilation to properly dry fireproofing during and subsequent to its application is provided.

.4 In enclosed areas lacking openings for natural ventilation, provide minimum of 4 air exchanges per hour by forced air circulation.

2 PRODUCTS

2.01 MATERIALS

.1 Sprayed fireproofing: ULC certified asbestos-free mineral fibre fireproofing qualified for use in ULC Designs specified and fungus resistant for 28 days.

.2 Curing compound: type recommended by fireproofing manufacturer, qualified for use in ULC Designs specified.

.3 Sealer: type recommended by fireproofing manufacturer, qualified for use in ULC Design specified.
.1 Colour: green.

.4 Fireproofing: minimum dry density and cohesion/adhesion properties as follows:
.1 Fireproofing for structural components concealed above ceiling, or within wall, chase, or furred space: average applied dry density of 240 kg per cubic meter and cohesion/adhesion strength of 9.57 kPa.
.2 Ensure spray-applied fireproofing: does not crack, spall or delaminate under downward deflection conditions over 3 m clear span.
.3 Minimum compressive strength: 48 kPa.
.4 Spray-Applied fireproofing material: not contribute to

corrosion of test panels.

.5 Dust removal: not exceed 0.25 gram per square meter.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 PREPARATION

.1 Substrate: free of material, which would impair bond.

.2 Verify that painted substrate[s] are compatible and have suitable bonding characteristics to receive fireproofing.

.3 Remove incompatible materials.

.4 Ensure that items required to penetrate fireproofing are placed before installation of fireproofing.

.5 Ensure that ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is completed.

3.03 APPLICATION

.1 Apply bonding adhesive or primer to substrate if recommended by manufacturer.

.2 Apply fireproofing to correspond with tested assemblies, or acceptable calculation procedures to provide following fire resistance ratings.

.3 Apply fireproofing over substrate, building up to required thickness to cover substrate with monolithic blanket of uniform density and texture.

.4 Apply fireproofing directly to open web joists without use of expanded lath.
.1 Structural steel, open-web steel joists and metal decking: 1 hour protection.

.5 Tamp smooth, surfaces [visible in finished work] [as indicated].

.6 Apply curing compound to surface of cementitious fireproofing as required by manufacturer.

.7 Apply sealer to surface of mineral fibre fireproofing as required by manufacturer in ventilation plenums and as indicated.

3.04 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product

and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.2 Inspection and Site Tests:

.1 Inspection and testing of fireproofing will be carried out by Testing Laboratory designated by Departmental Representative.

.2 Departmental Representative will pay costs for testing.

3.05 PATCHING

.1 Patch damage to fireproofing caused by testing or by other trades before fireproofing is concealed, or if exposed, before final inspection.

3.06 CLEANING

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

.2 Clean surfaces not indicated to receive fireproofing of sprayed material within 24 hours period after application.

.3 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 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 01 33 00.

.3 Shop Drawings:

.1 Submit shop drawings to show location, system application of 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.

.5 Quality assurance submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Test reports: in accordance with CAN-ULC-S101 for fire endurance and CAN-ULC-S102 for surface burning characteristics.

.1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures and storage.

1.4 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company specializing in fire stopping installations with 5 years experience approved by manufacturer.

.2 Pre-Installation Meetings: convene pre-installation meeting one week prior to beginning work of this Section, with contractor's representative, Departmental Representative and Consultant in accordance with General Instructions to:

.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 in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

.3 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

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: 1H and 2H, as noted in Matrix and as per location detailed on drawings.

.2 Service penetration assemblies: systems tested to CAN-ULC-S115.

.3 Service penetration fire stop components: certified by test laboratory to CAN-ULC-S115.

.4 Fire-resistance rating of installed fire stopping assembly in accordance with NBC.

.5 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.6 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

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

.8 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.9 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.10 Sealants for vertical joints: non-sagging.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 PREPARATION

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

.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation without interruption to vapour barrier.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

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

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.4 SPECIAL REQUIREMENTS

.1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:

.1 2 H rating at fire rated walls.

3.5 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Departmental Representative.

.2 Install floor fire stopping at locations noted using selected recommended application of system.

3.6 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.

3.7 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

.1 ASTM C919-08, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 19-GP-5M-1984, Sealing Compound, One Component, Acrylic Base, Solvent Curing (Issue of 1976 reaffirmed, incorporating Amendment No. 1).

.2 CAN/CGSB-19.24-M90, Multi-component, Chemical Curing Sealing Compound.

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

.1 Material Safety Data Sheets (MSDS).

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.

.3 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.

.1 Instructions to include installation instructions for each product used.

1.3 DELIVERY, STORAGE, AND HANDLING

.1 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.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

1.5 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.

1.6 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 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Type 1 Polysulfide Two Part.

.1 Self-Leveling to CAN/CGSB-19.24-M90, Type 1, Class B, colour to match wall.

.2 Type 2 Acrylics One Part.

.1 To CGSB 19-GP-5M.

.3 Preformed Compressible and Non-Compressible back-up materials.

.1 Polyethylene, Urethane, Neoprene or Vinyl Foam.

.1 Extruded closed cell foam backer rod.

.2 Size: oversize 30 to 50 %.

.2 Neoprene or Butyl Rubber.

.1 Round solid rod, Shore A hardness 70.

.3 High Density Foam.

.1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m^3 density, or neoprene foam backer, size as recommended by manufacturer.

.4 Bond Breaker Tape.

.1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building: Sealant type: 1.

.2 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: 1.

.3 Perimeters of interior frames, as detailed and itemized: Sealant type: 2.

.4 Interior masonry walls: Sealant type 2.

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.

3.3 PRIMING

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

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

3.4 BACKUP MATERIAL

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

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

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant.

- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing.

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

.3 Cleanup.

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

END OF SECTION

General

1.1 **RELATED SECTIONS**

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 07 84 00 - Firestopping.

.3 Section 07 92 10 - Joint Sealing.

1.2 **REFERENCES**

.1 Aluminum Association (AA).

.1 DAF-45-03, Designation System for Aluminum Finishes.

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM D412-98a(2002)e1, Test Methods for Vulcanized Rubber Thermoplastic Rubbers and Thermoplastic Elastomers - Tension.

.3 ASTM D2240-02b, Test Method for Rubber Property - Durometer Hardness.

.3 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-1.40-97, Anti-corrosive Structural Steel Alkyd Primer.

.2 CAN/CGSB-1.122-99, Anticorrosive Vinyl Primer.

1.3 **DESIGN REQUIREMENTS**

.1 Joint movement: design to permit unrestricted omnidirectional movement of up to +/-50% of joint width.

.2 Service Temperature: design exterior expansion joint cover assemblies to accommodate joint movements within service temperature range of -35 degrees C to 65 degrees C.

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 **SHOP DRAWINGS**

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

.2 Indicate lengths, fasteners, accessories, anchors, seals, butt joints and locations, finishes and profiles required for each condition.

1.6 **QUALITY ASSURANCE**

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

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

1.7 **DELIVERY AND STORAGE**

.1 Deliver products in original intact labelled containers and store undercover in a dry location until installed.

.2 Store off ground, protect from weather and construction activities.

1.8 **WASTE MANAGEMENT AND DISPOSAL**

.1 Separate and recycle waste materials.

Products

1.9 **MATERIALS**

.1 Expansion joint cover: flexible rubber membrane, supported by a closed cell foam to foam flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows. System similar to Johns Manville Expand-O-Flash Expansion Joint Cover or equivalent, curb-to-curb EJ/WC.

.2 Stainless steel brake formed or roll formed sections: to ASTM A167, type3 04, polished finish.

.3 Vinyl-acrylic extrusions: high impact vinyl acrylic in integral colour selected by Departmental Representative from manufacturer's standard range.

.4 Flexible inserts:

.1 Factory-bonded, reinforced, elastomer: to ASTM D2240; ultimate elongation 50% to ASTM D412 method A; colour selected by Departmental Representative from manufacturer's standard range.

.2 Extruded filler strips: flexible vinyl to manufacturer's standard. Colour selected by Departmental Representative from manufacturer's standard range.

.5 Primer: to CAN/CGSB-1.132, confirm with manufacturer.

.6 Accessories:

.1 Substrate seal: continuous, flexible vinyl seals to provide watertight juncture along base of joint covers.

.2 Butt joint seal: to provide watertight seal between lengths of joint covers.

.3 Spring clips: stainless steel.

.4 Condensation barrier: continuous flexible vinyl.

.5 Exposed fasteners: to match rigid joint cover finish.

.6 Concealed fasteners and anchors: stainless steel.

.7 Extruded filler strip, adhesives and water stops.

.8 Chemical fasteners and anchors: provide chemical anchoring as per manufacturers specifications to avoid joint face spalling.

.9 Epoxy levelling bed: minimum 6 mm epoxy levelling bed under metal rails.

.10 Elastomeric concrete: shop poured filler to allow multidirectional movement and maintain cohesion and adhesion.

1.10 **ALUMINUM FINISHES**

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System For Aluminum Finishes.

.1 Clear anodic finish: designation AA-6063.

1.11 **FABRICATION**

.1 Fabricate expansion joint covers, square, true, straight and accurate to required sizes and profiles.

.2 Fabricate in maximum practical lengths to minimize joints.

.3 Shop assemble covers ready for installation where practicable.

.4 Fabricate joint cover assemblies with anchors, levelling nuts, filler inserts and shop applied protection as required for a complete installation to suit installation and project requirements.

.5 Provide acceptable means of anchorage, such as anchor clips, expansion bolts and shields, welded studs or toggles.

.6 Factory fabricate terminations and transitions.

1.12 **COVER PLATE**

.1 Floor joint cover plate: similar to MM Systems ej Expansion Joints Model VSS 200-600 or equivalent.

.2 Wall joint : similar to Emseal SSW2 Security Seal by Emshield or equivalent. 2-hour fire rating, watertight, 50% movement.

.3 Roof joint cover plate: Construction Specialties SRJ-300 W/RFX-3F.

Execution

1.13 **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. Install as per manufacturer's instructions.

1.14 **INSTALLATION**

.1 Set work plumb, square, level, free from distortion.

.2 Secure work accurately to structure in manner not restricting joint movement.

.3 Maintain continuity of air barrier and vapour retarder.

.4 Seal butt joints to manufacturer's instructions to provide watertight joints using sealant as recommended by manufacturer.

.5 Protect cover plates during construction. Remove shop protection prior to final inspection.

.6 Ensure sound and clean substrates before installation.

1.15 **FIELD QUALITY CONTROL**

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work:

.1 Upon completion of Work, after cleaning is carried out.

.4 Obtain reports within three days of review and submit.

1.16 **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.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 07 92 10 - Joint Sealing: Caulking of joints between frames and other building components.

.3 Section 08 71 10 - Door hardware - General: Supply finish hardware, including weather-stripping and mounting heights.

.4 Section 09 91 23 - Interior Painting.

.5 Section 09 91 13 - Exterior Painting.

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

.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 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S702-97, Standard for Thermal Insulation, Mineral Fibre, for Buildings.
- .2 CAN/ULC-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
- .3 CAN4-S104-M80, Standard Method for Fire Tests of Door Assemblies.
- .4 CAN4-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.03 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 degrees C to 35 degrees C.

.2 Maximum deflection for exterior steel entrance screens under wind load of 1.2 kPa not to exceed 1/175th of span.

.3 Steel fire rated doors and frames: labelled and listed by an organization accredited by Standards Council of Canada in conformance with NFPA 252 for ratings specified or indicated.

.4 Provide fire labelled frames for openings requiring fire protection ratings. Test products in conformance with NFPA 252 and listed by nationally recognized agency having factory inspection services.

1.04 ACTION AND INFORMATIONAL 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 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Ontario, Canada.

.2 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.

.3 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing and fire rating, finishes.

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

.5 Submit test and engineering data, and installation instructions.

.4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

1.06 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.

2 PRODUCTS

2.01 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.

2.02 DOOR CORE MATERIALS

.1 Stiffened: face sheets welded, insulated core.

Polyurethane: to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/mü.

.2 Temperature rise rated (TRR): core composition to limit temperature rise on unexposed side of door to 250 degrees C at 60 minutes. Core to be tested as part of a complete door assembly, in accordance with NFPA 252, covering Standard Method of Tests of Door Assemblies and listed by nationally recognized testing agency having factory inspection service.

2.03 ADHESIVES

.1 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

.2 Lock-seam doors: fire resistant, resin reinforced polychloroprene, high viscosity, sealant/adhesive.

2.04 PRIMER

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

2.05 PAINT

.1 Field paint steel doors and frames in accordance with Sections 09 91 23 - Interior Painting, 09 91 13 - Exterior Painting. Protect weather-strips from paint. Provide final finish free of scratches or other blemishes.
.1 Maximum VOC emission level 50 g/L.

2.06 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Exterior and interior top and bottom caps: steel.

.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: retractable type.

.5 Metallic paste filler: to manufacturer's standard.

.6 Fire labels: metal rivited.

.7 Sealant: 07 92 10.

.8 Make provisions for glazing as indicated and provide necessary glazing stops.
.1 Provide dry glazing of snap-on type.
.2 Design exterior glazing stops to be tamperproof.

2.07 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Exterior frames: 1.6 mm welded, thermally broken type construction.

.4 Interior frames: 1.2 mm welded type construction.

.5 Blank, reinforce, drill and tap frames for mortised, templated hardware, and electronic hardware where indicated using templates provided by finish hardware supplier. Reinforce frames for surface mounted hardware.

.6 Protect mortised cutouts with steel guard boxes.

.7 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.8 Manufacturer's nameplates on frames and screens are not permitted.

.9 Conceal fastenings except where exposed fastenings are indicated.

.10 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.11 Insulate exterior frame components with polyurethane insulation.

2.08 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.

2.09 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

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

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

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

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

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

2.10 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.

.2 Exterior doors: hollow steel construction. Interior doors: hollow steel construction.

.3 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.

.4 Blank, reinforce, drill doors and tap for mortised, templated hardware and electronic hardware.

.5 Factory prepare holes 12.7 mm diameter and larger except mounting and through-bolt holes, on site, at time of hardware installation.

.6 Reinforce doors where required, for surface mounted hardware. Provide flush steel top caps to exterior doors. Provide inverted, recessed, spot welded channels to top and bottom of interior doors.

.7 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.8 Provide fire labelled doors for those openings requiring fire protection ratings, as scheduled. Test such products in conformance with [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.

.9 Manufacturer's nameplates on doors are not permitted.

2.11 DOORS AND FRAMES: BULLET RESISTANT CONSTRUCTION

.1 Product shall be tested in conformance with UL 752 "Standard for Bullet Resistant Equipment". Manufacturer shall submit independent test data from a recognized licensed laboratory indicating compliance with the ballistic rating UL Level Four.

.2 Materials commercial grade zinc coated steel to ASTM A653. Core: Manufacturer's proprietary bullet resistant standard in accordance with UL 752 most current edition. Core shall provide level of protection as specified.

.3 Glazing shall be attack resistant security glass, factory installed, and conform to that of the door/frame unit.

.4 Frames and doors shall be manufactured according to proprietary tests in conformance with UL 752. Frames and doors shall be blanked, reinforced, drilled and tapped for mortised, template hardware. Mortised cutouts shall be protected with steel guard boxes.

.5 Frames shall be accurately mitred and securely welded on the inside of the

profile. Shop drawings to show all construction details for the frames and the doors. Doors shall be swing type as shown on drawings.

2.12 HOLLOW STEEL CONSTRUCTION

.1 Form face sheets for exterior doors from 1.6 mm sheet steel.

.2 Form face sheets for interior doors from 1.2 sheet steel.

.3 Reinforce doors with vertical stiffeners, securely welded to face sheets at 150 mm on centre maximum.

.4 Fill voids between stiffeners of exterior doors with polystyrene core.

.5 Fill voids between stiffeners of interior doors with fiberglass or temperature rise rated core.

2.13 THERMALLY BROKEN DOORS AND FRAMES

.1 Fabricate thermally broken doors by using insulated core and separating exterior parts from interior parts with continuous interlocking thermal break.

.2 Thermal break: rigid polyvinylchloride extrusion conforming to CGSB 41-GP-19Ma.

.3 Fabricate thermally broken frames separating exterior parts form interior parts with continuous interlocking thermal break.

.4 Apply insulation.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 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.

3.03 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.

3.04 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 floorand thresholds as follows.
- .1 Hinge side: 1.0 mm.
- .2 Latchside and head: 1.5 mm.
- .3 Finished floor, noncombustible sill and thresholds: 13 mm.

.3 Install louvre(s) in door(s) where shown.

.4 Adjust operable parts for correct function.

3.05 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.

3.06 GLAZING

.1 Install glazing for doors in accordance with Section 08 80 50 - Glazing.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 05 50 00 - Metal Fabrications.

.4 Section 06 10 00 - Rough Carpentry.

.5 Section 06 40 00 - Finish Carpentry.

.6 Section 07 21 16 - Batt and Blanket Insulation.

.7 Section 07 92 10 - Joint Sealing.

.8 Section 08 71 00 - Door Hardware - General.

.9 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

.10 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.11 Section 26 05 20 - Wire and Box Connectors - 0-1000 V.

1.2 REFERENCES

.1 Aluminum Association (AA).

.1 DAF 45-03, Designation System for Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA).

.1 AAMA 609-93, Voluntary Guide Specification for Cleaning and Maintenance of Architectural Anodized Aluminum.

.3 American Society for Testing and Materials International, (ASTM).

.1 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB).

.1 CGSB 1.40-9, Primer, Structural Steel, Oil Alkyd Type.

.2 CAN/CGSB-12.1-M90 Tempered or Laminated Safety Glass.

.3 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 Canadian Standards Association (CSA International).

.1 CAN/CSA-G40.20/G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 SYSTEM DESCRIPTION

.1 Design Criteria.

.1 Design frames and doors in exterior walls to:

.1 Accommodate expansion and contraction within service temperature range of -35 to 35 degrees C.

.2 Limit deflection of mullions to maximum 1/175th of clear span when tested to ASTM E330 under wind load of 1.2 kpa .

.3 Movement within system.

.4 Movement between system and perimeter framing components or substrate.

.2 Size glass thickness and glass unit dimensions to limits in accordance with CAN/CGSB-12.20.

.3 Design door system to provide average thermal resistance of:

.1 Door system (excluding vision glass areas): RSI of 20.

.2 Vision glass areas: RSI of 20.

.4 Provide continuous air barrier and vapour retarder through door system. Primarily in line with inside pane of glass and heel bead of glazing compound.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and data sheets 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 caulking materials during application and curing.

1.5 SHOP DRAWINGS

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

.2 Indicate materials and profiles and provide full-size, scaled details of components for each type of door and frame. Indicate:

.1 Interior trim and exterior junctions with adjacent construction.

.2 Junctions between combination units.

.3 Elevations of units.

.4 Core thicknesses of components.

.5 Type and location of exposed finishes, method of anchorage, number of anchors, supports, reinforcement, and accessories.

.6 Location of caulking.

.7 Each type of door system including location.

.8 Arrangement of hardware and required clearances.

.3 Submit catalogue details for each type of door and frame illustrating profiles, dimensions and methods of assembly.

1.6 CLOSEOUT SUBMITTALS

.1 Provide maintenance data for cleaning and maintenance of aluminum finishes for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.7 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

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

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:

.1 Apply temporary protective coating to finished surfaces. Remove coating after erection. Do not use coatings that will become hard to remove or leave residue.

.2 Leave protective covering in place until final cleaning of building.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

Part 2 Products

2.1 MATERIALS

.1 Aluminum extrusions: Aluminum Association alloy AA6063-T6 anodizing quality.

.2 Sheet aluminum: Aluminum Association alloy H34 anodizing quality.

.3 Steel reinforcement: to CAN/CSA-G40.20/G40.21, grade 300 W.

.4 Fasteners: aluminum, finished to match adjacent material.

.5 Weatherstrip: replaceable backed wool pile.

.6 Door bumpers: black neoprene.

.7 Door bottom seal: adjustable door seal of anodized extruded aluminum frame and vinyl weather seal, recessed in door bottom, closed ends, automatic retract mechanism when door is open.

.8 Isolation coating: bituminous paint.

.9 Glass: tempered glass to CAN/CGSB-12.1, Type1, Class A.

.10 Glazing materials: Section 08 80 50.

.11 Sealants: 07 92 10, colour selected by Departmental Representative.

2.2 ALUMINUM DOORS

.1 Construct doors of porthole extrusions with minimum wall thickness of 3 mm.

.2 Door stiles nominal 53.2 mm wide plus or minus 6 mm.

.3 Top rail nominal 54 mm wide plus or minus 6 mm.

.4 Bottom rail nominal 98.4 mm wide plus or minus 6mm.

.5 Reinforce mechanically joined corners of doors to produce sturdy door unit.

.6 Glazing stops: interlocking snap in type for dry glazing. Exterior stops: tamperproof type.

.7 Provide thermally broken doors for exterior.

.8 Hardware: Section 08 71 10.

2.3 ALUMINUM FRAMES

.1 Construct thermally broken and insulated frames of aluminum extrusions with minimum wall thickness of 3 mm.

.2 Frame members x 6 mm nominal size, for applied stops.

2.4 ALUMINUM FINISHES

.1 Finish exposed surfaces of aluminum components in accordance with Aluminum Association Designation System for Aluminum Finishes.

.1 Clear anodic finish: designation AA-A41 class 1, .0007" (18 um) finish.

.2 Appearance and properties of anodized finishes designated by the Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative.

2.5 STEEL FINISHES

.1 Finish steel clips and reinforcing steel with zinc coating to CSA G164.

2.6 HARDWARE

.1 Hinges: one pair standard heavy duty hinges, standard duty back up plates (frame and door).

.2 Lock: MS deadlock, cylinder exterior, thumb turn interior, flush bolts on inactive leaf of pair.

.3 Glazing stops: 6.0 mm (1/4") or 25.4 mm (1").

.4 Threshold: 101.6 mm (4") aluminum threshold c/w door sweep.

.5 Closer: LCN 4020 "Alumicor Smoothee" series closer with parallel arm & hold open feature.

.6 Panic hardware: surface mount rim type panic.

.7 Pull handle: similar to Alumicor 231 pull handle.

2.7 FABRICATION

.1 Doors and framing to be by same manufacturer.

.2 Fabricate doors and frames to profiles and maximum face sizes as shown. Provide minimum 22 mm bite for insulating glazed units.

.3 Provide structural steel reinforcement as required.

.4 Fit joints tightly and secure mechanically.

.5 Conceal fastenings.

.6 Mortise, reinforce, drill and tap doors, frames and reinforcements to receive hardware using templates provided under Section 08 71 00 - Door Hardware - General.

.7 Isolate aluminum from direct contact with dissimilar metals, concrete and masonry.

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 Set frames plumb, square, level at correct elevation in alignment with adjacent work.

.2 Anchor securely.

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

.4 Adjust operable parts for correct function.

.5 Make allowances for deflection of structure to ensure that structural loads are not transmitted to frames.

3.3 GLAZING

.1 Glaze aluminum doors and frames in accordance with Section 08 80 50 - Glazing.

3.4 CAULKING

.1 Seal joints to provide weathertight seal at outside and air, vapour seal at inside.

.2 Apply sealant in accordance with Section 07 92 10 - Joint Sealing. Conceal sealant within the aluminum work except where exposed use is permitted by Departmental Representative.

3.5 FIELD QUALITY CONTROL

.1 Have manufacturer of products supplied under this Section review Work involved in handling, installation/application, protection and cleaning of its products, and submit written reports in acceptable format to verify compliance of Work with Contract.

.2 Manufacturer's field services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits to review Work at stages listed:

.1 After delivery and storage of products, and when preparatory Work on which Work of this Section depends is complete, but before installation begins.

.2 Upon completion of Work, after cleaning is carried out.

.4 Obtain reports within three days of review and submit.

3.6 CLEANING

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

.2 Clean aluminum with damp rag and approved non-abrasive cleaner.

.3 Remove traces of primer, caulking, epoxy and filler materials; clean doors and frames.

.4 Clean glass and glazing materials with approved non-abrasive cleaner.

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 61 00 - Common Product Requirements.

.3 Section 01 78 00 - Closeout Submittals.

.4 Section 05 50 00 - Metal Fabrications: Metal fabricated attachment devices.

.5 Section 07 21 16 - Blanket Insulation.

.6 Section 07 84 00 - Firestopping: Fire safing between floor edge and curtain wall system.

.7 Section 07 92 10 - Joint Sealing: Perimeter sealant and back-up materials.

.8 Section 08 11 16- Aluminum Doors and Frames: Entrance doors, frames, and glazed lights.

.9 Section 08 80 50 - Glazing.

1.2 REFERENCES

.1 Aluminum Association Designation System For Aluminum Finishes (AA)-1997.

.1 DAF 45 2003, Designation System For Aluminum Finishes.

.2 American Architectural Manufacturers Association (AAMA).

.1 AAMA CW-DG-1-96, Aluminum Curtain Wall Design Guide Manual.

.2 AAMA CW-10-97, Care and Handling of Architectural Aluminum From Shop to Site.

.3 AAMA CW-11-85, Design Wind Loads for Buildings and Boundary Layer Wind Tunnel Testing.

.4 AAMA T1R-A1-02, Sound Control for Fenestration Products.

.5 AAMA 501-94, Methods of Test for Exterior Walls.

.6 AAMA 503-92, Voluntary Specification for Field Testing of Metal Storefronts, Curtain Wall and Sloped Glazing Systems.

.7 AAMA 611-98, Voluntary Specifications for Anodized Finishes Architectural Aluminum.

.8 AAMA 612-02, Voluntary Specifications, Performance Requirements, and Test Procedures for Combined Coatings of Anode Oxide and Transparent Organic Coatings on Architectural Aluminum.

.9 AAMA 2603-02, Voluntary Specification Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

.10 AAMA 2604-02, Voluntary Specification Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

.3 American Society for Testing and Materials International, (ASTM).

.1 ASTM A36/A36M-103a, Specification for Carbon Structural Steel.

.2 ASTM A123/A123M-02, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

.3 ASTM A167-99, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.4 ASTM A653/A653M-03, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.5 ASTM B209-02a, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.6 ASTM B221-02, Specification for Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

.7 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls, by Uniform Static Air Pressure Difference.

.8 ASTM E331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.

.9 ASTM E413-87(1999), Classification for Rating Sound Insulation.

.10 ASTM E1105-00, Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

.4 Canadian General Standards Board (CGSB).

.1 CAN/CGSB 1.108-M89, Bituminous Solvent Type Paint.

.2 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.

.5 Canadian Standards Association (CSA International).

.1 CSA-G40.20/G40.21-98(R2003), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steels.

.2 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA-S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members.

.4 CAN3-S157-M83(R2002), Strength Design in Aluminum.

.5 CSA W59.2-M1991(R2003), Welded Aluminum Construction.

1.3 SYSTEM DESCRIPTION

.1 Vertical glazed aluminum curtain wall system includes thermally broken tubular aluminum sections with supplementary support framing, shop fabricated, factory prefinished, vision glass, insulated metal panel prefinished spandrel infill; related flashings, anchorage and attachment devices.

.2 Assembled system to permit re-glazing of individual glass (and infill panel) units from interior without requiring removal of structural mullion sections.

1.4 PERFORMANCE REQUIREMENTS

.1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with NBC, as measured in accordance with ASTM E330.

.2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with NBC.

.3 Limit mullion deflection to L/175; with full recovery of glazing materials.

.4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20.

.5 Provide system to accommodate, without damage to components or deterioration of seals:

- .1 Movement within system.
- .2 Movement between system and perimeter framing components.
- .3 Dynamic loading and release of loads.
- .4 Deflection of structural support framing.
- .5 Shortening of building concrete structural columns.
- .6 Creep of concrete structural members.
- .7 A mid-span slab edge deflection of 19 mm.

.6 Thermal Resistance of:

- .1 System (excluding vision areas): RSI of 20.

.7 Sound attenuation through wall system (exterior to interior): STC 45, measured in accordance with AAMA T1R - A1.

.8 Limit air infiltration through assembly to 0.0003 $m^3/s/m^2$ of wall area, measured at a reference differential pressure across assembly of 75 Pa as measured in accordance with AAMA 501.

.9 Vapour seal with interior atmospheric pressure of 25 mm sp, 22 degrees C, 40% RH: No failure.

.10 Water leakage: none, when measured in accordance with ASTM E331.

.11 System to provide for expansion and contraction within system components caused by a cycling temperature range of 95 degrees C over a 24 hour period without causing detrimental affect to system components.

.12 Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system, to the exterior by a weep drainage network.

.13 Maintain continuous air barrier and vapour retarder throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

.14 Ensure no vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system occur.

1.5 PRODUCT DATA

.1 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 Submittal Procedures.

.2 Submit product data in accordance with Section 01 33 00 - Submittal Procedures.

.3 Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details and water flow diagrams.

1.6 SHOP DRAWINGS

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

.2 Indicate system dimensions, framed opening requirements and tolerances, adjacent construction, anchor details anticipated deflection under load, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.

1.7 DESIGN DATA

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

.2 Provide framing member structural and physical characteristics, calculations,dimensional limitations, special installation requirements.

1.8 TEST REPORTS

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

.2 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

1.9 REGULATORY REQUIREMENTS

.1 Conform to applicable code for acoustic attenuation, sound transmission requirements.

1.10 PRE-INSTALLATION MEETING

.1 Convene one week before starting work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

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

.2 Handle work of this section in accordance with AAMA CW-10.

.3 Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.

1.12 ENVIRONMENTAL REQUIREMENTS

.1 Do not install sealants when ambient and surface temperature is less than 5 degrees C.

.2 Maintain this minimum temperature during and after installation of sealants.

1.13 SEQUENCING

.1 Coordinate work of this section with installation of fire stopping, air barrier placement, vapour retarder placement, flashing placement, installing components or materials.

1.14 WARRANTY

.1 For the Work of this Section, the 12 months warranty period prescribed in the General Conditions is extended to Twenty-four (24) months.

.2 Glazed aluminum curtain wall will stay in place and remain leak proof including coverage for complete system failure in accordance with GC 24, but for Twenty-four (24) months.

1.15 EXTRA MATERIALS

.1 Provide extra materials of glass units in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide two extra sealed glass units of each size required.

.3 Provide one extra insulated infill panels of each size required.

.4 Provide protected and packaged in wood crates suitable for storage. Clearly identify each crate.

.5 Deliver to Departmental Representative, upon completion of the work of this section.

1.16 WASTE MANAGEMENT AND DISPOSAL

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

Part 2 Products

2.1 MATERIALS

.1 Extruded aluminum: ASTM B221.

.2 Sheet aluminum: ASTM B209.

.3 Steel sections: CSA-G40.20/G40.21M; shaped to suit mullion sections.

.4 Anchors: 3-way adjustable hot-dip galvanized cast iron.

.5 Fasteners: aluminum, finish to match curtain wall.

.6 Bituminous paint: CAN/CGSB 1.108, Type 1, without thinner.

.7 Vertical glass units:

.1 Glass in exterior lights: Type clear .

.2 Glass in entrance safety lights: Type clear.

.8 Fire Safety Materials - See Section 07 84 00 - Firestopping.

.9 Sealant:

.1 Perimeter sealant: Type .

.2 Sealant used within system (not used for Glazing): Type .

2.2 COMPONENTS

.1 Mullion profile:

.1 Vertical members: 28.6 mm (2 ½") x 133.4 mm (5 ¼") nominal dimension.

.2 Horizontal members: 28.6 x 133.4 mm nominal dimension.

.3 Thermally broken with interior tubular section insulated from exterior pressure plate.

.4 Matching stops and pressure plate of sufficient size and strength to provide adequate bite on glass and infill panels.

.5 Drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system.

.6 Internal mullion baffles to eliminate "stack effect" air movement within internal spaces.

.2 Reinforced mullion: 28.6 x 133.4 mm profile of extruded aluminum cladding with internal reinforcement of shaped steel structural section.

.3 Infill panel: internally reinforced, glazing edge sealed permitting internal air movement to glazing space, outside air barrier line:

.1 Outer face: 8 mm thick aluminum.

.2 Core: glass fibre insulation core with RSI of 24.

.3 Inner face: 8 mm thick aluminum.

.4 Flashings: 8 mm thick aluminum, finish as selected, to match curtain wall mullion sections where exposed, secured with concealed fastening method.

.5 Vapour retarder: specified in Section 07 26 00 - Vapor Retarders.

.6 Air barrier: specified in Section .

2.3 FABRICATION

.1 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.2 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

.3 Prepare components to receive anchor devices. Install anchors.

.4 Arrange fasteners and attachments to ensure concealment from view.

.5 Prepare system components to receive exterior doors and hardware specified in Section 08 71 10.

.6 Reinforce interior horizontal head rail to receive drapery track brackets and attachments.

.7 Reinforce framing members for external imposed loads.

.8 Visible manufacturer's identification labels not permitted.

2.4 FABRICATION: INFILL PANELS

.1 Fabricate infill panels with metal covered edge seals around perimeter of panel assembly, enabling installation and minor movement of perimeter seal.

.2 Reinforce interior surface of exterior panel sheet from deflection caused by wind and suction loads.

.3 Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

.4 Place insulation within panel, adhered to exterior face of interior panel sheet over entire area of sheet with impale fasteners.

.5 Ventilate and pressure equalize the air space outside the exterior surface of the insulation, to the exterior.

.6 Arrange fasteners and attachments to ensure concealment from view.

2.5 FINISHES

.1 Finish coatings: conform to AA-A41 Class 1, .0007"(18 um) finish.

.2 Exterior exposed aluminum surfaces: AA-A41 anodized to 215-R1, 0.02 mm thickness, prepared with a pre-treatment, anodized to clear colour.

.3 Exterior exposed infill panel surfaces: Prepare surface with AAMA-605.2 fluoropolymer coating to match white colour finish on building.

.4 Interior exposed aluminum surfaces: AA-A41 anodized to 215-R1, 0.02 mm thickness, prepared with a pretreatment, anodized to clear colour.

.5 Shop and touch-up primer for steel components: SSPC 25 Paint red oxide.

.6 Touch-up primer for galvanized steel surfaces: SSPC 20 Paint zinc rich.

.7 Concealed steel items: galvanized in accordance with CAN/CSA-G164M to 600 gm/m^2.

.8 Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

2.6 SOURCE QUALITY CONTROL

.1 Perform work in accordance with AAMA GSM-1.

.2 Manufacturer qualifications: company specializing in manufacturing the products specified in this section with minimum three years experience.

.3 Installer qualifications: company specializing in performing the work of this section with minimum three years experience approved by manufacturer.

.4 Design structural support framing components to CAN3 S157 under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the Province of Ontario.

.5 Perform welding Work in accordance with CSA W59.2.

Part 3 Execution

3.1 EXAMINATION

.1 Verify dimensions, tolerances, and method of attachment with other work.

.2 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this section.

3.2 INSTALLATION

.1 Install curtain wall system in accordance with manufacturer's instructions.

.2 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

.3 Provide alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.4 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.5 Provide thermal isolation where components penetrate or disrupt building insulation.

.6 Install sill flashings.

.7 Coordinate installation of fire stop insulation, specified in Section 07 84 00, at each floor slab edge and intersection with vertical construction where indicated.

.8 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.

.9 Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.10 Install fire-safing in areas as indicated.

.11 Install glass and infill panels in accordance with Section 08 80 50 - Glazing, to glazing method required to achieve performance criteria exterior wet/dry method of glazing. Place sealant on the up-slope side of the pressure plate cover caps; finish the surface with a slope to encourage drainage over the cap. Cover caps to conceal screws and provide continuous sightline.

.12 Install perimeter sealant to method required to achieve performance criteria. Type , backing materials, and installation criteria in accordance with Section 07 92 00 - Joint Sealing.

3.3 SITE TOLERANCES

.1 Maximum variation from plumb: 1.5 mm/m non-cumulative or 12 mm/30 m, whichever is less.

.2 Maximum misalignment of two adjoining members abutting in plane: 0.8 mm.

.3 Maximum sealant space between curtain wall and adjacent construction: 13 mm.

3.4 FIELD QUALITY CONTROL

.1 Inspection will monitor quality of installation and glazing.

.2 Test to ASTM E1105, and AAMA 501.

3.5 MANUFACTURER'S FIELD SERVICES

.1 Glass product manufacturers to provide field surveillance of installation of their Products.

.2 Monitor and report installation procedures, unacceptable conditions and defects that need to be rectified.

3.6 CLEANING

.1 Remove protective material from prefinished aluminum surfaces.

.2 Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

.3 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

3.7 PROTECTION

.1 Protect finished Work from damage.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 78 00 - Closeout Submittals.

.2 Section 08 11 14 – Metal Doors And Frames.

1.2 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-69.18-M90/ANSI/BHMA A156.1-1981, Butts and Hinges.

.2 CAN/CGSB-69.19-93/ANSI/BHMA A156.3-1984, Exit Devices.

.3 CAN/CGSB-69.22-M90/ANSI/BHMA A156.6-1986, Architectural Door Trim.

.4 CAN/CGSB-69.34-93/ANSI/BHMA A156.18-1987, Materials and Finishes.

1.3 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 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, size, finish and other pertinent information.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

.4 Closeout Submittals

.1 Provide operation and maintenance data for door closers, locksets, door holders and fire exit hardware for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:

.1 Hardware for doors in fire separations and exit doors certified by a Canadian Certification Organization accredited by Standards Council of Canada.

.2 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

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

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Packing, Shipping, Handling and Unloading:

.1 Deliver, store, handle and protect materials as required.

.2 Package each item 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 finishing hardware in locked, clean and dry area.

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.

Part 2 Products

2.1 HARDWARE ITEMS

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

2.2 DOOR HARDWARE

.1 Locks and latches:

.1 Lockset L9070L 17A L/C 630 CC.

.2 Lever handle: plain design.

.3 Escutcheons : round.

.4 Normal strikes: box type, lip projection not beyond jamb.

.5 Cylinders: key into keying system as directed, doors keyed alike.

.6 Finished to match existing.

.2 Butts and hinges:

.1 Butts and hinges: to CAN/CGSB-69.18, designated by letter A and numeral identifiers, followed by size and finish, listed in Hardware Schedule.

.2 Stanley CB Series 5 (CB 168 127x101 C26D St.)

.3 Auxiliary Items:

.1 For pairs of doors: overlapping astragal and deadbolt on inactive leaf.

.4 Door Closers and Accessories:

.1 Door controls (closers): to CAN/CGSB-69.20, designated by letter C and numeral identifiers listed in Hardware Schedule, size in accordance with CAN/CGSB-69.20, table A1.

.5 Architectural door trim: to CAN/CGSB-69.22, designated by letter J and numeral identifiers.

.1 Door protection plates: kick plate type, 1.27 mm thick aluminum 3.2 mm thick size to suit door width, finish brushed.

.6 Door bottom seal: heavy duty, door seal of extruded aluminum frame and solid closed cell neoprene weather seal, recessed in door bottom , closed ends, automatic retract mechanism when door is open, clear anodized finish.

.7 Thresholds: 204 mm wide x full width of door opening, extruded aluminum mill finish, plain surface with thermal break of rigid PVC, with lip and vinyl door seal insert.

.8 Weatherstripping:

.1 Head and jamb seal:

.1 Adhesive backed neoprene material.

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 follows:
1. Door 109:ANSI Function F15
2. Door 109A: ANSI Function F01 Passage.
3. Door 102: Electronic Card Access.
4. Door 103: Electronic Card Access.
5. Door 100: Electronic Card Access.
6. Door 111: 24 Hr exit Alarm, mortise exit device, no exterior trim, and full length astragal.
7. Door 104: Electronic Card Reader, ANSI F07, L9080EU-Rx Lockset & door closer.
8. Door 108: mortise ANSI F7 store.
9. Doors 202, 203,206,207 & 208: mortise F04 type lock.
10. Roof hatch pad lock.
11. Door 101: electronic card access with electric ANSI F07 L9080EU-Rx lock set & door closer.

.2 Provide 6 sets of keys for every lock in this Contract.

.3 Stamp keying code numbers on keys and cylinders.

.4 Provide construction cores.

.5 Provide all permanent cores and keys to the Departmental Representative.

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.

.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.

3.2 INSTALLATION

.1 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 Manufacturers' Association.

.2 Where door stop contacts door pulls, mount stop to strike bottom of pull.

.3 Use only manufacturer's supplied fasteners. Failure to comply may void manufacturer's warranties and applicable licensed labels. Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.

.4 Remove construction cores when directed by Consultant; install permanent cores and check operation of locks.

3.3 ADJUSTING

.1 Adjust door hardware, operators, closures and controls for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

3.4 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.

.3 Remove protective material from hardware items where present.

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

3.5 SCHEDULE

.1 Refer to drawing A – schedule is listed.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

.1 American National Standards Institute (ANSI).

.1 ANSI/ASTM E330-02, Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

.2 American Society for Testing and Materials International, (ASTM).

.1 ASTM C542-94(1999), Specification for Lock-Strip Gaskets.

.2 ASTM D790-02, Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.3 ASTM D2240-02b, Test Method for Rubber Property - Durometer Hardness.

.4 ASTM E84-01, Test Method for Surface Burning Characteristics of Building Materials.

.5 ASTM F1233-[98], Test Method for Security Glazing Materials and Systems.

.3 Canadian General Standards Board (CGSB).

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.2-M91, Flat, Clear Sheet Glass.

.3 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.

.4 CAN/CGSB-12.5-M86, Mirrors, Silvered.

.5 CAN/CGSB-12.8-97, Insulating Glass Units.

.6 CAN/CGSB-12.11-M90, Wired Safety Glass.

.4 Canadian Standards Association (CSA International).

.1 CSA A440.2-98, Energy Performance Evaluation of Windows and Sliding Glass Doors.

.2 CSA Certification Program for Windows and Doors 2000.

.5 Flat Glass Manufacturers Association (FGMA).

.1 FGMA Glazing Manual - 1997.

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Provide continuity of building enclosure vapour and air barrier using glass and glazing materials as follow:

.1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

.2 Size glass to withstand wind loads, dead loads and positive and negative live loads.

.3 Limit glass deflection to 1/200 with full recovery of glazing materials.

1.4 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.

1.5 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.1 Provide testing and analysis of glass under provisions of Section 01 45 00 - Quality Control.

.2 Provide shop inspection and testing for glass.

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

1.6 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.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

Part 2 Products

2.1 MATERIALS: FLAT GLASS

.1 Float glass: to CAN/CGSB-12.3, Glazing quality, 6 mm thick.

.2 Safety glass: to CAN/CGSB-12.1, transparent, 6 mm thick.

- .1 Type 2-tempered.
- .2 Class B-float.
- .3 Category 1.

.3 Wired glass: to CAN/CGSB-12.11, 6 mm thick.

- .1 Type 1-Polished both sides (transparent).
- .2 Wire mesh styles 3-Square.

.4 Low emissivity (LOW E) glass, 6 mm thick.

- .1 Metallic coating: sputtered low-E coating on surface 2.
- .2 Light transmittance: 69%.
- .3 Shading co-efficient: 0.44.
- .4 U-Value: winter 0.29 maximum, summer 0.29 maximum.

2.2 MATERIALS: SEALED INSULATING GLASS

.1 Insulating glass units: to CAN/CGSB-12.8, double unit, 18 mm overall thickness.

- .1 Glass: to CAN/CGSB-12.8-97.
- .2 Glass thickness: 6 mm each light.
- .3 Inter-cavity space thickness: 6 mm.
- .4 Glass coating: surface number 2, low "E".
- .5 Inert gas fill: argon.

2.3 ACCESSORIES

.1 Setting blocks: Silicone, 80-90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.

.2 Spacer shims: Silicone, 50-60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape:

- .1 Preformed butyl compound with integral resilient tube spacing device, 10-15 Shore A durometer hardness to ASTM D2240; coiled on release paper; 25 x 15 mm size; black colour.
- .2 Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2 %, designed for compression of 25 %, to effect an air and vapour seal; 25 mm size.

.4 Glazing splines: resilient silicone, extruded shape to suit glazing channel retaining slot, black colour.

.5 Glazing clips: manufacturer's standard type.

.6 Lock-strip gaskets: to ASTM C542.

.7 Mirror attachment accessories:

.1 Stainless steel clips.

.2 Plastic rosettes.

.3 Mirror adhesive, chemically compatible with mirror coating and wall substrate.

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: EXTERIOR - WET METHOD (SEALANT AND SEALANT)

.1 Perform work in accordance with FGMA Glazing Manual and Laminators Safety Glass Association - Standards Manual for glazing installation methods.

.2 Place setting blocks at 1/3 points and install glazing light or unit.

.3 Install removable stops with glazing centred in space by inserting spacer shims both sides at 600 mm intervals, 6 mm below sight line.

.4 Fill gaps between glazing and stops with sealant to depth of bite on glazing, maximum 9 mm below sight line to ensure full contact with glazing and continue air and vapour seal.

.5 Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.5 INSTALLATION: MIRRORS

.1 Set mirrors with clips. Anchor rigidly to wall construction.

.2 Set in frame.

.3 Place plumb and level.

3.6 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 and mirrors using approved non-abrasive cleaner in accordance with manufacture's instructions.

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

3.7 PROTECTION OF FINISHED WORK

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 – Submittal Procedures.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)

- .1 ASTM C36/C36M-01, Specification for Gypsum Wallboard.
- .2 ASTM C442/C442M-01, Specification for Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board.
- .3 ASTM C475-01, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .4 ASTM C840-01, Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C954-00, Specification for Steel Drill Screws for the Application of Gypsum Panel Products From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .6 ASTM C1002-01, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .7 ASTM C1280-99, Specification for Application of Gypsum Sheathing Board.

.2 Association of the Wall and Ceilings Industries International (AWEI).

.3 Canadian General Standards Board (CGSB)

- .1 CAN/CGSB-51.34-M86(R1988), Vapour Barrier, Polyethylene Sheet for use in Building Construction.

.4 Underwriters' Laboratories of Canada (ULC)

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

1.3 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.

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

Part 2 Products

2.1 MATERIALS

.1 Standard board: to ASTM C36/C36M regular, 12.7 mm thick, and Type X, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut, edges bevelled.

.2 Backing Board and coreboard: to ASTM C442/C442M regular 12.7 mm thick and Type X 16 mm thick, bevelled edges.

.3 Water-resistant board: to ASTM C630/C630M, regular, 16 mm thick and abuse resistant 19mm thick board, 1220 mm wide x maximum practical length.

.4 Metal furring runners, hangers, tie wires, inserts, anchors: to manufacturer's recommendation.

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

.6 Steel drill screws: to ASTM C1002.

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

.8 Shadow mould: 35 mm high, snap-on trim, of 0.6 mm base steel thickness galvanized sheet pre-finished in satin enamel, white colour.

.9 Sealants: in accordance with Section 07 92 10 - Joint Sealing.

.10 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 64 mm (full stud width) wide, with self sticking permanent adhesive on one face, lengths as required.

.11 Joint compound: to ASTM C475, asbestos-free.

.12 Polyethylene: to CAN/CGSB-51.34, Type 2.

Part 3 Execution

3.1 ERECTION

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Do application of gypsum sheathing in accordance with ASTM C1280.

.3 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

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

.5 Furr above suspended ceilings for gypsum board sound stops as indicated.

.6 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

.7 Furr openings and around built-in equipment, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.8 Furr duct shafts, beams, columns, pipes and exposed services where indicated.

.9 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at a maximum 600 mm around perimeter of fixture.

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

3.2 APPLICATION

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

.2 Apply single layer gypsum board to metal furring or framing using screw fasteners. 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 C840.

.2 Apply gypsum board vertically, providing sheet lengths that will minimize end joints.

.3 Install gypsum board on walls vertically to avoid end-butt joints.

.4 Install gypsum board with face side out.

.5 Do not install damaged or damp boards.

.6 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.3 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.

.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.

.4 Install access doors to electrical and mechanical fixtures specified in respective sections.

.1 Rigidly secure frames to furring or framing systems.

.5 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.

.6 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 4: Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.7 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.

.8 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.

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

.10 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.11 Mix joint compound slightly thinner than for joint taping.

.12 Provide protection that ensures gypsum drywall work will remain without damage or deterioration at time of substantial completion.

.13 Install access doors to electrical and mechanical fixtures specified in respective sections.
.1 Rigidly secure frames to furring or framing systems.

3.4 SCHEDULES

.1 Refer to drawings; provide fire rated partition assembly as detailed and noted.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).

.1 ASTM C645-00, Specification for Nonstructural Steel Framing Members.

.2 ASTM C754-00, 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.

1.2 QUALITY ASSURANCE

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

Part 2 Products

2.1 MATERIALS

.1 Non-load bearing channel stud framing: to ASTM C645, 152 mm stud size; roll formed from 0.53 mm thickness hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres.

Part 3 Execution

3.1 ERECTION

.1 Align partition tracks to align with existing framing and secure at 600 mm on centre maximum.

.2 Place studs vertically at 406 mm on centre. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.3 Secure track to studs in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.4 Install steel studs or furring channel between studs for attaching electrical and other boxes and for stiffening.

3.2 CLEANING

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

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 09 51 13 - Acoustical Ceilings: Acoustical units.

.3 Division 25: Trim for recessed mechanical fixtures.

.4 Division 26: Trim for recessed light fixtures.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM International)

.1 ASTM C635-00, Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.

.2 ASTM C636-96, Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

1.3 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

1.4 SHOP DRAWINGS

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

.1 Indicate lay-out, insert and hanger spacing and fastening details, splicing method for main and cross runners, change in level details, acoustical unit support at ceiling fixture and lateral bracing and accessories.

Part 2 Products

2.1 MATERIALS

.1 Heavy duty system to ASTM C635.

.2 Basic materials for suspension system: commercial quality cold rolled steel.

.3 Suspension system: non fire rated, made up as follows:

.1 two directional exposed tee bar grid. Two sizes as shown on drawings.

.1 Acceptable material: CGC Inc., Donn Dx, Armstrong Prelude 15/16", Bailey Metal, Lance-Lock System 900.

.4 Exposed tee bar grid components: white colour. 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 to ULC design requirements for fire rated assemblies.

.3 2.6 mm diameter for other ceilings.

.6 Hanger inserts: purpose made.

.7 Carrying channels: 38 x 16 mm channel, of galvanized 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 INSTALLATION

.1 Installation: in accordance with ASTM C636 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 Lay out system according to reflected ceiling plan.

.7 Ensure suspension system is co-ordinated with location of related components.

.8 Install wall moulding to provide correct ceiling height.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures, diffusers, grilles, and speakers.

.10 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

Interlock cross member to main runner to provide rigid assembly.

Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.2 CLEANING

.1 Touch up scratches, abrasions, voids and other defects in painted surfaces.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

.3 Section 09 22 27 - Acoustical Suspension: Suspension system.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM E1264-98, Classification for Acoustical Ceiling Products.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-88(R2000), Surface Burning Characteristics of Building Materials.

1.3 SAMPLES

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

.2 Submit duplicate full size samples of each type acoustical units.

1.4 REGULATORY REQUIREMENTS

.1 Fire-resistance rated floor/ceiling and roof/ceiling assembly: certified by a Canadian Certification Organization accredited by Standards Council of Canada.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before commencement of installation.

.2 Maintain uniform minimum temperature of 15^0C 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.

.3 Extra materials to be from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Owner, upon completion of the work of this section.

.6 Store where directed by Owner.

Part 2 Products

2.1 MATERIALS

.1 Acceptable material:
Type 1: 609 x 609 x 15.8 mm thick, square edge lay-in coloured, mineral fibre tile, non-directional textured surface, NRC .55, CAC 33, humidity resistance performance, sag resistant, FS25, SD-10, light reflectance LR 0.84.
Acceptable material: CGC Inc. Radar Clima Plus #2215. Non-rated.

.2 Acoustic units for suspended ceiling system: to CAN/CGSB-92.1.

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: 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 ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 SCHEDULE

.1 Refer to Ceiling Plan.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society for Testing and Materials International (ASTM)

.1 ASTM F1303-04, Standard Specification for Sheet Vinyl Floor Covering with Backing.

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

.1 Material Safety Data Sheets (MSDS).

1.2 SUBMITTALS

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

.2 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 and base.

.3 Closeout Submittals:

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

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

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 m^2 of each colour, pattern and type flooring material required for project for maintenance use.

.3 Extra materials are to be 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.

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: 3.2 mm.
- .3 Colour : to be confirmed by Departmental Representative.
- .4 Acceptable Product: Forbo Marmoleum.

.2 Feature strips: of same material and thickness as adjacent work 450 mm wide, colour to be confirmed by Departmental Representative.

.3 Resilient base: continuous, top set, complete with premoulded end stops and external corners complete with brushed chrome wall cap:

- .1 Type: Vinyl.
- .2 Thickness: 2.6 mm.
- .3 Style: cove.
- .4 Height: 101.6 mm.
- .5 Colour: to be confirmed by Departmental Representative.

.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: 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, brushed stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.7 External corner protectors: 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.

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

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

1.03 ACTION AND INFORMATIONAL 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 Closeout Submittals:
  .1 Provide maintenance data for resilient flooring for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.04 DELIVERY, STORAGE AND HANDLING

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

1.05 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.

1.06 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 sq.m 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.

2 PRODUCTS

2.01 MATERIALS

.1 Linoleum sheet flooring: composed of natural ingredients which are mixed and calendered onto a jute backing:
.1 Pattern: marbleized.
.2 Thickness: 3.2 mm.
.3 Colour: selected by Departmental Representative.
.4 Feature strips: of same material and thickness as adjacent work 450 mm wide, colour to be confirmed by Departmental Representative.

.2 Resilient base: continuous, top set, complete with premoulded end stops and external corners:
.1 Type: vinyl.
.2 Style: cove.
.3 Thickness: 2.36 mm.
.4 Height: 101.6 mm.
.5 Lengths: cut lengths minimum 2400 mm.
.6 Colour: selected by Departmental Representative.

.3 Primers and adhesives: of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.
.1 Cove base adhesives:

.2 Adhesive: maximum VOC limit 50 g/L.

.4 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.

.5 Metal edge strips:
.1 Aluminum extruded, smooth, polished stainless steel with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.

.6 External corner protectors: type recommended by flooring manufacturer.

.7 Edging to floor penetrations: type recommended by flooring manufacturer.

.8 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 SITE VERIFICATION OF CONDITIONS

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

3.03 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 Seal concrete slab to resilient flooring manufacturer's printed instructions.

3.04 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 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Lay flooring with seams parallel to building lines to produce a minimum number of seams. Border widths minimum 1/3 width of full material or if accent edge, 480 mm.

.4 Double cut sheet joints and heat weld according to manufacturer's printed instructions.

.5 As installation progresses, and after installation roll flooring with 45 kg minimum roller to ensure full adhesion.

.6 Cut flooring around fixed objects.

.7 Install feature strips and floor markings where indicated. Fit joints tightly.

.8 Continue flooring over areas which will be under built-in furniture.

.9 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.10 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.05 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 Heat weld base in accordance with manufacturer's printed instructions.

3.06 CLEANING

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

.2 Remove excess adhesive from floor, base and wall surfaces without damage.

.3 Clean, seal and wax floor and base surface to flooring manufacturer's printed instructions.

3.07 PROTECTION

.1 Protect new floors from after initial waxing until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Use only water-based coating for linoleum.

END OF SECTION

1 GENERAL

1.01 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittal.

1.02 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)
- .1 AATCC Test Method 16-2004, Colorfastness to Light.
- .2 AATCC Test Method 129-2005, Colourfastness to Ozone in the Atmosphere Under High Humidities.
- .3 AATCC Test Method 134-2006, Electrostatic Propensity of Carpets.
- .4 AATCC Test Method 171-2005, Carpets: Cleaning of; Hot Water Extraction Method.
- .5 AATCC Test Method 174-1998, Antimicrobial Activity Assessment of carpet tile.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-4.2 No.27.6M-2004, Textile Test Methods - Flame Resistance - Methemine Tablet Test for Textile Floor Coverings.
- .2 CAN/CGSB-4.2 No.77.1-94/ISO 4919:2000 , Textile Test Methods - Carpets - Determination of Tuft Withdrawal Force.
- .3 CAN/CGSB-4.129-93(R1997), Carpets for Commercial Use.

.3 Carpet and Rug Institute (CRI)
- .1 CRI Carpet Installation Standard 2009.

.4 Health Canada
- .1 C.R.C., c.923-10, Hazardous Products Act - Carpet Regulations, Part II of Schedule 1.

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

.6 National Floor Covering Association (NFCA)
- .1 National Floor Covering Specification Manual 2007.

.7 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-07, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
- .2 CAN/ULC-S102.2-07, Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies.

1.03 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets for each carpet tile, adhesive, carpet protection,

subfloor patching compound and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Samples:

.1 Submit for review and acceptance of each unit.

.2 Samples will be returned for inclusion into work.

.3 Submit duplicate samples of each type of carpet tile specified and duplicate tiles for each colour selected, 150 mm length base.

.4 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.5 Test and Evaluation Reports:

.1 Certified test reports showing compliance with specified performance characteristics and physical properties.

.6 Manufacturer's Instructions: submit manufacturer's installation and storage instructions.

.7 Manufacturers Reports:

.1 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance with specifications.

.8 Sustainable Design Submittals:

.1 Low-Emitting Materials:

.1 Submit listing of adhesives and coatings used in building, showing compliance with VOC and chemical component limits or restriction requirements.

.9 Qualification Statements:

.1 Compliance: to CAN/ULC-S102 and CAN/ULC-S102.2.

.3 Tuft bind: meets requirements of CAN/CGSB-4.129 when tested to CAN/CGSB-4.2 No.77.1.

1.05 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for installed products for incorporation into manual.

.3 Warranty Documentation: submit warranty documents specified.

1.06 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra stock materials in accordance with Section 09 68 00: deliver to Departmental Representative 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.

.1 Quantity: provide minimum of:

.1 Carpet tile: carton.

.2 Carpet base: two lengths of 2440 mm.

.3 Adhesives: one container.

.2 Delivery, storage and protection: comply with Departmental Representative's requirements for delivery and storage of extra materials. Protect as follows:
.1 Ship in original containers.

1.07 QUALITY ASSURANCE

.2 Qualifications:
.1 Manufacturer: capable of providing field service representation during construction and approving application method.
.2 Flooring Installer:
.1 Experienced in performing work of this Section who has specialized in installation of work similar to that required for this project.
.2 Certified by carpet manufacturer prior to bid submission.
.3 Must not sub-contract labour without written approval of Departmental Representative.
.4 Responsible for proper product installation, including floor testing and preparation as specified and in accordance with carpet manufacturer's written instructions.

1.08 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: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:
.1 Store materials in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
.3 Store and protect carpet tile and adhesive in original containers or wrapping with manufacturer's seals and labels intact.
.4 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.
.5 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials.
.6 Replace defective or damaged materials with new.

1.09 SITE CONDITIONS

.1 Ambient Conditions:
.1 Moisture: ensure substrate is within moisture limits and alkalinity limits recommended by manufacturer. Prepare moisture testing and provide report to Departmental Representative.
.2 Temperature: maintain ambient temperature of not less than 18 degrees C from 48 hours before installation to at least 48 hours after completion of work.
.3 Relative humidity: maintain between 10% and 65% for 48 hours before, during and 48 hours after installation.
.4 Ventilation:
.1 Ventilate area of work as directed by Departmental

Representative by use of approved portable supply and exhaust fans with HEPA filters.

.5 Provide continuous ventilation during and after carpet application. Run ventilation system 24 hours per day during installation; provide continuous ventilation for 7 days after completion of carpet installation.

.5 Install carpet after space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete.

1.10 WARRANTY

.1 Manufacturer's warranty: submit, for Departmental Representative's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and does not limit other rights Owner may have under Contract Documents.

.2 Warranty period: 1 year, commencing on date of substantial performance of work.

.1 Warranty covers labour and repair or replacement of defective components for 1 year after date of substantial performance.

2 PRODUCTS

2.01 MATERIALS

.1 Acceptable materials: carpet tile 610 x 610 mm. Colour selection by Departmental Representative.

2.02 PERFORMANCE

.1 Flammability: certified for flammability to Health Canada regulations under "Hazardous Products - Carpet Regulations", Part II of Schedule 1.

.2 Flame Spread: maximum flame spread rating 300, maximum smoke developed classification 500, when tested to CAN/ULC-S102.2.

.3 Smoke Development: 450 or less per ASTM E 662.

.4 Dry Breaking Strength: to ASTM D 2661, minimum acceptable tear strength in both length and width:

.1 11.3 kg for carpets installed by glue down installation.

.5 Wear: maximum 10% of pile face fiber by weight for 10 years.

.6 Edge Ravel: none for 10 years.

.7 Static Resistance: permanent static control to AATCC 134, 3000 V maximum at 20% RH and 22 degrees C.

.8 Static Generation: less than 3.0 kV per AATCC 134 for 10 years.

.9 Tuft Bind: Tuft Lock: to ASTM D 1335, minimum acceptable 1.6 kilograms for cut pile product,3.6 for loop pile product.

.10 De-lamination of Secondary Backing: Lamination Strength of Secondary Backing: to ASTM D 3936, minimum acceptable peel strength of 1.6 kg/25 mm.

.11 Stain resistance: to AATCC 175, 8.

.12 Soil Resistance: Fluorine Durability Level to AATCC 189.

.13 Colourfastness to light: to AATCC 16.

.14 Colourfastness to atmosphere: to AATCC 129 and AATCC 23.

.15 Colourfastness to crocking: to CAN/CGSB-4.2 No. 22.

.16 Indoor Air Quality Certification: certified to CRI Green Label.

2.03 FABRICATION

.1 Type: product carpet tile, pattern and colour as selected by Departmental Representative, size 610 mm x 610.

.2 Face construction:
- .1 Tufted.

.3 Pile Surface Appearance:
- .1 Level loop:textured.
- .2 Multi-level loop: concealed-pile.
- .3 Cut and loop: Saxony.
- .4 Cut pile: plain Saxony.

.4 Pile fibre: to CAN/CGSB-4.129.
- .1 Nylon: BCF.
  - .1 Type: Nylon 6.

.5 Face Fiber Denier: minimum 18.

.6 Dyeing Method: solution dyed.

.7 Tufted Carpet Backing: to CAN/CGSB-4.129.
- .1 Primary backing:
  - .1 Polypropylene: Cut Pile Carpet: 100% spunbonded polypropylene at a minimum weight of 126 g/mý.

.8 Finished Pile Height: minimum 0.5 mm average.

.9 Surface Pile Weight: minimum 474 g.

.10 Performance Rating: 3.0 minimum at 12,000 cycles to Hexapod test.

.11 Dimensional Stability: maximum + 0.15% to CAN/CGSB-4.2 No. 76/ISO 2551.

2.04 TILE CUSHION BACKING

.1 Density: urethane 224 kg/mü; EVA and PVC 240 kg/mü to ASTM D 3574.

.2 Compression force deflection, minimum: urethane 34.5 kN/mý to ASTM D 3574.

.3 Compression deflection, minimum: EVA and PVC 48.3 kN/mý to ASTM D 1667.

.4 Compression set at 50%, maximum: urethane 15% to ASTM D 3574.

.5 Anti-microbial Resistance: to AATCC 174, 2 mm minimum halo of inhibition for gram positive bacteria.
.1 1 mm minimum halo of inhibition for gram negative bacteria.
.2 Ensure no fungal growth.

2.05 ACCESSORIES

.1 Base:
.1 Resilient Base: Vinyl.

.2 Binder Bars: aluminum finish.

.3 Edge Strips:
.1 Metal:
.1 Hammered surface aluminum. Clamp down type

.4 Adhesive:
.1 Multi-purpose Adhesive Type: recommended by carpet tile manufacturer for direct glue down installation.

.2 On site application VOC limit: 50 g/L maximum.

.3 Adhesive in compliance with CCD-152.

.5 Transition Mouldings:
.1 Carpet edge / reducer strip: brushed aluminum.

.6 Carpet protection: non-staining heavy duty kraft paper.

.7 Concrete floor sealer/primer:
.1 As per manufacturer recommendation.

.2 VOC limit: 100 g/L maximum.

.8 Subfloor patching compound: Portland cement base filler, mix with latex and water to form cementitious paste.

3 EXECUTION

3.01 INSTALLERS

.1 Use experienced and qualified technicians to carry out assembly and installation of tile carpet.

3.02 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for carpet tile installation in accordance with manufacturer's written instructions.
.1 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
.2 Proceed with installation only after unacceptable conditions

have been remedied.

3.03 PREPARATION

.1 Subfloor Preparation:
- .1 Inspect concrete and determine special care required to make it a suitable for carpet.
- .2 Fill and level cracks 3 mm wide or protrusions over 0.8 mm with appropriate and compatible patching compound.
- .3 Comply with manufacturer's written recommendations for maximum patch thickness.
- .4 Prime large patch areas with compatible primer.
- .5 Ensure concrete substrates are cured, clean and dry.
- .6 Ensure concrete substrates are free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that interfere with the bonding of adhesive.
- .7 Where powdery or porous concrete surface is encountered, apply primer compatible with adhesive to provide a suitable surface for glue-down installation.

.2 Surface Preparation: prepare surface in accordance with manufacturer's written recommendations.
- .1 Prepare floor surfaces in accordance with CRI Carpet Installation Standard.

.3 Tile Carpeting Preparation:
- .1 Pre-condition carpeting: following manufacturer's written instructions.

3.04 INSTALLATION

.1 Install carpet tiles in accordance with manufacturer's written instructions, and CRI Carpet Installation Standard.

.2 Co-ordinate tile carpeting work with work of other trades, for proper time and sequence to avoid construction delays.

.3 Install carpet tile after finishing work is completed but before demountable office partitions and telephone and electrical pedestal outlets are installed.

.4 Install carpet tile as per manufacturer's recommendation. Patternis to be half tile off-set.

.5 Snugly join carpet tiles in completed installation.
- .1 Measure distance covered by 11 carpet tiles (10 joints) and ensure distance is in compliance with manufacturer specifications.
- .2 Do not trap yarn between carpet tiles.

.6 Apply thin film of pressure-sensitive adhesive according to manufacturer's recommendations.

.7 Ensure finished installation presents smooth wearing surface free from conspicuous seams, burring and other faults.

.8 Use material from same dye lot.
- .1 Ensure colour, pattern and texture match within visual areas.

.2 Maintain constant pile direction.

.9 Fit around architectural, mechanical, electrical and telephone outlets, and furniture fitments, around perimeter of rooms into recesses, and around projections.

.10 Install carpet tiles to access covers.

.11 Extend carpet tiles into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.12 Install carpet tiles smooth and free from bubbles, puckers, and other defects.

.13 Protect exposed carpet tile edges at transition to other flooring materials with suitable transition strips.

.14 Base Installation: Section 09 65 16 .

3.05 SITE QUALITY CONTROL

.1 Site Tests and Inspections:
.1 Co-ordinate site test with Section 01 45 00 - Quality Control.

.2 Manufacturer's Field Services:

.1 Co-ordinate manufacturer's services with Section 01 45 00 - Quality Control. Have manufacturer review work involved in handling, installation / application, protection and cleaning of its product, and submit written reports, in acceptable format, to verify compliance of work with Contract.
.2 Manufacturer's field services: provide manufacturer's field services, consisting of product use recommendations and periodic site visits for inspection of product installation, in accordance with manufacturer's instructions.
.3 Schedule site visits:
.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
.2 Twice during progress of Work at 25% and 60% complete.
.3 Upon completion of Work, after cleaning is carried out.
.4 Obtain reports within 3 days of review and submit immediately to Departmental Representative.

3.06 CLEANING

.1 Progress Cleaning: clean in accordance with Section [01 74 11 - Cleaning] .
.1 Leave Work area clean at end of each day.
.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
.1 Vacuum carpets clean immediately after completion of installation.

.2 Waste Management: separate waste materials for reuse and recycling.

3.07 PROTECTION

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

.2 Prohibit traffic on carpet for period of 24 hours minimum after installation and until adhesive is cured.

.3 Install carpet protection to satisfaction of Departmental Representative.

.4 Repair damage to adjacent materials caused by tile carpeting installation.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 01 33 00 – Submittal Procedures.

.2 Section 01 78 00 – Closeout Submittals.

.3 Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CGSB 41-GP-30M-82, Wall Coverings, Vinyl-Coated Fabrics.

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

.1 Material Safety Data Sheets (MSDS).

.3 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S102-03, Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL 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.

.1 Submit WHMIS MSDS - Material Safety Data Sheets. WHMIS MSDS acceptable to Labour Canada and Health and Welfare Canada for vinyl-coated fabric wall coverings. Indicate VOC content.

.2 Submit complete written description, including total fabric weight, name of fabric backing, tensile strength, tear strength and fire rating characteristics.

.3 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

.1 Due to product lead times, order material immediately upon approval of wall covering from Departmental Representative.

.2 Submit duplicate 280 x 215 mm samples of colours and textures of wall coverings.

.4 Closeout Submittals:

.1 Provide maintenance data for vinyl-coated fabric wall covering in accordance with Section 01 78 00 - Closeout Submittals.

1.4 QUALITY ASSURANCE

.1 Field Sample:

.1 Before commencing application, prepare wall and apply samples textures of wall covering from current production run of materials selected to show evidence there are no roller marks or other imperfections which may occur during manufacturing process of wall covering to three full wall panels, for Departmental Representative's approval.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 AMBIENT CONDITIONS

.1 Temperature: maintain air temperature and structural base temperature at wall covering installation area above 20 degrees C and relative humidity below 40% for 72 hours before, during and 72 hours after installation.

.2 Ventilation:

.1 Provide continuous ventilation during and after coating application.

Part 2 Products

2.1 MATERIALS

.1 Wall covering: to CGSB 41-GP-30M, Type1, 1380 mm width, silk texture, colour as later selected. Surface burning characteristics in accordance with CAN/ULC-S102. Acceptable product: similar to Ralph Lauren Breakwater Ultramarine colour blue, minimum 42 oz. fabric at supply cost range of $ 55.00/yard.

.2 Sealer: type recommended by covering manufacturer.

.3 Sizing: type recommended by covering manufacturer.

.4 Adhesive: wheat powder based adhesive, as recommended by covering 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 PREPARATION

.1 Unwrap wall covering when ventilation conditions are accelerated. Allow 24 hours acclimation in installation before application.

.2 Prepare surfaces according to covering manufacturer's instructions.

.3 Work penetrating substrate to be completed before installing covering.

.4 Seal surfaces to receive covering.

3.3 INSTALLATION

.1 Installation sequence:

- .1 Use rolls in consecutive numerical sequence of manufacture.
- .2 Place strip consecutively in exact order they are cut from roll; including spaces above or below windows, doors or similar penetrations.
- .3 Reverse alternate strips except on match patterns.

.2 Trim additional salvage where required to achieve colour and pattern match at seams.

.3 Apply adhesive to substrate as recommended by manufacturer.

.4 Hang non-matched patterns by overlapping edges and double cutting through both thicknesses with metal back-up strip to prevent cutting substrate.

.5 Wrap fabric 150 mm beyond inside and outside corners. No cutting at corners permitted, unless pattern or colour changes.

.6 No horizontal seams permitted.

.7 Install covering before installation of plumbing fixtures, electrical equipment, bases and cabinets.

.8 Remove excess adhesive along finished seams immediately after strips of wall covering is applied. As work progresses ensure clean warm water is used for final rinsing of wall covering and leave clean.

.9 Leave completed work smooth, clean, without wrinkles, gaps, overlaps or air pockets.

3.4 CLEANING

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

.2 Clean surfaces to covering manufacturer's written instructions.

3.5 PROTECTION

.1 Protect finished surfaces and exterior corners from damage until [final inspection].

3.6 SCHEDULES

.1 Refer to Room Finish Schedule.

END OF SECTION

General

1.1 **REFERENCES**

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

.1 Material Safety Data Sheets (MSDS).

.2 The Master Painters Institute (MPI)

.1 Architectural Painting Specification Manual - February 2004.

.3 National Fire Code of Canada.

1.2 **QUALITY ASSURANCE**

.1 Qualifications:

.1 Contractor: to have a minimum of five years proven satisfactory experience.

.2 Qualified journey persons as defined by local jurisdiction to be engaged in painting work

.3 Apprentices: may be employed provided they work under direct supervision of qualified journeyperson in accordance with trade regulations.

.4 Conform to latest MPI requirements for exterior painting work including preparation and priming.

.5 Materials: in accordance with MPI Painting Specification Manual "Approved Product" listing and from a single manufacturer for each system used.

.6 Paint materials such as linseed oil, shellac, and turpentine to be highest quality product of an approved manufacturer listed in MPI Painting Specification Manual and to be compatible with other coating materials as required.

.7 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

.8 Standard of Acceptance:

.1 Walls: No defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Soffits: No defects visible from floor 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.

1.3 **SCHEDULING**

.1 Submit work schedule for various stages of painting to Departmental Representative for approval. Submit schedule minimum of 48 hours in advance of proposed operations.

.2 Obtain written authorization from Departmental Representative for changes in work schedule.

.3 Schedule painting operations to prevent disruption of occupants in and about building.

1.4 **SUBMITTALS**

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00.

.3 Upon completion, submit records of products used. List products in relation to finish system and include the following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

.4 Manufacturer's Material Safety Data Sheets (MSDS).

.4 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit duplicate 200 x 300 mm sample panels of each paint finish with specified paint or coating in colours, gloss/sheen and textures required to MPI Painting Specification Manual standards submitted on the following substrate materials:

.1 3 mm plate steel for finishes over metal surfaces.

.2 50 mm concrete block for finishes over concrete or concrete masonry surfaces.

.3 13 mm gypsum board for finishes over gypsum board and other smooth surfaces.

.2 When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.

.3 Submit full range of available colours where colour availability is restricted.

1.5 **QUALITY CONTROL**

.1 When requested by Departmental Representative, prepare and paint designated surface, area, room or item to requirements specified herein, with specified paint or coating showing selected colours, number of coats, gloss/sheen, textures and workmanship to MPI Painting Specification Manual standards for review and approval. When approved, surface, area, room and/or items shall become acceptable standard of finish quality and workmanship for similar on-site work.

1.6 **MAINTENANCE**

.1 Extra Materials:

.1 Submit maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

.2 Submit one, four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.

1.7 **DELIVERY, STORAGE AND HANDLING**

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

.1 Deliver and store materials in original containers, sealed, with labels intact.

.2 Labels: to indicate:

.1 Manufacturer's name and address.

.2 Type of paint or coating.

.3 Compliance with applicable standard.

.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Provide and maintain dry, temperature controlled, secure storage.

.5 Observe manufacturer's recommendations for storage and handling.

.6 Store materials and supplies away from heat generating devices.

.7 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.8 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.9 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Departmental Representative. After completion of operations, return areas to clean condition to approval of Departmental Representative.

.10 Remove paint materials from storage only in quantities required for same day use.

.11 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling storage, and disposal of hazardous materials.

.12 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC fire extinguisher adjacent to storage area.

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

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

.2 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

1.8 **AMBIENT 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 Perform no painting work unless a minimum lighting level of 323 Lux is provided on surfaces to be painted. Adequate lighting facilities to be provided by General Contractor.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Unless specifically pre-approved by specifying body, Paint Inspection Agency and, applied product manufacturer, perform no painting work when:

.1 Ambient air and substrate temperatures are below 10 degrees C.

.2 Substrate temperature is over 32 degrees C unless paint is specifically formulated for application at high temperatures.

.3 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.

.4 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

.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 noted herein.

.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.

.5 Do not apply paint when:

.1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.

.2 Surface to be painted is wet, damp or frosted.

.6 Provide and maintain cover when paint must be applied in damp or cold weather. Heat substrates and surrounding air to comply with temperature and humidity conditions specified by manufacturer. Protect until paint is dry or until weather conditions are suitable.

.7 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.

.8 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

.9 Paint occupied facilities in accordance with approved schedule only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Products

1.9 **MATERIALS**

.1 Paint materials for paint systems: to be products of single manufacturer.

.2 The following must be performed on each batch of consolidated post-consumer material before surface coating is reformulated and canned. These tests must be performed at a laboratory or facility which has been accredited by the Standards Council of Canada.

.1 Lead, cadmium and chromium are to be determined using ICP-AES (Inductively Coupled Plasma - Atomic Emission Spectroscopy) technique no. 6010 as defined in EPA SW-846.

.2 Mercury is to be determined by Cold Vapour Atomic Absorption Spectroscopy using Technique no. 7471 as defined in EPA SW-846.

.3 Organochlorines and PCBs are to be determined by Gas Chromatography using Technique no. 8081 as defined in EPA SW-846.

1.10 COLOURS

.1 Departmental Representative will provide Colour Schedule after Contract award.

.2 Colour schedule will be based upon selection of five base colours and three accent colours. No more than eight colours will be selected for entire project and no more than three colours will be selected in each area.

.3 Selection of colours will be from manufacturers full range of colours.

.4 Where specific products are available in restricted range of colours, selection will be 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.

1.11 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Add thinner to paint manufacturer's recommendations. Do not use kerosene or organic solvents to thin water-based paints.

.4 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.

1.12 GLOSS/SHEEN RATINGS

.1 Paint gloss: defined as sheen rating of applied paint, in accordance with following values:

Gloss Level Category/	Units @ 60 Degrees/	Units @ 85 Degrees/
G1 - matte finish	0 to 5	max. 10
G2 - velvet finish	0 to 10	10 to 35
G3 - eggshell finish	10 to 25	10 to 35
G4 - satin finish	20 to 35	min. 35
G5 - semi-gloss finish	35 to 70	
G6 - gloss finish	70 to 85	
G7 - high gloss finish	> 85	

.2 Gloss level ratings of painted surfaces as specified.

1.13 EXTERIOR PAINTING SYSTEMS

.1 Asphalt Surfaces: zone/traffic marking for drive and parking areas, etc.

.1 EXT 2.1A - Latex zone/traffic marking finish.

.2 EXT 2.1B - Alkyd zone/traffic marking finish.

.2 Structural Steel and Metal Fabrications:

.1 EXT 5.1F - Epoxy finish.

Execution

1.14 **MANUFACTURER'S INSTRUCTIONS**

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

1.15 **PREPARATION**

.1 Apply paint materials in accordance with paint manufacturer's written application instructions.

.2 Clean and prepare exterior surfaces to be repainted in accordance with MPI Maintenance Repainting Manual requirements.

.3 Clean metal surfaces to be repainted by removing rust, dirt, oil, grease and foreign substances in accordance with MPI requirements. Remove such contaminates from surfaces, pockets and corners to be repainted by brushing with clean brushes, blowing with clean dry compressed air, or brushing/vacuum cleaning as required.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

.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.

1.16 **PROTECTION**

.1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore such surfaces as directed by Departmental Representative.

.2 Protect items that are permanently attached such as Fire Labels on doors and frames.

.3 Protect factory finished products and equipment.

.4 Protect building occupants in and about building.

.5 Remove light fixtures, surface hardware on doors, and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations.Store items and re-install after painting is completed.

.6 Move and cover exterior furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.7 As painting operations progress, place "WET PAINT" signs in pedestrian and vehicle traffic areas to approval of Departmental Representative.

1.17 **APPLICATION**

.1 Brush and Roller Application:

.1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Departmental Representative.

.5 Remove runs, sags and brush marks from finished work and repaint.

.2 Spray Application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of properly atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in a uniform layer, with overlapping at edges of spray pattern.

.4 Brush out immediately runs and sags.

.5 Use brushes to work paint into cracks, crevices and places which are not adequately painted by spray.

.3 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.

.4 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.5 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.6 Sand and dust between coats to remove visible defects.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as projecting ledges.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

1.18 **FIELD QUALITY CONTROL**

.1 Inspection:

.1 Advise Departmental Representative when each surface and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

.2 Co-operate with inspection firm and provide access to areas of work.

.2 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

1.19 **CLEANING**

.1 Proceed with Cleaning as follows.

.1 Remove paint where spilled, splashed, splattered or sprayed as work progresses using means and materials that are not detrimental to affected surfaces.

1.20 **RESTORATION**

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Departmental Representative. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Departmental Representative.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Related Sections:

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 78 00 - Closeout Submittals.

1.2 REFERENCES

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

.1 Material Safety Data Sheets (MSDS).

.2 Master Painters Institute (MPI)

.1 MPI Architectural Painting Specifications Manual, 2004.

.3 National Fire Code of Canada – 2005.

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.

1.4 SCHEDULING

.1 Schedule painting operations to prevent disruption of occupants.

1.5 SUBMITTALS

.1 Product Data:

.1 Submit product data and instructions for each paint and coating product to be used.

.2 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 Samples:

.1 Submit duplicate 200 x 300 mm sample panels of each paint 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 gypsum board for finishes over gypsum board and other smooth surfaces.

.2 Retain reviewed samples on-site to demonstrate acceptable standard of quality for appropriate on-site surface.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation and application instructions.

.4 Closeout Submittals: submit maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals include following:

.1 Product name, type and use.

.2 Manufacturer's product number.

.3 Colour numbers.

1.6 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 litre can of each type and colour of paint. Identify colour and paint type in relation to established colour schedule and finish system.

.3 Delivery, storage and protection: comply with Departmental Representative requirements for delivery and storage of extra materials.

1.7 DELIVERY, STORAGE AND HANDLING

.1 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.

.2 Remove damaged, opened and rejected materials from site.

.3 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.4 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.5 Remove paint materials from storage only in quantities required for same day use.

.6 Fire Safety Requirements:

.1 Provide one 9 kg Type ABC 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.

.7 Waste Management and Disposal:

.1 Separate waste materials for reuse and recycling.

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

1.8 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:

.1 Provide heating facilities 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 minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:

.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

.2 Apply paint in occupied facilities during silent hours only. Schedule operations to approval of Departmental Representative such that painted surfaces will have dried and cured sufficiently before occupants are affected.

Part 2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Conform to latest MPI requirements for interior painting work including preparation and priming.

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 manufacturer's 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.

.2 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as sheen rating of applied paint, in accordance with following values:

	Gloss @ 60 degrees	Sheen @ 85 degrees
Gloss Level 1 - Matte Finish (flat)	Max. 5	Max. 10
Gloss Level 2 - Velvet-Like Finish	Max.10	10 to 35
Gloss Level 3 - Eggshell Finish	10 to 25	10 to 35
Gloss Level 4 - Satin-Like Finish	20 to 35	min. 35
Gloss Level 5 - Traditional Semi-Gloss Finish	35 to 70	
Gloss Level 6 - Traditional Gloss	70 to 85	
Gloss Level 7 - High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as indicated.

2.5 INTERIOR PAINTING SYSTEMS

.1 Concrete Masonry Units: Smooth face block.

.1 INT 4.2A Latex eggshell finish over Latex sealer.
One coat: Latex sealer, CAN/CGSB 1.119-2000 and Two coats Interior Acrylic Latex, CAN/CGSB 1.195-99, Gloss Level G3 eggshell finish, 10 to 25 sheen value 60 deg. And 10 to 35 at 85 deg.

.2 Galvanized metal: doors, frames, and misc. steel.

.1 INT 5.3A - Latex insert gloss level 5 finish.

.3 Dressed lumber: including doors:

.1 INT 6.3A - High performance architectural latex gloss level 5 finish.

.4 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:

.1 INT 9.2A - Latex gloss level 4 finish (over latex sealer).

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. Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:

.1 Stucco, plaster and gypsum board: 12%.

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 factory finished products and equipment.

.3 Protect building occupants in and about the building.

.2 Surface Preparation:

.1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.

.2 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 wiping with dry, clean cloths.

.4 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

3.5 APPLICATION

.1 Brush and Roller Application:

.1 Apply paint in uniform layer using brush and/or roller type suitable for application.

.2 Work paint into cracks, crevices and corners.

.3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.

.4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.

.5 Remove runs, sags and brush marks from finished work and repaint.

.2 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between coats to remove visible defects.

3.6 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 1000 mm at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.7 FIELD QUALITY CONTROL

.1 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 floor 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.

.2 Advise Departmental Representative when surfaces and applied coating is ready for inspection. Do not proceed with subsequent coats until previous coat has been approved.

3.8 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.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 08 80 50 - Glazing: Mirrors.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)

.1 ASTM A167-99, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

.2 ASTM B456-95, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.

.3 ASTM A653/A653M-99, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.4 ASTM A924/A924M-99, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-1.88-92, Gloss Alkyd Enamel, Air Drying and Baking.

.2 CGSB 31-GP-107Ma-90, Non-inhibited Phosphoric Acid Base Metal Conditioner and Rust Remover.

.3 Canadian Standards Association (CSA)

.1 CAN/CSA-B651-95, Barrier-Free Design.

.2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 SHOP DRAWINGS

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

.2 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.4 CLOSEOUT SUBMITTALS

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

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

1.6 EXTRA MATERIALS

.1 Provide special tools required for accessing, assembly/disassembly or removal for toilet and bath accessories in accordance with requirements specified in Section 01 78 00 - Closeout Submittals.

.2 Deliver special tools to Departmental Representative.

Part 2 Products

2.1 MATERIALS

.1 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.

.2 Stainless steel sheet metal: to ASTM A167, Type 304, with polished finish.

.3 Stainless steel tubing: Type 304, commercial grade, seamless welded, 1.2 mm wall thickness.

.4 Fasteners: concealed screws and bolts hot dip galvanized, exposed fasteners to match face of unit. Expansion shields fibre, lead or rubber as recommended by accessory manufacturer for component and its intended use.

2.2 COMPONENTS

.1 Toilet tissue dispenser: double roll type, surface mounted, chrome plated steel frame, capacity of 500 double ply roll, roll under spring tension for controlled delivery.

.1 Acceptable material: ASIWatrous 9030 or equivalent.

.2 Combination towel dispenser/waste receptacle: recessed wall unit, approximately 410 mm wide, 1050 mm high, 230 mm deep. Interior of 0.8 mm galvanized steel, exterior of 0.8 mm stainless steel. Suitable for roll paper towels. Removable galvanized steel waste receptacle, lockable access door with continuous full height stainless steel hinge.

.1 Acceptable material: ASIWatrous 64696 or equivalent.

.3 Soap dispenser: liquid push-in valve 152 mm spout, self contained 1.14 L tank, stainless steel piston and valve assembly, tamper proof filler lock, under counter mounted, exposed metal components chrome plated.

.1 Acceptable material: ASIWatrous 0332 or equivalent.

.4 Feminine napkin disposal bin: stainless steel, recessed unit, continuous hinged door, self closing, embossed with universally accepted symbol, removable plastic receptacles fitted with spring clip for deodorizer block.

.1 Acceptable material: ASIWatrous 0473 or equivalent.

.5 Towel bar: 25 mm diameter stainless steel tubing, stainless steel end brackets, concealed fasteners, 760 mm long.

.1 Acceptable material: ASIWatrous 0755-Z or equivalent.

.6 Grab bars: 38 mm dia x 1.6 mm wall] tubing of stainless steel, 76 mm diameter wall flanges, concealed screw attachment, flanges welded to tubular bar, provided with steel back plates and all accessories. Knurl bar at area of hand grips. Grab bar material and anchorage to withstand downward pull of 2.2 kN.

.1 Acceptable material: ASIWatrous 3200Series type – 01, 600 and 760 or equivalent.

.7 Mirror: wall mounted unit, fixed framed mirror 6 mm polished tempered glass to CAN/CGSB-12.5, stainless steel frame, type 304 satin finish, 610 x 760 mm..

.1 Acceptable material: ASIWatrous 0620 or equivalent.

2.3 FABRICATION

.1 Weld and grind joints of fabricated components flush and smooth. Use mechanical fasteners only where approved.

.2 Wherever possible form exposed surfaces from one sheet of stock, free of joints.

.3 Brake form sheet metal work with 1.5 mm radius bends.

.4 Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.

.5 Back paint components where contact is made with building finishes to prevent electrolysis.

.6 Hot dip galvanize concealed ferrous metal anchors and fastening devices to CSA G164.

.7 Shop assemble components and package complete with anchors and fittings.

.8 Deliver inserts and rough-in frames to job site at appropriate time for building-in. Provide templates, details and instructions for building in anchors and inserts.

.9 Provide steel anchor plates and components for installation on studding and building framing.

2.4 FINISHES

.1 Chrome and nickel plating: to ASTM B456, polished finish.

.2 Stainless steel type 304 satin finish.

.3 Manufacturer's or brand names on face of units not acceptable.

Part 3 Execution

3.1 INSTALLATION

.1 Install and secure accessories rigidly in place as follows:

.1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.

.2 Hollow masonry units or existing plaster/drywall: use toggle bolts drilled into cell/wall cavity.

.3 Toilet/shower compartments: use male/female through bolts.

.2 Install grab bars on built-in anchors provided by bar manufacturer.

.3 Use tamper proof screws/bolts for fasteners.

.4 Fill units with necessary supplies shortly before final acceptance of building.

.5 Install mirrors in accordance with Section 08 80 50 - Glazing.

3.2 SCHEDULE

.1 Locate accessories where indicated and as follows. Exact locations determined by Departmental Representative.

.2 Toilet tissue dispenser: one in each toilet compartment mounting height 600 mm F.F.F.

.3 Combination towel dispenser/waste receptacles: one in each washroom where indicated. Maximum height of dispenser and operable part from floor 1200 mm.

.4 Soap dispenser: one at each wash basin.

.5 Feminine napkin disposal bin: one in each female toilet compartment mounting height 600 mm F.F.F.

.6 Grab bar: two in each handicapped toilet compartment. Height of grab bar from floor 840 mm. Side grab bar: maximum distance from rear wall 300 mm, minimum distance passed front edge of toilet 450 mm.

.7 Mirror: one at each wash basin, height of bottom edge of mirror from floor 1000 mm. Note: For room 109A, mirror glazing is to be non-breakable polycarbonate.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 06 10 00 – Rough Carpentry.

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

1.2 REFERENCES

.1 ASTM International

.1 ASTM D G 21, Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Indicate on drawings dimensions in relation to window jambs, operator details, head and sill anchorage details, hardware and accessories details.

.4 Samples:

.1 Submit one representative working sample of roller shade.

.2 Submit duplicate samples of manufacturer's standard colours for selection by Departmental Representative.

.5 Maintenance data including cleaning methods and instructions for operating hardware.

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

Part 2 Products

2.1 MATERIALS AND FABRICATION

.1 Design roller shades to following requirements:

.1 Roller shade: manual operating, chain drive, sunscreen roller shades in all exterior windows.
Shade cloth: visually transparent single-fabric shade cloth, single thickness non-raveling 0.762 mm (0.30") thick vinyl fabric, woven from 0.457 mm diameter extruded vinyl yarn comprising of 21 percent polyester and 78 percent reinforced vinyl, in colours selected from manufacturer's available range. Fabric is to be 5000 series.
Pattern: 5 percent open linear weave.
Acceptable Product: MechoShade Systems ThermoVeil or Equivalent.

.2 Shade Bands: construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hems pockets are not acceptable.

.3 Shade fabrication: units to completely fill window openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise. Shadecloth to hang flat without buckling or distorting

.4 Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands.

.5 Components: provide shade hardware allowing for removal of roller shade tube from brackets without removing hardware from opening and without requiring end or centre supports to be removed.

.6 Chain Drive: manual operated chain drive hardware and brackets to be provided for universal, regular and offset drive capacity allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Shade hardware system is to be positive mechanical engagement drive mechanism to shade roller tube. System to be fully integrated drive bracket/brake assembly.

.7 Drive Chain: #10 qualified stainless steel chain rated to 41 kg minimum breaking strength.

.8 Valance: continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives or exposed fasteners.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates and surfaces to receive roller shades previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to roller shade installation.

.1 Visually inspect substrate in presence of Departmental Representative .

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Install roller shades at exterior windows on all elevations on all floors that have visual glass.

.2 Install roller shades level, plumb, square, and true according to manufacturer's written instructions. Position so shades band is not closer than 50 mm to interior surface of glass.

.3 Adjust to provide for operation without binding.

.4 Use non corrosive metal fasteners for installation, concealed in final assembly.

3.3 ADJUSTING

.1 Adjust roller louvre components for correct function and operation in accordance with manufacturer's written instructions.

.2 Lubricate moving parts to operate smoothly and fit accurately.

.3 Installer to train client maintenance personnel to adjust, operate and maintain roller shade system.

3.4 CLEANING

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

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

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

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by roller shade installation.

END OF SECTION