



GREENING NORTHERN HOUSING

Pond Inlet, Nunavut

PROJECT MANUAL – VOL. 1

Divisions 00-13

Issued for Tender
January 28, 2022



Parks
Canada

Parcs
Canada

kobayashi+zedda

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Part 1 General**1.1 DEFINITIONS**

- .1 Information Documents means information of any type and in any form, related to the Project and identified in this Section as such.

1.2 STATUS OF INFORMATION DOCUMENTS

- .1 Information Documents, or any part thereof, are not part of the Contract unless specifically incorporated into Contract Document by means of copying, transcribing, or referencing.

1.3 USE OF AND RELIANCE UPON INFORMATION DOCUMENTS

- .1 Information Documents are made available for the purpose of providing information available to the Owner.
- .2 Information Documents shall not be considered a representation or warranty that information contained therein is accurate, complete or appropriate.
- .3 Contractor to interpret and draw its own conclusions about Information Documents and is encouraged to obtain specialist advice with respect thereto. The Engineer assumes no responsibility for such interpretations and conclusions.
- .4 Information contained in Information Documents may be time sensitive and dates shall be considered when interpreting Information Documents.
- .5 Contractor may rely upon the data contained in Information Documents or parts thereof, which are specifically incorporated into Contract Documents by means of copying, transcribing or referencing, but shall draw his own conclusions from such data and shall not rely on opinions or interpretations contained therein.

1.4 INFORMATION AVAILABLE FOR REVIEW

- .1 Geotechnical Reports:
 - .1 A copy of detailed geotechnical desktop reports with respect to the building site; prepared by Wood Environment & Infrastructure Solutions identified as follows have been appended hereto:
 - .1 Desktop Geotechnical Evaluation – Residence on Lot 75, Pond Inlet, Nunavut (Project # EA16466, 21 Pages), November 26, 2021.
 - .2 The report was prepared based on the present desktop geotechnical evaluation, using available geotechnical information close to the subject site. It is assumed that a geotechnical engineer will be required to confirm that the soil conditions encountered during preparation of the gravel pad subgrade are similar to these described in the present report.

- .3 The reports records properties of the soils and recommendations for the design of the foundations, prepared primarily for the use of the Consultant. The recommendations given shall not be construed as a requirement of this contract unless also contained in the Contract Documents.
- .2 Energy Modeling Report:
 - .1 A copy of energy report with respect to the building energy consumption prepared by ReNu Engineering identified as follows been appended hereto:
 - .1 Energy Modeling Report – Parks Canada Greening Northern Housing (99% Construction Documents), Project No. C20-895, December 23, 2021.
 - .2 The report outlines the design intent and energy consumption analysis of the project, prepared primarily for the use of the Consultant. The recommendations given shall not be construed as a requirement of this contract unless also contained in the Contract Documents.

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 WORK COVERED BY CONTRACT DOCUMENTS**

- .1 Work of this Contract comprises general construction of a new two-storey duplex located at Pond Inlet Nunavut as described in the attached drawings and specifications.
- .2 Work includes, but is not limited to the following:
 - .1 General construction including: Triodetic foundation including ground preparation; structural and non-structural wood stud framing; structural and non-structural insulated paneling; preformed metal exterior cladding; metal roofing; insulated metal doors; fiberglass frame windows; millwork; gypsum board including fire rated board; resilient flooring; painting.
 - .2 Site Work including: Rough grading and pads; Division 31-33 work.
 - .3 All architectural, structural, mechanical, electrical, and civil work shown on drawings.
 - .4 Airtightness and roofing testing by independent agency engaged by the Contractor.
 - .5 3rd Party commissioning agent engaged by the Contractor for overseeing commissioning of the mechanical and electrical system as indicated.
 - .6 O&M manuals and as-built drawings.
 - .7 All work within the extent of the contract as shown on Drawing A1.01.
 - .8 Co-ordination of sub-contractors.
 - .9 Co-ordination with local utilities and services.
 - .10 Liaison with Owner and Departmental Representative team members, including architect, structural engineer, commissioning agent and coordination with Owner-employed independent testing agencies.
 - .11 Obtain and pay for all required insurances.
 - .12 Securing and paying for all fees and permits as required by the Authorities Having Jurisdiction, including any permits required to complete the Work.
 - .13 Mobilization and demobilization costs.
 - .14 Temporary heating and hoarding costs.
 - .15 All work within the extent of contract.
 - .16 Dumpster, construction fencing, and coordination of all rental costs (including all heavy and light equipment).
 - .17 Coordination and management of all staging areas.
 - .18 Site cleanliness, including progressive cleaning.
 - .19 The contractor shall refer to the following reports for all geotechnical aspects of construction including, but not limited to, excavation, dewatering, shoring, underpinning, bearing capacity, bearing surface protection, backfilling, fill materials, subgrade protection, etc.:

- .1 Geotechnical Evaluation by Wood Environment & Infrastructure Solutions entitled "EA16466 - Pond Inlet Lot 75 Residence Desktop Geotechnical Evaluation -at"

1.1 SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures
- .2 Submit Project construction progress schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.
- .3 Submit site-specific and Work Plan Health and Safety Plan accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.2 COMPLETION DATE

- .1 Interim Certificate (Substantial Completion) by August 8, 2023.
- .2 Final Completion by September 5, 2024.

1.3 WORK BY OTHERS

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

1.4 CONTRACTOR USE OF PREMISES

- .1 Unrestricted use of site until Substantial Performance.
- .2 Co-ordinate use of premises under direction of Departmental Representative.
- .3 Obtain and pay for use of additional storage or work areas needed for operations under this Contract.

1.5 OWNER FURNISHED ITEMS

- .1 Owner Responsibilities:
 - .1 Arrange for delivery of shop drawings, product data, samples, manufacturer's instructions, and certificates to Contractor.
 - .2 Deliver supplier's bill of materials to Contractor.
 - .3 Arrange and pay for delivery to site in accordance with Progress Schedule.
 - .4 Inspect deliveries jointly with Contractor.
 - .5 Submit claims for transportation damage.
 - .6 Arrange for replacement of damaged, defective or missing items.
 - .7 Arrange for manufacturer's field services; arrange for and deliver manufacturer's warranties and bonds to Contractor.
- .2 Contractor Responsibilities:
 - .1 Designate submittals and delivery date for each product in progress schedule.

- .2 Review shop drawings, product data, samples, and other submittals. Submit to Departmental Representative notification of observed discrepancies or problems anticipated due to non-conformance with Contract Documents.
 - .3 Receive and unload products at site.
 - .4 Inspect deliveries jointly with Owner; record shortages, and damaged or defective items.
 - .5 Handle products at site, including uncrating and storage.
 - .6 Protect products from damage, and from exposure to elements.
 - .7 Assemble, install, connect, adjust, and finish products.
 - .8 Provide installation inspections required by public authorities.
 - .9 Repair or replace items damaged by Contractor or subcontractor on site (under his control).
- .3 Not in Contract Items:
- .1 NIC (Not in Contract) shall be used to designate various items of equipment that require coordination for installation although are not Provided as part of the Work.

1.6 EXISTING SERVICES

- .1 Establish location and extent of service lines in area of work before starting Work. Notify Departmental Representative of findings.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours notice for necessary interruption of mechanical or electrical service throughout course of work. Minimize duration of interruptions. Carry out work at times as directed by governing authorities with minimum disturbance to vehicular traffic.
- .3 Provide adequate bridging over trenches which cross sidewalks or roads to permit normal traffic.
- .4 Where unknown services are encountered, immediately advise Departmental Representative and confirm findings in writing.
- .5 Protect, relocate or maintain existing active services. When inactive services are encountered, cap off in manner approved by authorities having jurisdiction.
- .6 Record locations of maintained, re-routed and abandoned service lines.
- .7 Construct barriers in accordance with Section 01 50 00 - Temporary Facilities and Controls.

1.7 CONTRACT DOCUMENTS

- .1 The Contract Documents have been arranged into various divisions, sections, drawings, and schedules in a complementary manner for the purpose of presenting the Work in a logical and organized form and to enable ease of reference and interpretation, and are not intended to be an arrangement of precise and independent Subcontractors, or

jurisdiction of responsibility for the various parts of the Work. The Contractor shall be solely responsible for coordinating the execution of the Work of this Contract in accordance with the requirements of the Contract Documents.

- .2 As a result, the Departmental Representative shall not be required to decide on questions arising with regard to agreements or contracts between the Contractor and Subcontractors or Suppliers, nor to the extent of the parts of the Work assigned thereto.
- .3 Further, no extra will be allowed as a result of the failure to coordinate and allocate the Work such that the Work is Provided in accordance with the Contract Documents.
- .4 In the event of discrepancies or conflicts when interpreting the drawings and specifications, the specifications govern.

1.8 DOCUMENTS REQUIRED

- .1 Maintain at job site, one copy of each document as follows:
 - .1 Contract Drawings.
 - .2 Specifications.
 - .3 Addenda.
 - .4 Reviewed Shop Drawings.
 - .5 List of Outstanding Shop Drawings.
 - .6 Change Orders.
 - .7 Other Modifications to Contract.
 - .8 Field Test Reports.
 - .9 Departmental Representative's field review reports and deficiency reports.
 - .10 Reports by authorities having jurisdiction.
 - .11 Building and other applicable permits, and related permit documents.
 - .12 Daily log including:
 - .1 Weather (precipitation, high and low temperatures, wind, and visibility).
 - .2 Pertinent site conditions (muddy, flooded, frozen ground, water level).
 - .3 Number of workers actively working at the Place of the Work by each subcontract.
 - .4 Subcontractors working at the Place of the Work.
 - .5 Parts of the Work being worked on.
 - .6 Working hours worked at the Place of the Work.
 - .7 Activities with intermittent progress.
 - .8 Time lost and explanation for such time lost.
 - .9 Difficulties (work scheduled to start but did not with the reason why, delays, labour inefficiencies, labour shortage, weather).
 - .10 Products and materials delivered.
 - .11 Equipment mobilized and/or demobilized.
 - .12 Excavation conditions.

- .14 Start and finish date of each part of the Work.
- .15 Erection and removal dates of formwork.
- .16 Date, quantities and particulars of each concrete pour.
- .13 Copy of Approved Work Schedule.
- .14 Health and Safety Plan and Other Safety Related Documents.
- .15 As-built drawings recording as-built conditions, instructions, changes for structure, equipment, wiring, plumbing, and the like, as called for in Section 01 77 00 and Divisions 21, 22, and 23 and Divisions 26, 27, and 28, prior to being concealed.
- .16 Other documents as specified.

1.9 CONSTRUCTION SAFETY MEASURES

- .1 Observe and enforce construction safety measures required by the Canada Labour Code Part II, Occupational Health and Safety, Occupational Health and Safety Regulations - Nunavut and municipal statutes and authorities and site-specific Health and Safety Policies and Directives
- .2 In the event of conflict between any provisions of above authorities, the most stringent will apply.
- .3 Provide and maintain guardrails, fences, barricades, lights, signs and other devices required for protection of workmen and public in accordance with the requirements of the Canada Labour Code Part II, Occupational Health and Safety, Occupational Health and Safety Regulations - Nunavut and Regulations for Construction Projects and Local by-laws. All signs shall be bilingual or CSA universal pictograms.
- .4 Ensure the safety of building personnel at all times when performing work.

1.10 FIRE SAFETY REQUIREMENTS

- .1 Comply with the National Building Code of Canada for fire safety in construction and the National Fire Code of Canada for fire prevention, fire fighting and life safety in building in use.

1.11 CONTRACTOR AND SUB-CONTRACTORS

- .1 The Contractor agrees to employ those sub-contractors proposed by him in writing as listed in the Contractor's tender submission.
- .2 Do not change or substitute approved contractor for sub-contractors without prior authorization from the Departmental Representative.
- .3 Contractor and sub-contractor personnel shall be qualified as per definitions under the Trades Qualification and Apprenticeship Acts and as required by regulatory agencies in the Nunavut.

1.12 SUBMISSION OF TENDER

- .1 Submission of a tender is deemed to be confirmation of the fact that the Tenderer has analyzed the Contract Documents and is fully conversant with all conditions.

1.13 CONTRACT ADMINISTRATION CLOUD-BASED SOFTWARE

- .1 Contractor to provide and manage a cloud-based contract administration tool for use by the Contractor, Departmental Representative and Owner throughout the duration of the Contract.
 - .1 Functionality of software to include the following:
 - .2 Project Team contacts
 - .3 Payment certification
 - .4 Field reviews or project files
 - .5 Submittals
 - .6 Requests for Information
 - .7 Supplemental Instructions
 - .8 Proposed Changes / Change Orders with automatic migration to payment certification
 - .9 Designed to work within the Canadian regulatory environment.
 - .2 Acceptable software includes:
 - .1 Newforma Contract Management
 - .2 Onware
 - .3 Procore Project Management
 - .4 Rform

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 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, territorial and other regulations.

1.2 USE OF SITE AND FACILITIES

- .1 Execute work with least possible interference or disturbance to normal use of premises. Make arrangements with Departmental Representative to facilitate work as stated.
- .2 Maintain existing services to building and provide for personnel and vehicle access.
- .3 Where security is reduced by work provide temporary means to maintain security.
- .4 Provide temporary sanitary facilities for use by Contractor's personnel. Keep facilities clean.
- .5 Closures: protect work temporarily until permanent enclosures are completed.

1.3 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING FENCE

- .1 Execute work with least possible interference or disturbance to adjacent property Owner, tenants and public and normal use of premises. Arrange with Departmental Representative to facilitate execution of work.

1.4 EXISTING SERVICES

- .1 Notify, Departmental Representative and utility companies of intended interruption of services and obtain required permission.
- .2 Where Work involves breaking into or connecting to existing services, give Departmental Representative 48 hours of notice for necessary interruption of mechanical or electrical service throughout course of work. Keep duration of interruptions minimum. Carry out interruptions after normal working hours of occupants, preferably on weekends.
- .3 Provide for personnel and pedestrian and vehicular traffic.

1.5 SPECIAL REQUIREMENTS

- .1 Carry out noise generating Work in compliance with Pond Inlet Community Plan By-law.
- .2 Submit schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.
- .3 Ensure Contractor's personnel employed on site become familiar with and obey regulations including safety, fire, traffic and security regulations.
- .4 Keep within limits of work and avenues of ingress and egress.

- .5 Ensure all personnel entering the work site to become familiar with site COVID-19 protocols.

1.6 SECURITY

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

1.7 BUILDING SMOKING ENVIRONMENT

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

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 REFERENCE STANDARDS

- .1 Owner/Contractor Agreement.

1.2 APPLICATIONS FOR PROGRESS PAYMENT

- .1 Make applications for payment on account as provided in Agreement as Work progresses.
- .2 Date applications for payment last day of agreed monthly payment period and ensure amount claimed is for value, proportionate to amount of Contract, of Work performed and Products delivered to Place of Work at that date.
- .3 Submit to Departmental Representative, at least fourteen (14) days before first application for payment. Schedule of Values for parts of Work, aggregating total amount of Contract Price, to facilitate evaluation of applications for payment.
 - .1 At minimum, the Schedule of Values is to be divided by specification section.
 - .2 Departmental Representative to review proposed breakdown within 5 working days.

1.3 SCHEDULE OF VALUES

- .1 Provide schedule of values supported by evidence as Departmental Representative may reasonably direct and when accepted by Departmental Representative, be used as basis for applications for payment.
- .2 Include statement based on schedule of values with each application for payment.
- .3 Support claims for products delivered to Place of Work but not yet incorporated into Work by such evidence as Departmental Representative may reasonably require to establish value and delivery of products.

1.4 PROGRESS PAYMENT

- .1 Include updated project schedule with each application for payment. Departmental Representative will not review application unless an updated schedule meeting the requirements of Section 01 32 16.19 – Construction Project Schedule – Bar (Gantt) Chart is provided.
- .2 Departmental Representative will issue to Owner, no later than ten (10) working days after receipt of an application for payment, certificate for payment in amount applied for or in such other amount as Departmental Representative determines to be due. If Departmental Representative amends application, Departmental Representative will give notification in writing giving reasons for amendment.

1.5 SUBSTANTIAL PERFORMANCE OF WORK

- .1 Prepare and submit to Departmental Representative **comprehensive list** of items to be completed or corrected and apply for a review by Departmental Representative to establish Substantial Performance of Work. Failure to include items on list does not alter responsibility to complete Contract.
- .2 No later than ten (10) working days after receipt of list and application, Departmental Representative will review Work to verify validity of application, and no later than 7 working days after completing review, will notify Contractor if Work or designated portion of Work is substantially performed.
- .3 Departmental Representative will state date of Substantial Performance of Work in certificate.
- .4 Immediately following issuance of certificate of Substantial Performance of Work, in consultation with Departmental Representative, establish reasonable date for finishing Work.

1.6 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

- .1 After issuance of certificate of Substantial Performance of Work:
 - .1 Submit application for payment of holdback amount.
 - .2 Submit sworn statement that accounts for labour, subcontracts, products, construction machinery and equipment, and other indebtedness which may have been incurred in Substantial Performance of Work and for which Owner might in be held responsible have been paid in full, except for amounts properly retained as holdback or as identified amount in dispute.
- .2 After receipt of application for payment and sworn statement, Departmental Representative will issue certificate for payment of holdback amount.
- .3 Where holdback amount has not been placed in a separate holdback account, Owner shall, ten (10) working days prior to expiry of holdback period stipulated in lien legislation applicable to Place of Work, place holdback amount in bank account in joint names of Owner and Contractor.
- .4 Amount authorized by certificate for payment of holdback amount is due and payable on day following expiration of holdback period stipulated in lien legislation applicable to Place of Work. Where lien legislation does not exist or apply, holdback amount is due and payable in accordance with other legislation, industry practice, or provisions which may be agreed to between parties. Owner may retain out of holdback amount sums required by law to satisfy liens against Work or, if permitted by lien legislation applicable to Place of Work, other third-party monetary claims against Contractor which are enforceable against Owner.

1.7 FINAL PAYMENT

- .1 Submit application for final payment when Work is completed.

- .2 Departmental Representative will, no later than then (10) working days after receipt of application for final payment, review Work to verify validity of application. Departmental Representative will give notification that application is valid or give reasons why it is not valid, no later than seven (7) days after reviewing Work.
- .3 Departmental Representative will issue final certificate for payment when application for final payment is found valid.

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 ADMINISTRATIVE**

- .1 Schedule and administer project meetings throughout the progress of the work at the call of Departmental Representative.
- .2 Prepare agenda for meetings.
- .3 Distribute written notice of each meeting four working days in advance of meeting date to Departmental Representative.
- .4 Provide physical and/or virtual space and make arrangements for meetings.
- .5 Preside at meetings.
- .6 Record the meeting minutes. Include significant proceedings and decisions. Identify actions by parties.
- .7 Reproduce and distribute copies of minutes within three working days after meetings and transmit to meeting participants, affected parties not in attendance, and Departmental Representative.
- .8 Representative of Contractor, Subcontractor and suppliers attending meetings will be qualified and authorized to act on behalf of party each represents.

1.2 PRECONSTRUCTION MEETING

- .1 Within 10 working days after award of Contract, request a meeting of parties in contract to discuss and resolve administrative procedures and responsibilities.
- .2 Departmental Representative, Contractor, major Subcontractors, field inspectors and supervisors will be in attendance.
- .3 Establish time and location of meeting and notify parties concerned minimum 5 working days before meeting.
- .4 Incorporate mutually agreed variations to Contract Documents into Agreement, prior to signing.
- .5 Agenda to include:
 - .1 Code of conduct for the place of the Work.
 - .2 Appointment of official representative of participants in the Work.
 - .3 Status of permits, fees and requirements of the Authorities Having Jurisdiction.
 - .4 Health and safety procedure, notification to local authorities (fire, police, health).
 - .5 Schedule for progress meetings.
 - .6 Schedule of Work: in accordance with Section 01 32 16.19 - Construction Progress Schedule – Bar (Gantt) Chart.

- .7 Schedule of submission of shop drawings, samples, colour chips. Submit submittals in accordance with Section 01 33 00- Submittal Procedures.
- .8 Requirement for temporary facilities, site sign, offices, storage sheds, utilities, fences in accordance with Section 01 51 00 – Temporary Utilities and Section 01 52 00- Construction Facilities.
- .9 Delivery schedule of specified equipment.
- .10 Notification requirements for reviews. Allow for a minimum of 48 hours notice to Departmental Representative for review of Work unless specified otherwise.
- .11 Requirements for temporary facilities, site sign, offices, storage sheds, utilities, fences, and controls in accordance with Section 01 50 13- Temporary Facilities and Controls.
- .12 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, administrative requirements.
- .13 Owner provided products.
- .14 Record drawings in accordance with Section 01 33 00- Submittal Procedures.
- .15 Requirements for firestopping coordination and preparation of firestopping manual.
- .16 Commissioning requirements.
- .17 Requirements for airtightness testing and appointment of airtightness champion.
- .18 Maintenance manuals in accordance with Section 01 78 00- Closeout Submittals.
- .19 Take-over procedures, acceptance, warranties in accordance with Section 01 78 00- Closeout Submittals.
- .20 Monthly progress claims, administrative procedures, photographs, hold backs.
- .21 Appointment of inspection and testing agencies or firms.
- .22 Insurances, transcript of policies.

1.3 PROGRESS MEETINGS

- .1 During course of Work and bi-weekly.
- .2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 5 working days before meeting.
- .4 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within 3 days after meeting.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Work progress since previous meeting.
 - .3 Field observations, problems, conflicts.
 - .4 Problems which impede construction schedule.

- .5 Review of off-site fabrication delivery schedules.
- .6 Corrective measures and procedures to regain projected schedule.
- .7 Revision to construction schedule.
- .8 Progress schedule, during succeeding work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for affect on construction schedule and on completion date.
- .12 Health and safety updates.
- .13 Review of requests for interpretation log.
- .14 Review of commissioning pre-facility start-up progress and form preparation.
- .15 Other business.

1.4 COMMISSIONING PROGRESS MEETINGS

- .1 During commissioning and facility start-up, schedule commissioning progress meetings every 2 weeks. These meetings can occur as part of the regular Progress Meetings.
- .2 Contractor, Contractor's site superintendent(s), major Subcontractors involved in Work, Commissioning Agent, Commissioning Authority, Departmental Representative are to be in attendance.
- .3 Notify parties minimum 5 working days before meeting.
- .4 Location: Contractor's site office, or other location agreed to between the Owner and Contractor.
- .5 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Review of Commissioning progress since previous meeting.
 - .3 Identification of problems impeding progress towards achievement of Commissioning (Facility Start-up) milestones.
 - .4 Review of outstanding Contract Deficiencies.
 - .5 Review of Contract modifications and interpretations.
 - .6 Other business.

1.5 PRE-TAKEOVER MEETING

- .1 Prior to application for Substantial Performance of the Work, schedule a pre-takeover meeting.
- .2 Contractor, major Subcontractors involved in Work, and Departmental Representative are to be in attendance.
- .3 Notify parties minimum 10 working days before meeting.
- .4 Agenda to include the following:

- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Review of procedures for Substantial Performance of the Work, completion of the Contract, and handover of the Work.
- .4 Field observations, problems, conflicts.
- .5 Review of problems which impede Substantial Performance of the Work.
- .6 Review of procedures for deficiency review and corrective measures required.
- .7 Review of arrangements for utilities.
- .8 Progress schedule, during succeeding work period.
- .9 Review of submittal requirements for warranties, manuals, draft O&M manual and all demonstrations and documentation required for Substantial Performance of the Work.
- .10 Review of keying and hardware requirements.
- .11 Review of status of as-built documents and record drawings.
- .12 Status of commissioning and training.
- .13 Review of Contractor's deficiency (punch) list and status.
- .14 Review airtightness testing.
- .15 Cleaning requirements for occupancy.
- .16 Demobilization.
- .17 Other business.

1.6 POST CONSTRUCTION MEETING

- .1 Prior to application for Total Performance, schedule a post-construction meeting.
- .2 Agenda to include the following:
 - .1 Review, approval of minutes of previous meeting.
 - .2 Confirmation of completion of the Contract, and handover of reviewed documentation from the Consultant to the Owner.
 - .3 Confirmation of completion of Contract modifications.
 - .4 Problems which impede Total Performance of the Work.
 - .5 Identification of unresolved issues or potential warranty problems.
 - .6 Confirmation of completion of deficiencies.
 - .7 Corrective measures required.
 - .8 Confirm submittal requirements for Closeout submittals and Total Performance are in order.
 - .9 Review of procedures for communication during post-construction period.
 - .10 Handover of record documents by the Consultant to the Owner.
 - .11 Handover of Contract completion insurance policy transcripts to the Owner.
 - .12 Submission of final application for payment.
 - .13 Review and finalize outstanding claims and pricing amounts.

- .14 Status of commissioning and training.
- .15 Demobilization and restoration.
- .16 Other business.

1.7 WARRANTY MEETINGS

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with Consultant, Owner, and contractor's representative, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements.
 - .2 Consultant to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.
- .2 Owner reserves the right to require meetings during the warranty period to review Contract deficiencies, to determine action required for their correction, and to monitor progress of corrections related to previously identified Contract deficiencies.
- .3 Contractor, affected Subcontractors, Consultant and Owner are to be in attendance.

1.8 SPECIAL MEETINGS

- .1 Owner and Consultant reserve the right to require special meetings which may be held on short notice and at which the Contractor and representatives of affected Subcontractors and/or Suppliers is mandatory.
 - .1

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 DEFINITIONS**

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

1.2 REQUIREMENTS

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

- .2 Plan to complete Work in accordance with prescribed milestones and time frame.
- .3 Limit activity durations to maximum of approximately 10 working days, to allow for progress reporting.
- .4 Ensure that it is understood that Award of Contract or time of beginning, rate of progress, Interim Certificate and Final Certificate as defined times of completion are of essence of this contract.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Submit Master Plan to Departmental Representative within 10 working days of Contract Award.
- .3 Submit Project Schedule to Departmental Representative within 5 working days of receipt of acceptance of Master Plan.

1.4 QUALITY ASSURANCE

- .1 Use experienced personnel, fully qualified in planning and scheduling to provide services from start of construction to Final Certificate, including Commissioning.

1.5 PROJECT MILESTONES

- .1 Project milestones form interim targets for Project Schedule.
 - .1 Interim Certificate (Substantial Completion) by September 15, 2025
 - .2 Final Completion by March 31, 2026.

1.6 MASTER PLAN

- .1 Structure schedule to allow orderly planning, organizing and execution of Work as Bar Chart (GANTT) using Critical Path Method (CPM).
- .2 Departmental Representative will review and return revised schedules within 5 working days.
- .3 Revise impractical schedule and resubmit within 5 working days.
- .4 Accepted revised schedule will become Master Plan and be used as baseline for updates.

1.7 PROJECT SCHEDULE

- .1 Develop detailed Project Schedule derived from Master Plan.
- .2 Ensure detailed Project Schedule includes as minimum milestone and activity types as follows:
 - .1 Award.
 - .2 Shop Drawings, Samples.
 - .3 Permits.

- .4 Mobilization.
 - .5 Excavation.
 - .6 Triodetic Foundation.
 - .7 Backfill.
 - .8 Prefabricated panels.
 - .9 Wood Framing.
 - .10 Siding and Roofing.
 - .11 Interior Architecture (Walls, Floors and Ceiling).
 - .12 Plumbing.
 - .13 Piping.
 - .14 Controls.
 - .15 Heating, Ventilating, and Air Conditioning.
 - .16 Millwork.
 - .17 Lighting.
 - .18 Electrical.
 - .19 Testing and Commissioning.
 - .20 Supplied equipment long delivery items.
- .3 Clearly show sequence and interdependence of construction activities and indicate:
- .1 Start and completion of all items of Work, their major components, and interim milestone completion dates.
 - .2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:
 - .1 Time for submittals, resubmittals and review.
 - .2 Time for fabrication and delivery of manufactured products for Work.
 - .3 Interdependence of procurement and construction activities.
 - .3 Include sufficient detail to assure adequate planning and execution of Work. Activities generally range in duration from 3 to 15 work days each.
- .4 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.
- .5 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.
- .6 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Departmental Representative for review effects created by insertion of new Change Order.

1.8 PROJECT SCHEDULE REPORTING

- .1 Update Project Schedule on bi-weekly basis reflecting activity changes and completions, as well as activities in progress.
- .2 Include as part of Project Schedule, narrative report identifying Work status to date, comparing current progress to baseline, presenting current forecasts, defining problem areas, anticipated delays and impact with possible mitigation.
- .3 Ensure project schedule efficiencies through monitoring of project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed.
- .4 Monitor sufficiently often so that causes of delays can immediately be identified and mitigated.

1.9 PROJECT MEETINGS

- .1 Discuss Project Schedule at regular site meetings, identify activities that are behind schedule and provide measures to regain slippage. Activities considered behind schedule are those with projected start or completion dates later than current approved dates shown on baseline schedule.
- .2 Weather related delays with their remedial measures will be discussed and negotiated.

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 REFERENCE STANDARDS**

- .1 Approval of shop drawings and samples required by Departmental Representative as indicated

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 are co-ordinated.
- .8 Contractor's responsibility for errors and omissions in submission is not relieved by Departmental Representative's review of submittals.
- .9 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative review.
- .10 Keep one reviewed copy of each submission on site.

1.3 SHOP DRAWINGS AND PRODUCT DATA

- .1 The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.
- .2 Submit drawings stamped and signed by professional engineer registered or licensed in Northwest Territories and Nunavut (NAPEG), Canada.
- .3 Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been co-ordinated, regardless of Section

- under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.
- .4 Allow 14 days for Departmental Representative's review of each submission.
 - .5 Adjustments made on shop drawings by Departmental Representative are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Departmental Representative prior to proceeding with Work.
 - .6 Make changes in shop drawings as Departmental Representative may require, consistent with Contract Documents. When resubmitting, notify Departmental Representative in writing of revisions other than those requested.
 - .7 Accompany submissions with transmittal letter, containing:
 - .1 Date.
 - .2 Project title and number.
 - .3 Contractor's name and address.
 - .4 Identification and quantity of each shop drawing, product data and sample.
 - .5 Other pertinent data.
 - .8 Submissions include:
 - .1 Date and revision dates.
 - .2 Project title and number.
 - .3 Name and address of:
 - .1 Subcontractor.
 - .2 Supplier.
 - .3 Manufacturer.
 - .4 Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.
 - .5 Details of appropriate portions of Work as applicable:
 - .1 Fabrication.
 - .2 Layout, showing dimensions, including identified field dimensions, and clearances.
 - .3 Setting or erection details.
 - .4 Capacities.
 - .5 Performance characteristics.
 - .6 Standards.
 - .7 Operating weight.
 - .8 Wiring diagrams.
 - .9 Single line and schematic diagrams.
 - .10 Relationship to adjacent work.
 - .9 After Departmental Representative's review, distribute copies.

- .10 Submit electronic copies of submittals for each requirement requested in specification Sections and as Departmental Representative may reasonably request.
- .11 Submit electronic copies of product data sheets or brochures for requirements requested in specification Sections and as requested by Departmental Representative where shop drawings will not be prepared due to standardized manufacture of product.
- .12 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.
 - .2 Testing must have been within 3 years of date of contract award for project.
- .13 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Statements printed on manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements.
 - .2 Certificates must be dated after award of project contract complete with project name.
- .14 Submit electronic copies of manufacturers instructions for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Pre-printed material describing installation of product, system or material, including special notices and Material Safety Data Sheets concerning impedances, hazards and safety precautions.
- .15 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Departmental Representative.
 - .1 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .16 Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.
- .17 Submit electronic copies of Operation and Maintenance Data for requirements requested in specification Sections and as requested by Departmental Representative.
- .18 Delete information not applicable to project.
- .19 Supplement standard information to provide details applicable to project.
- .20 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.

- .21 The review of shop drawings by Public Services and Procurement Canada (PSPC) is for sole purpose of ascertaining conformance with general concept.
 - .1 This review shall not mean that PWGSC 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 interior material sample board including resilient tile flooring, laminated plastic countertop and casework, cabinet hardware and paint chips within 30 days of commence of contract.
- .2 Submit for review samples in triplicate as requested in respective specification Sections. Label samples with origin and intended use.
- .3 Deliver samples prepaid to Departmental Representative's business address.
- .4 Notify Departmental Representative in writing, at time of submission of deviations in samples from requirements of Contract Documents.
- .5 Where colour, pattern or texture is criterion, submit full range of samples.
- .6 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.
- .7 Make changes in samples which Departmental Representative may require, consistent with Contract Documents.
- .8 Reviewed and accepted samples will become standard of workmanship and material against which installed Work will be verified.

1.5 MOCK-UPS

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

1.6 PHOTOGRAPHIC DOCUMENTATION

- .1 Submit electronic copy of colour digital photography in jpg format, fine resolution monthly with progress statement and as directed by Departmental Representative.
- .2 Project identification: name and number of project and date of exposure indicated.
- .3 Number of viewpoints: 4 locations.
 - .1 Viewpoints and their location as determined by Departmental Representative.

- .4 Frequency of photographic documentation: as directed by Departmental Representative.
 - .1 At each stage of construction, and after the installation of each layer in an assembly.
 - .2 Before concealment of Work and as directed by Departmental Representative.

1.7 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 REFERENCE STANDARDS**

- .1 Government of Canada.
 - .1 Canada Labour Code - Part II
 - .2 Canada Occupational Health and Safety Regulations.
- .2 The Canadian Electric Code, Part II
- .3 Canadian Standards Association (CSA) as amended:
 - .1 CSA Z797-18 Code of Practice for Access Scaffold
 - .2 CSA Z462-18 Workplace Electrical Safety Standard
- .4 Nunavut:
 - .1 Occupational Health and Safety Regulations - Nunavut
 - .2 Oil and Gas Occupational Safety and Health Regulations

1.2 RELATED SECTIONS

- .1 Section 01 33 00 – Submittal Procedures
- .2 Section 01 50 00 – Temporary Facilities and Controls

1.3 WORKER'S COMPENSATION BOARD COVERAGE

- .1 Comply fully with the Workers' Compensation Act, regulations and orders made pursuant thereto, and any amendments up to the completion of the work.
- .2 Maintain Workers' Compensation Board coverage during the term of the Contract, until and including the date that the Certificate of Final Completion is issued.

1.4 COMPLIANCE WITH REGULATIONS

- .1 PWGSC may terminate the Contract without liability to PWGSC where the Contractor, in the opinion of PWGSC, refuses to comply with a requirement of the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .2 It is the Contractor's responsibility to ensure that all workers are qualified, competent and certified to perform the work as required by the Workers' Compensation Act or the Occupational Health and Safety Regulations.
- .3 Contractor must keep all safety plans up-to-date and conform Territories COVID-19 safety and regulations.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Submit site-specific Health and Safety Plan: Within 7 days after date of Notice to Proceed and prior to commencement of Work. Health and Safety Plan must include:
 - .1 Results of site-specific safety hazard assessment.
 - .2 Results of safety and health risk or hazard analysis for site tasks and operation found in work plan.
- .3 Submit copies of reports or directions issued by Federal, Provincial and Territorial health and safety inspectors.
- .4 Submit copies of incident and accident reports.
- .5 Submit WHMIS MSDS - Material Safety Data Sheets and all other documentation required by Workplace Hazardous Materials Information System (WHMIS) requirements.
- .6 Submit COVID-19 Workplace Risk Assessments and Exposure Control Plan to outline all necessary precautions that the employer needs to follow to minimize risks of COVID-19 transmission and to keep works and client safe.
- .7 Departmental Representative will review Contractor's site-specific Health and Safety Plan and provide comments to Contractor within 5 working days.
- .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.
- .11 Submission of the Site Specific Health and Safety Plan, and any revised version, to the Departmental Representative is for information and reference purposes only. It shall not:
 - .1 Be construed to imply approval by the Departmental Representative.
 - .2 Be interpreted as a warranty of being complete, accurate and legislatively compliant.
 - .3 Relieve the Contractor of his legal obligations for the provision of health and safety on the project.

1.6 FILING OF NOTICE

- .1 File Notice of Project with Territorial authorities prior to beginning of Work.
- .2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of contract award.

- .3 Contractor shall agree to install proper site separation and identification in order to maintain time and space at all times throughout life of project.

1.7 SAFETY ASSESSMENT

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

1.8 MEETINGS

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

1.9 REGULATORY REQUIREMENTS

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

1.10 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.

1.11 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 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.
- .3 Contractor shall be the Principal Contractor as described in the Quebec Act Respecting Health and Safety code for the Construction for only their scope and areas of work as defined and described this project specification.
- .4 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.

1.12 COMPLIANCE REQUIREMENTS

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

1.13 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 Territory having jurisdiction and advise Departmental Representative verbally and in writing.

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

1.14 HEALTH AND SAFETY CO-ORDINATOR

- .1 If required by territorial legislation, employ and assign to Work, competent and authorized representative as Health and Safety Co-ordinator.

1.15 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 Territory having jurisdiction, and in consultation with Departmental Representative.

1.16 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.

1.17 BLASTING

- .1 Blasting or other use of explosives is not permitted without prior receipt of written instruction by Departmental Representative.

1.18 POWDER ACTUATED DEVICES

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

1.19 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 REFERENCE STANDARDS****1.2 DEFINITIONS**

- .1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.
- .2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets.
 - .2 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29- Health and Safety Requirements.

1.4 FIRES

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

1.5 DRAINAGE

- .1 Ensure pumped water into waterways, sewer or drainage systems is free of suspended materials.
- .2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.6 SITE CLEARING AND PLANT PROTECTION

- .1 Minimize stripping of topsoil and vegetation.

1.7 POLLUTION CONTROL

- .1 Maintain temporary erosion and pollution control features installed under this Contract.
- .2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.
- .3 Prevent sandblasting and other extraneous materials from contaminating air and waterways beyond application area.
 - .1 Provide temporary enclosures where required.

- .4 Cover or wet down dry materials and rubbish to prevent blowing dust and debris. Provide dust control for temporary roads.

1.8 HISTORICAL/ARCHAEOLOGICAL CONTROL

- .1 Provide historical, archaeological, cultural resources, biological resources, and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on project site: and identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in area are discovered during construction.
- .2 Plan: include methods to assure protection of known or discovered resources and identify lines of communication between Contractor personnel and Departmental Representative.

1.9 NOTIFICATION

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Bury rubbish and waste materials on site where directed after receipt of written approval from Departmental Representative.

- .3 Ensure public waterways, storm and sanitary sewers remain free of waste and volatile materials disposal.
- .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.
- .5 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 19- Waste Management and Disposal.
 - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section references to laws, by laws, ordinances, rules, regulations, codes, orders of Authority Having Jurisdiction, and other legally enforceable requirements applicable to Work and that are; or become, in force during performance of Work.

1.2 REFERENCES TO REGULATORY REQUIREMENTS

- .1 Perform Work in accordance with National Building Code of Canada (NBC) 2015 including amendments up to tender closing date and other codes of provincial or local application provided that in case of conflict or discrepancy, more stringent requirements apply.
- .2 Specific design and performance requirements listed in specifications or indicated on Drawings may exceed minimum requirements established by referenced Building Code; these requirements will govern over the minimum requirements listed in Building Code
 - .1 Meet or exceed requirements of:
 - .1 Contract documents.
 - .2 Specified standards, codes and referenced documents.
 - .3 National Fire Code
 - .4 National Energy Code.

1.3 BUILDING SMOKING ENVIRONMENT

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

1.4 QUALITY ASSURANCE

- .1 Regulatory Requirements: Except as otherwise specified, Contractor shall apply for, obtain, and pay fees associated with, permits, licenses, certificates, and approvals required by regulatory requirements and Contract Documents, based on General Conditions of Contract and the following:
 - .1 Regulatory requirements and fees in force on date of Bid submission, and
 - .2 A change in regulatory requirements or fees scheduled to become effective after date of tender submission and of which public notice has been given before date of tender submission

Part 2 Products

2.1 PERMITS

- .1 Development Permit: Owner has applied for, obtained, and paid for development permit.

- .2 Building Permit:
 - .1 Constructor shall apply for, obtain and pay for building permit on behalf of Owner, and other permits required for Work and its various parts.
 - .2 Constructor will require that specific Subcontractor's obtain and pay for permits required by authorities having jurisdiction.
 - .3 Constructor shall display building permit and other permits in a conspicuous location at Place of Work.
- .3 Occupancy Permits:
 - .1 Constructor shall apply for, obtain, and pay for occupancy permits, including partial occupancy permits where required by authority having jurisdiction.
 - .2 Departmental Representative will issue appropriate instructions to Constructor for correction to Work where Contract Document deficiencies are required to be corrected in order to obtain occupancy permits, including partial occupancy permits.
 - .3 Constructor shall correct deficiencies in accordance with Departmental Representative's instructions. Where deficiency is not corrected, Owner reserves the right to make correction and charge Constructor for costs incurred.
 - .4 Constructor shall turn occupancy permits over to Owner.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General**1.1 INSPECTION**

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

1.2 INDEPENDENT INSPECTION AGENCIES

- .1 Independent Inspection/Testing Agencies will be engaged by the Owner for purpose of inspecting and/or testing portions of Work.
- .2 Costs for airtightness testing of the building envelope shall be included as part of the Contract. Refer to 07 08 13 Building Enclosure Performance Testing.
- .3 Costs of soil testing shall be included as part of the Contract. Number and test locations shall be determined by Departmental Representative.
- .4 Costs for roofing inspection shall be included in the warranties specified in that section.
- .5 Costs for a 3rd party commissioning agent will be included as part of the contract.
- .6 Costs of commissioning, testing and balancing of mechanical and plumbing systems shall be included as part of the mechanical subcontract. Refer to Mechanical Divisions.
- .7 Costs of commissioning, testing electrical systems shall be included as part of the electrical subcontract. Refer to Electrical Divisions.
- .8 Inspection and testing required by codes or ordinances, or by an authority having jurisdiction, and made by a legally constituted authority, shall be the responsibility of the Contractor and shall be paid for by the Contractor and not be paid by Owner, unless otherwise specified in the Contract Documents.
- .9 Inspection or testing performed exclusively for Contractor's convenience shall be sole responsibility of Contractor, and will not be paid by Owner.

- .10 Inspection and testing shall be performed by an independent company approved by Departmental Representative qualified to perform the inspections or tests specified or required.
- .11 Provide equipment required for executing inspection and testing by appointed agencies.
- .12 Employment of inspection/testing agencies does not relax responsibility to perform Work in accordance with Contract Documents.
- .13 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 Owner. Pay costs for retesting and reinspection.

1.3 ACCESS TO WORK

- .1 Allow inspection/testing agencies access to Work, off site manufacturing and fabrication plants.
- .2 Co-operate to provide reasonable facilities for such access.

1.4 PROCEDURES

- .1 Notify appropriate agency and Departmental Representative a minimum of 5 Working Days in advance of requirement for tests, in order that attendance arrangements can be made.
- .2 Submit samples and/or materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in orderly sequence to not cause delays in Work.
- .3 Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

1.5 REJECTED WORK

- .1 Remove defective Work, whether result of poor workmanship, use of defective products or damage and whether incorporated in Work or not, which has been rejected by Departmental Representative as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.
- .2 Make good other Contractor's work damaged by such removals or replacements promptly.
- .3 If in opinion of Departmental Representative, it is not expedient to correct defective Work or Work not performed in accordance with Contract Documents, Owner will deduct from Contract Price difference in value between Work performed and that called for by Contract Documents, amount of which will be determined by Departmental Representative.

1.6 REPORTS

- .1 Submit electronic copies of inspection and test reports to Departmental Representative within 5 Working Days of each inspection.
- .2 Inspection and testing companies shall submit a digital written report for each inspection or test, including pertinent data such as conditions at the Place of the Work, dates, test references, locations of tested materials, actual Product identification, testing methodology, procedures, and descriptions, site instructions given, recommendations and/or any other information required by standard applicable to reporting of tests and inspections.
 - .1 Report shall clearly indicate failure of Product or procedures to meet applicable standards, give recommendations for retesting or correction. Inspector shall contact Contractor and Departmental Representative immediately when Product or Product assembly fails to meet requirements of the Contract Documents.
- .3 Provide copies to manufacturer or fabricator of material being inspected or tested or subcontractor of work being inspected or tested.

1.7 TESTS AND MIX DESIGNS

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

1.8 MOCK-UPS

- .1 Prepare mock-ups for Work specifically requested in specifications. Include for Work of Sections required to provide mock-ups.
- .2 Construct in locations as specified in specific Section or as acceptable to Departmental Representative.
- .3 Prepare mock-ups for Departmental Representative's review with reasonable promptness and in orderly sequence, to not cause delays in Work.
- .4 Failure to prepare mock-ups in ample time is not considered sufficient reason for extension of Contract Time and no claim for extension by reason of such default will be allowed.
- .5 If requested, Departmental Representative will assist in preparing schedule fixing dates for preparation.
- .6 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.
- .7 Reviewed and accepted mock-ups will become standards of workmanship and material against which installed work will be compared.
- .8 Remove and replace materials or assemblies not matching reviewed mock-ups.

- .9 Resubmit mock-ups until written acceptance is obtained from Departmental Representative.

1.9 EQUIPMENT AND SYSTEMS

- .1 Submit commissioning, adjustment and balancing reports for mechanical, electrical and building equipment systems.
- .2 Refer to the following sections: Section 23 05 93 – Testing, Adjusting and Balancing for HVAC; Section 23 08 13 – Performance Verification HVAC Systems.
- .3 Refer to the following sections: Section 26 31 00 – Photovoltaic Systems for Photovoltaic Systems.

1.10 AIRTIGHTNESS TESTING

- .1 Contractor to complete airtightness testing as specified in Section 07 08 13 – Building Enclosure Performance Testing at the following stages of construction:
 - .1 Upon completion of the mock-up unit.
 - .2 Upon completion of the installation of the air barrier and windows and doors, to identify any air leaks, and allow for correction.
 - .3 After completion of all corrective measures identified in the first test.
 - .4 At substantial completion of construction.
- .2 Contractor is to correct details as required by Departmental Representative and independent Airtightness Testing Agent to achieve specified airtightness, and to complete additional re-testing as required until the specified airtightness is achieved.
- .3 Contractor to undertake qualitative testing at various points during construction using smoke tracer testing or infrared thermography to identify air leakage paths prior to airtightness testing.
 - .1 Testing is to be completed by pressurizing the interior by using a test chamber to isolate the section of the building being tested. Pressurization can be completed using dedicated fans or the building mechanical system.
 - .2 Air leakage rates do not need to be tested or recorded.

Part 2 Products

2.1 SIGNAGE

- .1 Provide interior signage at entry to building indicating the following (or similar language):
 - .1 **NOTICE**
THIS IS AN AIRTIGHT BUILDING.
No drilling, chasing, or cutting without prior consent from the airtightness supervisor.

Any damages caused to the air-tight layer will be at the expense of the trade.
Report all penetrations to the Departmental Representative.

- .2 Signage to be a minimum of 400 x 300mm, and digitally printed on coroplast. Locate
- .3 signage prominently at all entrances to the building and at every floor level.

2.2 Execution

2.3 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

1.2 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities control in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.3 DEWATERING

- .1 Provide temporary drainage and pumping facilities to keep excavations and site free from standing water.
- .2 The Work includes the removal of collected groundwater and surface water accumulating from precipitation and groundwater infiltration throughout the course of the Work until date of Substantial Performance of the Work.
- .3 Keep drainage lines and gutters open. No flow of water shall be directed across or over pavements except through pipes or properly constructed troughs. Keep portions of the Work properly and efficiently drained during construction and until completion. Be responsible for disturbances, dirt and damage which may be caused by or result from water backing up or flowing over, through, from or along any part of the Work, or due to operations which may cause water to flow elsewhere.
- .4 Keep trenches and other excavations free of water. Remove water in a manner that will prevent loss of soil, and maintain the stability of existing soils.
- .5 Dispose of such water in a manner that will not be hazardous to public health and safety, private property, or to the Work.
- .6 Drainage of trenches or other excavation through storm drainage pipe will be allowed only with the express permission of the authority having jurisdiction.
- .7 When drainage is permitted in writing to be directed to existing catch basins, regularly and at Substantial Performance of the Work inspect such catch basins and remove accumulated debris and sediment.

1.4 WATER SUPPLY

- .1 Provide a continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Pay for utility charges at prevailing rates.

1.5 TEMPORARY HEATING AND VENTILATION

- .1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.
- .2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.
- .3 Provide temporary heat and ventilation in enclosed areas as required to:
 - .1 Facilitate progress of Work.
 - .2 Protect Work and products against dampness and cold.
 - .3 Prevent moisture condensation on surfaces.
 - .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
 - .5 Provide adequate ventilation to meet health regulations for safe working environment.
- .4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.
- .5 Ventilating:
 - .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
 - .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
 - .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
 - .4 Ventilate storage spaces containing hazardous or volatile materials.
 - .5 Ventilate temporary sanitary facilities.
 - .6 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.
- .6 Permanent heating system of building, may be used when available. Be responsible for damage to heating system if use is permitted.
- .7 Ensure Date of Substantial Performance and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Departmental Representative.
- .8 Pay costs for maintaining temporary heat, when using permanent heating system.
- .9 Maintain strict supervision of operation of temporary heating and ventilating equipment to:
 - .1 Conform with applicable codes and standards.
 - .2 Enforce safe practices.
 - .3 Prevent abuse of services.
 - .4 Prevent damage to finishes.

- .5 Vent direct-fired combustion units to outside.
- .10 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

1.6 TEMPORARY POWER AND LIGHT

- .1 Provide and pay for temporary power during construction for temporary lighting and operating of power tools.
- .2 Arrange for connection with appropriate utility company. Pay costs for installation, maintenance and removal.
- .3 Provide and maintain any components and equipment necessary to transform supply power to necessary temporary power voltage.
- .4 Provide and maintain temporary lighting throughout project. Ensure level of illumination on all floors and stairs is not less than 162 lx.
- .5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Departmental Representative provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace non-LED lamps which have been used for more than 3 months.

1.7 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone and data hook up. Lines and equipment will be for use by Contractor and Departmental Representative.
- .2 Superintendent shall be equipped with mobile telephone device.

1.8 FIRE PROTECTION

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

END OF SECTION

Part 1 General**1.1 REFERENCE STANDARDS**

- .1 CSA Group (CSA)
 - .1 CAN/CSA-S269.2-16, Access Scaffolding for Construction Purposes.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 GENERAL INSTRUCTIONS

- .1 Arrange, obtain and pay cost for permits required for temporary facilities and controls.
- .2 Provide and maintain temporary facilities and controls for the Work and remove them from the Work upon issuance of certificate of Substantial Performance of the Work.
- .3 Arrange and pay for required temporary services, unless otherwise indicated by Departmental Representative.
- .4 Provide connection and disconnection of temporary services and facilities required in the Work.
- .5 Design and Safety Requirements for Temporary Facilities:
 - .1 Be responsible for design, erection, operation, maintenance and removal of temporary structural and other temporary facilities. Engage and pay for registered professional engineering personnel skilled in the appropriate disciplines to perform these functions where required by law or by the Contract Documents; and in cases where such temporary facilities and their method of construction are of such a nature that professional engineering skill is required to produce safe and satisfactory results.
 - .2 Engage and pay for professional engineer(s) registered in Place of the Work to design and supervise construction and maintenance of hoardings, covered ways, protective canopies and project sign(s).

1.4 INSTALLATION AND REMOVAL

- .1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.
- .2 Identify areas which have to be gravelled to prevent tracking of mud.
- .3 Indicate use of supplemental or other staging area.
- .4 Provide construction facilities in order to execute work expeditiously.
- .5 Remove from site all such work after use.

1.5 SCAFFOLDING

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

1.6 HOISTING

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

1.7 SITE STORAGE/LOADING

- .1 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.
- .2 Do not load or permit to load any part of Work with weight or force that will endanger Work.
- .3 Construct weather-tight storage sheds for storage of materials that may be damaged or defaced by weather. Provide floors raised 150 mm (6") clear of ground for storage of Products.
- .4 Owner is not responsible for securing Products or materials at the Place of the Work.

1.8 CONSTRUCTION PARKING

- .1 Parking will be permitted on site provided it does not disrupt performance of Work.
- .2 Provide and maintain adequate access to project site.

1.9 SECURITY

- .1 The Contractor shall be solely responsible for securing the Place of the Work and the Work, and for securing areas used for the storage of Products or construction machinery and equipment. The Owner shall have no responsibility in this regard.
- .2 Provide and maintain security lighting.
- .3 Provide and maintain temporary locks. Premises to be locked after working hours.

1.10 OFFICES

- .1 Provide site office heated to 22 degrees C, lighted 750 lx and ventilated and furnished with drawing laydown table.
- .2 Provide marked and fully stocked first-aid case in a readily available location.
- .3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

1.11 EQUIPMENT, TOOL AND MATERIALS STORAGE

- .1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.
- .2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.12 SANITARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.
- .3 Use of new building's sanitary facilities by workers is prohibited.

1.13 CONSTRUCTION SIGNAGE

- .1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.
- .2 Indicate on sign, name of Owner, Contractor, Funding Agents, of design style established by Departmental Representative.
- .3 No other signs or advertisements, other than warning signs, are permitted on site.
- .4 Provide project identification site sign comprising foundation, framing, and 1200 x 2400 mm signboard as detailed and as described below.
 - .1 Foundations: A-frame SPF, pressure-treated foundation with pre-cast concrete ballast blocks.
 - .2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.
 - .3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.
 - .4 Paint: alkyd enamel to MPI#9 over exterior alkyd primer to MPI#5.
 - .5 Fasteners: hot-dip galvanized steel nails and carriage bolts.
 - .6 Vinyl sign face: printed project identification, self adhesive, vinyl film overlay, design supplied by Departmental Representative.
- .5 Locate project identification sign as directed by Departmental Representative and construct as follows:
 - .1 Build concrete foundation, erect framework, and attach signboard to framing.
 - .2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.
 - .3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.
- .6 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Consultant/Contractor

signboard must conform to project identification site sign. Wording in both official languages.

- .7 Signs and notices for safety and instruction in both official languages. Graphic symbols to CAN/CSA-Z535.2.
- .8 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Departmental Representative.

1.14 PROTECTION AND MAINTENANCE OF TRAFFIC

- .1 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.
- .2 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs.
- .3 Protect travelling public from damage to person and property.
- .4 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.
- .5 Dust control: adequate to ensure safe operation at all times.
- .6 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.
- .7 Provide snow removal during period of Work.
- .8 Keep public and private roads free of dust, mud and debris resulting from truck, machinery and vehicular traffic related specifically to this Project, for the duration of Work.
- .9 Clean roads regularly, public or private. Wash down and scrape flush roads at least daily when earth moving operations take place. Maintain public property in accordance with requirements of authorities having jurisdiction.
- .10 Repair of damage to roads caused by construction operations.

1.15 CLEAN-UP

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
- .3 Remove construction debris, waste materials, packaging material from work site daily.
- .4 Clean dirt or mud tracked onto paved or surfaced roadways.
- .5 Store materials resulting from demolition activities that are salvageable.
- .6 Stack stored new or salvaged material not in construction facilities.

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 REFERENCE STANDARDS**

- .1 Within text of each specifications section, reference may be made to reference standards. List of standards reference writing organizations is contained in Section 01 41 00 – Regulatory Requirements.
- .2 Conform to these reference standards, in whole or in part as specifically requested in specifications.
- .3 If there is question as to whether products or systems are in conformance with applicable standards, Departmental Representative reserves right to have such products or systems tested to prove or disprove conformance.
- .4 Cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

- .1 Products, materials, equipment and articles incorporated in Work shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- .2 Procurement policy is to acquire, in cost effective manner, items containing highest percentage of recycled and recovered materials practicable consistent with maintaining satisfactory levels of competition. Make reasonable efforts to use recycled and recovered materials and in otherwise utilizing recycled and recovered materials in execution of work.
- .3 Defective products, whenever identified prior to completion of Work, will be rejected, regardless of previous inspections. Inspection does not relieve responsibility, but is precaution against oversight or error. Remove and replace defective products at own expense and be responsible for delays and expenses caused by rejection.
- .4 Should disputes arise as to quality or fitness of products, decision rests strictly with Departmental Representative based upon requirements of Contract Documents.
- .5 Unless otherwise indicated in specifications, maintain uniformity of manufacture for any particular or like item throughout building.
- .6 Permanent labels, trademarks and nameplates on products are not acceptable in prominent locations, except where required for operating instructions, or when located in mechanical or electrical rooms.

1.3 AVAILABILITY

- .1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify Departmental Representative of such, in order that substitutions or

other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Handle and store products in manner to prevent damage, adulteration, deterioration and soiling and in accordance with manufacturer's instructions when applicable.
- .2 Store packaged or bundled products in original and undamaged condition with manufacturer's seal and labels intact. Do not remove from packaging or bundling until required in Work.
- .3 Store products subject to damage from weather in weatherproof enclosures.
- .4 Store cementitious products clear of earth or concrete floors, and away from walls.
- .5 Store sheet materials, lumber and other Products susceptible to deterioration on flat, solid supports and keep clear of ground or slab. Slope to shed moisture.
- .6 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.
- .7 Remove and replace damaged products at own expense and to satisfaction of Departmental Representative.
- .8 Touch-up damaged factory finished surfaces to Departmental Representative's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.5 TRANSPORTATION

- .1 Pay costs of transportation of products required in performance of Work.
- .2 Reject Products damaged during transport.
- .3 Transportation of Products must be undertaken to suit construction schedule. Contractor is responsible for determining mode of transport to ensure delivery, obtaining shop drawings, placement of orders, and on-time premium costs, air freight, and the like.
- .4 Transportation cost of products supplied by Owner will be paid for by Owner. Unload, handle and store such products.

1.6 MANUFACTURER'S INSTRUCTIONS

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

- .2 Notify Departmental Representative in writing, of conflicts between specifications and manufacturer's instructions, so that Departmental Representative will establish course of action.
- .3 Improper installation or erection of products, due to failure in complying with these requirements, authorizes Departmental Representative to require removal and re-installation at no increase in Contract Price or Contract Time.

1.7 QUALITY OF WORK

- .1 Ensure Quality of Work is of highest standard, executed by workers experienced and skilled in respective duties for which they are employed. Immediately notify Departmental Representative if required Work is such as to make it impractical to produce required results.
- .2 Do not employ anyone unskilled in their required duties. Departmental Representative reserves right to require dismissal from site, workers deemed incompetent or careless.
- .3 Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative, whose decision is final.

1.8 CO-ORDINATION

- .1 Ensure co-operation of workers in laying out Work. Maintain efficient and continuous supervision.
- .2 Be responsible for coordination and placement of openings, sleeves and accessories.

1.9 CONCEALMENT

- .1 In finished areas conceal pipes, ducts and wiring in floors, walls and ceilings, except where indicated otherwise.
- .2 Before installation inform Departmental Representative if there is interference. Install as directed by Departmental Representative.

1.10 REMEDIAL WORK

- .1 Refer to Section 01 73 00- Execution Requirements.
- .2 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.
- .3 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.11 LOCATION OF FIXTURES

- .1 Consider location of fixtures, outlets, and mechanical and electrical items indicated as approximate.
- .2 Inform Departmental Representative of conflicting installation. Install as directed.

1.12 FASTENINGS

- .1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent materials, unless indicated otherwise.
- .2 Prevent electrolytic action between dissimilar metals and materials.
- .3 Use non-corrosive hot dip galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in affected specification Section.
- .4 Space anchors within individual load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
- .5 Keep exposed fastenings to a minimum, space evenly and install neatly.
- .6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

1.13 FASTENINGS - EQUIPMENT

- .1 Use fastenings of standard commercial sizes and patterns with material and finish suitable for service.
- .2 Use heavy hexagon heads, semi-finished unless otherwise specified. Use No. 304 stainless steel for exterior areas.
- .3 Bolts may not project more than one diameter beyond nuts.
- .4 Use plain type washers on equipment, sheet metal and soft gasket lock type washers where vibrations occur. Use resilient washers with stainless steel.

1.14 PROTECTION OF WORK IN PROGRESS

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

1.15 EXISTING UTILITIES

- .1 When breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, with minimum of disturbance to Work, and pedestrian and vehicular traffic.
- .2 Protect, relocate or maintain existing active services. When services are encountered, cap off in manner approved by authority having jurisdiction. Stake and record location of capped service.

Part 2 Products**2.1 NOT USED**

- .1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General**1.1 QUALIFICATIONS OF SURVEYOR**

- .1 Qualified registered land surveyor, licensed to practise in Place of Work, acceptable to Departmental Representative.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit name and address of Surveyor to Departmental Representative.
- .2 On request of Departmental Representative, submit documentation to verify accuracy of field engineering work.
- .3 Submit Topographic and Legal survey of the property 10 days prior to starting site work.
- .4 Topographic and Legal Survey Submittals:
 - .1 Provide results as: tabular data in Excel format
 - .2 Submit plotted plan of elevation data (PDF and CAD).
 - .3 All results to include benchmark number for each point.
- .5 Submit certificate signed by surveyor certifying and noting those elevations and locations of completed Work that conform and do not conform with Contract Documents.

1.3 TOPOGRAPHIC SURVEY

- .1 Topographic survey requirement including, but not limited to the following;
 - .1 North Arrow;
 - .2 Elevation of permanent Hamlet geodetic datum or permanent Monuments;
 - .3 Corner and angle posts of elevations, install and leave all new iron survey bars on site;
 - .4 Lot boundary with dimensions and bearings;
 - .5 Easements;
 - .6 Utility right of way;
 - .7 Existing structures (including fence, access road, fuel tanks and building/structure) on property & adjacent properties with locations related to property lines, dimensions, size, materials (for fence, pad etc), top of slab/floor/pad elevations, existing grade elevations at corners of structure;
 - .8 Elevations on 500mm contour;
 - .9 Elevation centre line of roads, ditch and Lanes;
 - .10 Electrical lines location;
 - .11 Power poles, overhead lines on property and near property;
 - .12 Plot rock outcroppings, gravel surface & other items that might interfere with development & construction;

- .13 Any other site features that will affect and have an impact to the renovation and construction work, and site development.

1.4 SURVEY REFERENCE POINTS

- .1 Locate, confirm and protect control points prior to starting site work. Preserve permanent reference points during construction.
- .2 Conduct elevation survey of benchmarks. Accuracy to be +/- 5mm (total station or level are acceptable).
- .3 Make no changes or relocations without prior written notice to Departmental Representative.
- .4 Report to Departmental Representative when reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- .5 Require surveyor to replace control points in accordance with original survey control.

1.5 SURVEY REQUIREMENTS

- .1 Establish two permanent bench marks on site, referenced to established bench marks by survey control points. Record locations, with horizontal and vertical data in Project Record Documents.
- .2 Establish lines and levels, locate and lay out, by instrumentation.
- .3 Stake for grading and fill placement.
- .4 Establish pipe invert elevations.
- .5 Stake batter boards for foundations.
- .6 Establish foundation, column locations and floor elevations.

1.6 EXISTING SERVICES

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

1.7 LOCATION OF EQUIPMENT AND FIXTURES

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

1.8 RECORDS

- .1 Maintain a complete, accurate log of control and survey work as it progresses.
- .2 On completion of foundation pads and major site improvements, prepare a certified survey showing dimensions, locations, angles and elevations of Work.
- .3 Record locations of service lines.

1.9 SUBSURFACE CONDITIONS

- .1 Promptly notify Departmental Representative in writing if subsurface conditions at Place of Work differ materially from those indicated in Contract Documents, or a reasonable assumption of probable conditions based thereon.
- .2 After prompt investigation, should Departmental Representative determine that conditions do differ materially, instructions will be issued for changes in Work as provided in Changes and Change Orders.

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 ACTION AND INFORMATIONAL SUBMITTALS**

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit written request in advance of cutting or alteration which affects:
 - .1 Structural integrity of elements of project.
 - .2 Integrity of weather-exposed or moisture-resistant elements.
 - .3 Efficiency, maintenance, or safety of operational elements.
 - .4 Visual qualities of sight-exposed elements.
 - .5 Work of Owner or separate contractor.
- .3 Include in request:
 - .1 Identification of project.
 - .2 Location and description of affected Work.
 - .3 Statement on necessity for cutting or alteration.
 - .4 Description of proposed Work, and products to be used.
 - .5 Alternatives to cutting and patching.
 - .6 Effect on Work of Owner or separate contractor.
 - .7 Written permission of affected separate contractor.
 - .8 Date and time work will be executed.

1.2 MATERIALS

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

1.3 PREPARATION

- .1 Inspect existing conditions, including elements subject to damage or movement during cutting and patching.
- .2 After uncovering, inspect conditions affecting performance of Work.
- .3 Beginning of cutting or patching means acceptance of existing conditions.
- .4 Provide supports to assure structural integrity of surroundings; provide devices and methods to protect other portions of project from damage.
- .5 Provide protection from elements for areas which are to be exposed by uncovering work; maintain excavations free of water.

1.4 EXECUTION

- .1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.
- .2 Fit several parts together, to integrate with other Work.

- .3 Uncover Work to install ill-timed Work.
- .4 Remove and replace defective and non-conforming Work.
- .5 Provide openings in non-structural elements of Work for penetrations of mechanical and electrical Work.
- .6 Execute Work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
- .7 Cut rigid materials using masonry saw or core drill. Pneumatic or impact tools not allowed on masonry work without prior approval.
- .8 Restore work with new products in accordance with requirements of Contract Documents.
- .9 Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- .10 Provide firestopping in accordance with Section 07 84 00 - Firestopping to maintain the integrity of fire separations, including:
 - .1 Protecting penetrations at fire-resistance rated wall, ceiling or floor construction.
 - .2 Using construction joint fire stops and building perimeter fire stops to protect gaps at fire separations and between fire separations and other construction assemblies.
- .11 Refinish surfaces to match adjacent finishes: Refinish continuous surfaces to nearest intersection. Refinish assemblies by refinishing entire unit.
- .12 Conceal pipes, ducts and wiring in floor, wall and ceiling construction of finished areas except where indicated otherwise.

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 PROJECT CLEANLINESS**

- .1 Maintain Work in tidy condition, free from accumulation of waste products and debris, other than that caused by Owner or other Contractors.
- .2 Keep all waste generated by the work within the work area until scheduled disposal at an approved disposal facility as per Section 01 74 19 – Waste Management and Disposal.
- .3 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.
- .4 Clear snow and ice from access to building. Bank/pile snow in designated areas only.
- .5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.
- .6 Clean interior areas prior to start of finishing work, and maintain areas free of dust and other contaminants during finishing operations.
- .7 Store volatile waste in covered metal containers, and remove from premises at end of each working day.
- .8 Provide adequate ventilation during use of volatile or noxious substances. Use of building ventilation systems is not permitted for this purpose.
- .9 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.
- .10 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces nor contaminate building systems.

1.2 FINAL CLEANING

- .1 When Work is Substantially Performed remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.
- .2 Remove waste products and debris other than that caused by others, and leave Work clean and suitable for occupancy.
- .3 Prior to final review remove surplus products, tools, construction machinery and equipment.
- .4 Remove waste products and debris within the work area.
- .5 Remove waste materials from site at regularly scheduled times or dispose of as directed by Departmental Representative. Do not burn waste materials on site, unless approved 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, and floors.
- .9 Clean lighting reflectors, lenses, and other lighting surfaces.
- .10 Vacuum clean and dust building interiors, behind grilles, louvres and screens.
- .11 Wax, seal, shampoo or prepare floor finishes, as recommended by manufacturer.
- .12 Inspect finishes, fitments and equipment and ensure specified workmanship and operation.
- .13 Broom clean and wash exterior walks, steps and surfaces; rake clean other surfaces of grounds.
- .14 Remove dirt and other disfiguration from exterior surfaces.
- .15 Clean and sweep roofs, gutters, areaways, and sunken wells.
- .16 Sweep and wash clean paved areas.
- .17 Clean equipment and fixtures to sanitary condition; clean or replace filters of mechanical equipment.
- .18 Clean roofs, downspouts, and drainage systems.
- .19 Remove debris and surplus materials from crawl areas and other accessible concealed spaces.
- .20 Remove snow and ice from access to building.

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 WASTE MANAGEMENT GOALS**

- .1 Prior to start of Work conduct meeting with Departmental Representative to review and discuss PCA's waste management Plan and Goals.
- .2 Protect environment and prevent environmental pollution damage.

1.2 DEFINITIONS:

- .1 Clean Waste: Untreated and unpainted; not contaminated with oils, solvents, sealants or similar materials.
- .2 Construction Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction operations.
- .3 Hazardous: Exhibiting the characteristics of hazardous substances including properties such as ignitability, corrosiveness, toxicity or reactivity.
- .4 Non hazardous: Exhibiting none of the characteristics of hazardous substances, including properties such as ignitability, corrosiveness, toxicity, or reactivity.
- .5 Non toxic: Not poisonous to humans either immediately or after a long period of exposure.
- .6 Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- .7 Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- .8 Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form; recycling does not include burning, incinerating, or thermally destroying waste.
- .9 Return: To give back reusable items or unused products to vendors for credit.
- .10 Reuse: To reuse a construction waste material in some manner on the project site.
- .11 Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- .12 Sediment: Soil and other debris that has been eroded and transported by storm or well production run off water.
- .13 Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- .14 Toxic: Poisonous to humans either immediately or after a long period of exposure.
- .15 Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- .16 Volatile Organic Compounds (VOC's): Chemical compounds common in and emitted by many building products over time through outgassing:

- .17 Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.3 REFERENCE STANDARDS:

- .1 Canadian Construction Association (CCA)
- .1 CCA 81-2001: A Best Practices Guide to Solid Waste Reduction.
- .2 Parks Canada
- .1 Guide for the Use, Handling and Disposal of Pressure Treated Wood, 2009
- .2 Departmental Sustainable development Strategy 2020-2023
https://drive.google.com/drive/u/0/folders/1Ex0xPvY8kgzd-3F_HsMKtqR59ECuJn97
- .3 Public Services and Procurement Canada (PSPC)
- .1 2002 National Construction, Renovation and Demolition Non-Hazardous Solid Waste Management Protocol.
- .2 CRD Waste Management Market Research Report (available from PWGSC's Environmental Services).
- .3 Departmental Sustainable Development Strategy 2020-2023: Target 2.1 Environmentally Sustainable Use of Natural Resources.

1.4 STORAGE, HANDLING AND PROTECTION

- .1 Store, materials to be reused, recycled and salvaged in locations as directed by Departmental Representative.
- .2 All solid waste to be stored and handled according to applicable federal and provincial regulations.
- .3 Unless specified otherwise, materials for removal become Contractor's property.
- .4 Separate non-salvageable materials from salvaged items. Transport and deliver non-salvageable items to licensed disposal facility. All material to be removed from site.
- .5 Cover materials during transportation.
- .6 Protect structural components not removed and salvaged materials from movement or damage.
- .7 Support affected structures. If safety of building is endangered, cease operations and immediately notify Departmental Representative.
- .8 Protect surface drainage, mechanical and electrical from damage and blockage.
- .9 Separate and store materials produced during project in designated areas.
- .10 Securely store waste materials.
- .11 Separate and store hazardous Waste and hazardous materials in accordance with Community of Pond Inlet Hazardous Waste Disposal Guidelines and in designated areas.

- .12 Prevent contamination of materials to be salvaged and recycled and handle materials in accordance with requirements for acceptance by designated processing facilities.
 - .1 On-site source separation is required.
 - .2 Remove co-mingled materials to off site processing facility for separation.

1.5 DISPOSAL OF WASTES

- .1 Do not bury or burn rubbish or waste materials.
- .2 Do not dispose of waste, volatile material, mineral spirits, oil, or paint thinner into waterways, storm, or sanitary sewers.
- .3 Dispose of treated wood in accordance with Parks Canada Guide for the Use, Handling and Disposal of Pressure Treated Wood, 2009.
- .4 All waste materials from Work shall be removed from the site on upon completion and considered for reuse or resale prior to disposal.
- .5 All cuttings, sawdust, and other wood waste material shall be collected and disposed of at an approved disposal facility.
- .6 Remove materials on-site as Work progresses.
- .7 Food waste shall be removed daily and disposed of as directed by the Departmental Representative.
- .8 Hazardous Waste and Hazardous Materials: Handle in accordance with Nunavut’s General Management of Hazardous Wastes.

1.6 WASTE MANAGEMENT FACILITIES

- .1 Hamlet landfill.

1.7 SCHEDULING

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

Part 2 Products

2.1 NOT USED

- .1 Not Used.

Part 3 Execution

3.1 APPLICATION

- .1 Handle waste materials not reused, salvaged, or recycled in accordance with appropriate regulations and codes.

3.2 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

END OF SECTION

Part 1 General**1.1 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's 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 Equipment and systems: tested, adjusted, balanced and fully operational.
 - .4 Certificates required by authorities having jurisdiction and Utility companies: submitted.
 - .5 Operation of systems: demonstrated to Owner's personnel in accordance with Section 01 79 00 – Demonstration and Training.
 - .6 Commissioning of mechanical systems: completed in accordance with Section 23 05 93 – Testing, Adjusting and Balancing for HVAC and Section 23 08 13 – Performance Verification HVAC Systems
 - .7 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 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.

1.2 FINAL CLEANING

- .1 Clean in accordance with Section 01 74 00 - Cleaning.
 - .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 ADMINISTRATIVE REQUIREMENTS**

- .1 Pre-warranty Meeting:
 - .1 Convene meeting one week prior to contract completion with Departmental Representative and contractor's representative, in accordance with Section 01 31 19- Project Meetings to:
 - .1 Verify Project requirements.
 - .2 Review warranty requirements.
 - .2 Departmental Representative to establish communication procedures for:
 - .1 Notifying construction warranty defects.
 - .2 Determine priorities for type of defects.
 - .3 Determine reasonable response time.
 - .3 Contact information for bonded and licensed company for warranty work action: provide name, telephone number and address of company authorized for construction warranty work action.
 - .4 Ensure contact is located within local service area of warranted construction, is continuously available, and is responsive to inquiries for warranty work action.

1.2 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, a digital copy of operating and maintenance manuals in English for review, including at minimum the following content:
 - .1 System Data
 - .2 Installation Instructions
 - .3 Operation Instructions
 - .4 Maintenance Instructions
 - .5 Spare Parts Lists
 - .6 Supplier and Contractors Lists
 - .7 Product Data and Shop Drawings
 - .8 Draft Testing and Balancing and Commissioning Forms.
- .3 Following review, provide two final copies of the closeout submittals specified in this section.
- .4 Provide spare parts, maintenance materials and special tools of same quality and manufacture as products provided in Work.
- .5 Provide evidence, if requested, for type, source and quality of products supplied.

1.3 FORMAT

- .1 Organize data as instructional manual.
- .2 Binders: bound using expanding spine catalogue binders complete with plated piano hinges, hard covered, expandable pots, 210 x 275 mm with spine and face embossed with Project title. Provide sufficient volumes to allow each binder to hold system data while in full closed position, and to be no more than 75% full. Provide artwork and colour to Owner for approval prior to binder construction.
- .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 Electronic Copy: Provide electronic copy of all closeout submittals on a USB storage device as follows:
 - .1 File type to be a composite electronically indexed portable document format file (PDF).
 - .2 Name each indexed document file in the composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - .3 Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - .4 File Names and Bookmarks:
 - .1 Enable bookmarking of individual documents based on file names.
 - .2 Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents.
 - .3 Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree.
 - .4 Configure electronic manual to display bookmark panel on opening file.
 - .5 Enable inserted reviewer comments on draft submittals.

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.
- .6 Training: refer to Section 01 79 00- Demonstration and Training.

1.5 AS -BUILT DOCUMENTS AND SAMPLES

- .1 Maintain, 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.
- .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 Referenced Standards 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 inspection certifications, manufacturer's certifications, field test records, required by individual specifications sections.
- .7 Provide digital photos, if requested, for site records.

1.7 FINAL SURVEY

- .1 Submit final site survey certificate in accordance with Section 01 71 00 - Examination and Preparation, certifying that elevations and locations of completed Work are in conformance, or non-conformance with Contract Documents.

1.8 EQUIPMENT AND SYSTEMS

- .1 For each item of equipment and each system include description of unit or system, and component parts.
 - .1 Give function, normal operation characteristics and limiting conditions.

- .2 Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.
- .2 Panel board circuit directories: provide electrical service characteristics, controls, and communications.
- .3 Include installed colour coded wiring diagrams.
- .4 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences.
 - .1 Include regulation, control, stopping, shut-down, and emergency instructions.
 - .2 Include summer, winter, and any special operating instructions.
- .5 Maintenance Requirements: include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- .6 Provide servicing and lubrication schedule, and list of lubricants required.
- .7 Include manufacturer's printed operation and maintenance instructions.
- .8 Include sequence of operation by controls manufacturer.
- .9 Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- .10 Provide installed control diagrams by controls manufacturer.
- .11 Provide Contractor's co-ordination drawings, with installed colour coded piping diagrams.
- .12 Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- .13 Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- .14 Include test and balancing reports as specified in Section 01 45 00- Quality Control and Section 23 05 93 – Testing, Adjusting and Balancing for HVAC.
- .15 Additional requirements: as specified in individual specification sections.

1.9 MATERIALS AND FINISHES

- .1 Building products, applied materials, and finishes: include product data, with catalogue number, size, composition, and colour and texture designations.
 - .1 Provide information for re-ordering custom manufactured products.
- .2 Instructions for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- .3 Moisture-protection and weather-exposed products: include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

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

1.10 MAINTENANCE MATERIALS

- .1 Spare Parts and Extra Stock Materials:
 - .1 Provide spare parts, maintenance and extra materials, and special tools 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.

1.11 DELIVERY, STORAGE AND HANDLING

- .1 Store spare parts, maintenance materials, and special tools in manner to prevent damage or deterioration.
- .2 Store in original and undamaged condition with manufacturer's seal and labels intact.
- .3 Store components subject to damage from weather in weatherproof enclosures.
- .4 Store paints and freezable materials in a heated and ventilated room.
- .5 Remove and replace damaged products at own expense and for review by Departmental Representative.

1.12 WARRANTIES AND BONDS

- .1 Develop warranty management plan to contain information relevant to Warranties.
- .2 Submit warranty management plan, 30 days before planned pre-warranty conference, to Departmental Representative for approval.
- .3 Warranty management plan to include required actions and documents to assure that Owner receives warranties to which it is entitled.
- .4 Provide plan in narrative form and contain sufficient detail to make it suitable for use by future maintenance and repair personnel.
- .5 Submit, warranty information made available during construction phase, to Departmental Representative for approval prior to each monthly pay estimate.
- .6 Assemble approved information in binder, submit upon acceptance of work and organize binder as follows:
 - .1 Separate each warranty or bond with index tab sheets keyed to Table of Contents listing.
 - .2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principals.

- .3 Obtain warranties and bonds, executed in duplicate by subcontractors, suppliers, and manufacturers, within [ten] days after completion of applicable item of work.
- .4 Verify that documents are in proper form, contain full information, and are notarized.
- .5 Co-execute submittals when required.
- .6 Retain warranties and bonds until time specified for submittal.
- .7 Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial Performance is determined.
- .8 Conduct joint 9-month warranty inspection, measured from time of acceptance, by Departmental Representative.
- .9 Include information contained in warranty management plan as follows:
 - .1 Roles and responsibilities of personnel associated with warranty process, including points of contact and telephone numbers within the organizations of Contractors, subcontractors, manufacturers or suppliers involved.
 - .2 Listing and status of delivery of Certificates of Warranty for extended warranty items as specified in the individual specification sections.
 - .3 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.
 - .4 Contractor's plans for attendance at 9 month post-construction warranty inspections.
 - .5 Procedure and status of tagging of equipment covered by extended warranties.

- .6 Post copies of instructions near selected pieces of equipment where operation is critical for warranty and/or safety reasons.
- .10 Respond in timely manner to oral or written notification of required construction warranty repair work.
- .11 Written verification to follow oral instructions.
 - .1 Failure to respond will be cause for the Owner to proceed with action against Contractor.

1.13 WARRANTY TAGS

- .1 Tag, at time of installation, each warranted item. Provide durable, oil and water-resistant tag approved by Departmental Representative.
- .2 Attach tags with copper wire and spray with waterproof silicone coating.
- .3 Leave date of acceptance until project is accepted for occupancy.
- .4 Indicate following information on tag:
 - .1 Type of product/material.
 - .2 Model number.
 - .3 Serial number.
 - .4 Contract number.
 - .5 Warranty period.
 - .6 Inspector's signature.
 - .7 Construction Contractor.

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 This Section specifies roles and responsibilities of Training.

1.2 ADMINSTRATIVE REQUIREMENTS

- .1 Demonstrate scheduled operation and maintenance of equipment and systems to Owner's personnel prior acceptance of facility
- .2 Owner: provide list of personnel to receive instructions, and co-ordinate their attendance at agreed-upon times.
- .3 Preparation:
 - .1 Verify conditions for demonstration and instructions comply with requirements.
 - .2 Verify designated personnel are present.
 - .3 Ensure equipment has been inspected and put into operation in accordance with Section 23 09 33 – Electric and Electronic Control System for HVAC.
 - .4 Ensure testing, adjusting, and balancing has been performed in accordance with Section 23 05 93 – Testing, Adjusting and Balancing for HVAC and equipment and systems are fully operational.

1.3 TRAINEES

- .1 Trainees: personnel selected for operating and maintaining this facility. Includes Facility Manager, building operators, maintenance staff, security staff, and technical specialists as required.
- .2 Trainees will be available for training during later stages of construction for purposes of familiarization with systems.

1.4 TRAINING OBJECTIVES

- .1 Training to be detailed and duration to ensure:
 - .1 Safe, reliable, cost-effective, energy-efficient operation of systems in normal and emergency modes under all conditions.
 - .2 Effective on-going inspection, measurements of system performance.
 - .3 Proper preventive maintenance, diagnosis and trouble-shooting.
 - .4 Ability to update documentation.
 - .5 Ability to operate equipment and systems under emergency conditions until appropriate qualified assistance arrives.

1.5 DEMONSTRATION AND INSTRUCTORS

- .1 Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, and maintenance of each item of equipment at scheduled] times.
- .2 Instruct personnel in phases of operation and maintenance using operation and maintenance manuals as basis of instruction.
- .3 Review contents of manual in detail to explain aspects of operation and maintenance.
- .4 Prepare and insert additional data in operations and maintenance manuals when needed during instructions.

1.6 TRAINING MATERIALS

- .1 Instructors to be responsible for content and quality.
- .2 Training materials to include:
 - .1 "As-Built" Contract Documents.
 - .2 Operating Manual.
 - .3 Maintenance Manual.
 - .4 Management Manual.
 - .5 TAB and PV Reports.
- .3 Departmental Representative and Facility Manager will review training manuals.
- .4 Training materials to be in a format that permits future training procedures to same degree of detail.
- .5 Supplement training materials:
 - .1 Transparencies for overhead projectors.
 - .2 Multimedia presentations.
 - .3 Manufacturer's training videos.
 - .4 Equipment models.

1.7 RESPONSIBILITIES

- .1 Be responsible for:
 - .1 Implementation of training activities,
 - .2 Coordination among instructors,
 - .3 Quality of training, training materials,
- .2 Departmental Representative will evaluate training and materials.
- .3 Upon completion of training, provide written report, signed by Instructors, witnessed by Departmental Representative.

1.8 TRAINING CONTENT

- .1 Training to include demonstrations by Instructors using the installed equipment and systems.
- .2 Content includes:
 - .1 Review of facility and occupancy profile.
 - .2 Functional requirements.
 - .3 System philosophy, limitations of systems and emergency procedures.
 - .4 Review of system layout, equipment, components and controls.
 - .5 Equipment and system start-up, operation, monitoring, servicing, maintenance and shut-down procedures.
 - .6 System operating sequences, including step-by-step directions for starting up, shut-down, operation of valves, dampers, switches, adjustment of control settings and emergency procedures.
 - .7 Maintenance and servicing.
 - .8 Trouble-shooting diagnosis.
 - .9 Inter-Action among systems during integrated operation.
 - .10 Review of O&M documentation.
- .3 Provide specialized training as specified in relevant Technical Sections of the construction specifications.

1.9 VIDEO-BASED TRAINING

- .1 Manufacturer's videotapes to be used as training tool with Departmental Representative's review and written approval 3 months prior to commencement of scheduled training.
- .2 On-Site training videos:
 - .1 Videotape training sessions for use during future training.
 - .2 To be performed after systems are fully tested and balanced.
 - .3 Organize into several short modules to permit incorporation of changes.
- .3 Production methods to be high quality.

1.10 SYSTEMS REQUIRING TRAINING

- .1 Door Hardware: Operations and Maintenance
- .2 Floor Finishes: Maintenance
- .3 Mechanical Systems
- .4 Electrical Systems

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 DEFINITIONS:**

- .1 Acronyms:
 - .1 Cx Authority - Personnel who oversee commissioning
 - .2 Cx Agent – Personnel who develop and implement commissioning
 - .3 Cx - Commissioning.
 - .4 EMCS - Energy Monitoring and Control Systems.
 - .5 O&M - Operation and Maintenance.
 - .6 PFC - Pre Functional Checklists
 - .7 PV - Performance Verification.
 - .8 TAB - Testing, Adjusting and Balancing.
- .2 Cx - A required program of tests, procedures and checks carried out systematically on systems and integrated systems of the finished Project. Cx is performed after systems and integrated systems are completely installed, functional and Contractor's performance Verification responsibilities have been completed and approved.

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 Contract Documents. To meet Project functional and operational requirements.
 - .1 To meet Project functional and operational requirements.

- .2 To meet building energy use outlined in the Energy Modeling Report (99% Construction Documents) dated December 23, 2021 by ReNu Engineering in Appendix B.

1.3 COMMISSIONING OVERVIEW

- .1 Section 01 91 13.13 - Commissioning Plan.
- .2 For Cx responsibilities refer to Section 01 91 13.13 - Commissioning Plan.
- .3 Contractor to retain third party Commissioning Agent.
- .4 Cx to be a line item of Contractor's cost breakdown.
- .5 Cx activities supplement field quality and testing procedures described in relevant technical sections.
- .6 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 facility is constructed and proven to operate satisfactorily under weather, environmental and occupancy conditions to meet functional and operational requirements. Cx activities includes transfer of critical knowledge to facility operational personnel.
- .7 Departmental Representative will issue Interim Acceptance Certificate when:
 - .3 Completed Cx documentation has been received, reviewed for suitability and approved by Departmental Representative.
 - .4 Equipment, components and systems have been commissioned.
 - .5 O&M training has been completed.

1.4 QUALIFICATION OF COMMISSIONING AGENT

- .1 Commissioning Agent should have one of the following certifications.
 - .1 ASHRAE's BCxP – Building Commissioning professional certification or
 - .2 CIET (Canadian Institute for Energy Training)'s CBCP – Certified Building Commissioning Professional

1.5 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.

1.6 PRE-CX REVIEW

- .1 Before Construction:

- .1 Review Contract Documents, confirm by writing to Commissioning Authority.
 - .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, 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 Commissioning Agent.
 - .7 Have Cx schedules up-to-date.
 - .8 Ensure systems have been cleaned thoroughly.
 - .9 Complete TAB procedures on systems, submit TAB reports to Commissioning Agent for review and approval.
 - .10 Ensure "As-Built" system schematics are available.
- .4 Inform Commissioning Authority in writing of discrepancies and deficiencies on finished works.

1.7 CONFLICTS

- .1 Report conflicts between requirements of this section and other sections to Commissioning Authority before start-up and obtain clarification.
- .2 Failure to report conflict and obtain clarification will result in application of most stringent requirement.

1.8 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submittals: in accordance with Section 01 33 00 - Submittal Procedures.
 - .1 Submit no later than 4 weeks after award of Contract:
 - .1 Name of 3rd Party 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 8 weeks prior to start of Cx.
 - .3 Submit proposed Cx procedures to Departmental Representative where not specified and obtain written approval at least 8 weeks prior to start of Cx.
 - .4 Provide additional documentation relating to Cx process required by Departmental Representative.

1.9 COMMISSIONING DOCUMENTATION

- .1 Commissioning Agent to provide Cx documentation.
- .2 Provide completed and approved Cx documentation to Departmental Representative.

1.10 COMMISSIONING SCHEDULE

- .1 Provide detailed Cx schedule as part of construction schedule in accordance with Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart.
- .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.

1.11 COMMISSIONING MEETINGS

- .1 Convene Cx meetings following project meetings: Section 01 32 16.19 - Construction Progress Schedule - Bar (GANTT) Chart and as specified herein.
- .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 or at time requested 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 Cx Agent, who will record and distribute minutes.
- .7 Ensure subcontractors and relevant manufacturer representatives are present at all Cx meetings and as required.

1.12 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.

1.13 WITNESSING OF STARTING AND TESTING

- .1 Provide 10 working days notice prior to commencement.
- .2 Cx Agent to witness of start-up and testing.
- .3 Cx Agent to be present at tests performed and documented by sub-trades, suppliers and equipment manufacturers.

1.14 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 Commissioning Agent 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.

1.15 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 Commissioning Agent 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.

1.16 START-UP DOCUMENTATION

- .1 Contractor to assemble start-up documentation to Commissioning Agent.
- .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 Commissioning Agent to repeat start-up at any time.

1.17 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.

1.18 TESTING 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.

1.19 START OF COMMISSIONING

- .1 Notify Commissioning Authority at least 20 working days prior to start of Cx.
- .2 Start Cx after elements of building affecting start-up and performance verification of systems have been completed.

1.20 INSTRUMENTS/ EQUIPMENT

- .1 Submit to Commissioning Agent 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.

1.21 COMMISSIONING PERFORMANCE VERIFICATION

- .1 Carry out Cx:
 - .1 Under actual or 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.

1.22 WITNESSING COMMISSIONING

- .1 Commissioning Agent to witness activities and verify results.

1.23 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 working days of test and with Cx report.

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 Elsewhere:
 - .1 Provide manpower and instrumentation to verify up to 30% of reported results, unless specified otherwise in other sections.
 - .2 Number and location to be at discretion of Commissioning Agent.
 - .3 Conduct tests repeated during verification under same conditions as original tests, using same test equipment, instrumentation.
 - .4 Review and repeat commissioning of systems if inconsistencies found in more than 20% of reported results.
 - .5 Perform additional commissioning until results are acceptable to Commissioning Agent.

1.26 REPEAT VERIFICATIONS

- .1 Assume costs incurred by Commissioning Agent for third and subsequent verifications where:
 - .1 Verification of reported results fail to receive Commissioning Agent's approval.
 - .2 Repetition of second verification again fails to receive approval.
 - .3 Commissioning Agent 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 Commissioning Agent.

- .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 79 00 - Demonstration and 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

Part 1 General**1.1 SUMMARY**

- .1 Section Includes:
 - .1 Description of overall structure of Plan and roles and responsibilities of commissioning team.
 - .2 Related Requirements
 - .1 Section 070813 – Building Enclosure Performance Testing
 - .2 Section 230593 – Testing, Adjusting and Balancing for HVAC
 - .3 Section 230813 – Performance Verification HVAC Systems
 - .4 Section 230933 – Electric and Electronic control system for HVAC
 - .5 Section 263100 – Photovoltaic Systems

1.2 REFERENCE STANDARDS

- .1 Public Works and Government Services Canada (PWGSC)
 - .1 PWGSC - Commissioning Guidelines CP.1 – 4th Edition
 - .2 PWGSC - Commissioning Guidelines CP.3 to CP.13
- .2 Underwriters' Laboratories of Canada (ULC)
- .3 CSA Z320 Building Commissioning Standards and Check Sheets
- .4 The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
 - .1 ASHRAE Standard 202, The Commissioning Process for Buildings and Systems
 - .2 ASHRAE Guideline 0 – The Commissioning Process.
 - .3 ASHRAE Guideline 1 – The HVAC Commissioning Process.

1.3 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 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 Authority - Personnel who oversee commissioning
 - .2 Cx Agent – Personnel who develop and implement commissioning
 - .3 Cx - Commissioning.
 - .4 BMM - Building Management Manual.
 - .5 EMCS - Energy Monitoring and Control Systems.
 - .6 MSDS - Material Safety Data Sheets.
 - .7 PI - Product Information.
 - .8 PV - Performance Verification.
 - .9 TAB - Testing, Adjusting and Balancing.
 - .10 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.

1.4 DEVELOPMENT OF CX PLAN

- .1 Cx Plan to be 80% completed within 8 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.
- .2 Submit completed Cx Plan to Departmental Representative and obtain written approval.

1.5 REFINEMENT OF CX PLAN

- .1 During construction phase, revise, refine and update Cx Plan to include:
 - .1 Changes resulting from Departmental Representative program modifications.
 - .2 Approved design and construction changes.
- .2 Revise, refine and update every 4 weeks 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.

1.6 COMPOSITION, ROLES AND RESPONSIBILITIES OF CX TEAM

- .1 Contractor is to maintain overall responsibility for managing the project and demonstrating to the Departmental Representative that the installed systems and overall facility meet the Contract Documents.
- .2 Cx Team consisting of following members:
 - .1 Departmental Representative: during construction, will conduct periodic site reviews to observe general progress and 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.
 - .2 Commissioning Authority is responsible for:
 - .1 Provide oversight and quality assurance of the project commissioning activities and documentation.
 - .2 Responsible for overall project commissioning and ensures the performance and completion of commissioning in the delivery of a fully functional and operation project.
 - .3 Provide planning and technical support.
 - .4 Provide advice on the project and O&M matters.
 - .5 Coordinates the commissioning services and activities during construction administration to final contractual documents.
 - .6 Responsible for design, construction, and warranty-related commitments for commissioning.
 - .3 Third Party Commissioning Agents

- .1 Develops the initial commissioning plan, design intent, and system operating manual.
- .2 Prepare commission report and documentation including the Product Information (PI) and Performance Verification (PV) report forms.
- .3 Develop and implement the training plan.
- .4 Organizing Cx.
- .5 Monitoring operations Cx activities.
- .6 Witnessing, certifying accuracy of reported results.
- .7 Witnessing and certifying TAB and other tests.
- .8 Collect commissioning data
- .9 Ensuring implementation of final Cx Plan.
- .10 Performing verification of performance of installed systems and equipment.
- .11 This individual also coordinates commissioning activities, conducts commissioning meetings, refines the commissioning plan, refines commissioning schedule, assembles maintenance manuals, and organizes training.
- .4 Construction Team: contractor, subcontractors, suppliers and support disciplines, is responsible for construction/installation in accordance with Contract Documents, including:
 - .1 Carries out start-up and performance verification activities and performs acceptance tests and related procedures for all equipment, systems and integrated systems.
 - .2 Testing.
 - .3 TAB.
 - .4 Performance of Cx activities.
 - .5 Delivery of training and Cx documentation.
 - .6 Assigning one person as point of contact with Cx Agent and Cx Authority for administrative and coordination purposes.
- .5 Property Manager (part of Departmental Representative): represents lead role in Operation Phase and onwards and is responsible for:
 - .1 Receiving facility.
 - .2 Day-To-Day operation and maintenance of facility.

1.7 EXTENT OF CX

- .1 Cx Architectural Systems:
 - .1 Architectural:
 - .1 Refer to Section 07 08 13- Building Enclosure Performance Testing.

- .2 Assembly Performance: assemblies described in the specifications and drawings are expected to achieve the following performance requirements when tested in accordance with CAN/CGSB-149.10:
 - .1 Air Leakage Rate: Install materials to achieve maximum air leakage of 0.4 ACH at 50 Pa as measured using the procedure in CAN/CGSB-149.10 (Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method).
- .2 Commission mechanical systems and associated equipment:
 - .1 Plumbing systems:
 - .1 Domestic CWS and HWS
 - .2 Plumbing fixtures
 - .3 Mixing valves
 - .4 Domestic Hot Water Heaters
 - .5 Drain Water Heat Recovery Units
 - .6 Regular sanitary waste systems
 - .7 Water and Sanitary Tank Systems including fill connections
 - .8 Heat Traced Arctic vents
 - .9 Plumbing Pumps
 - .1 Hot Water Recirculation Pumps
 - .2 Cold Water Supply Pumps
 - .2 HVAC and exhaust systems:
 - .1 Hydronic Circulators
 - .2 Energy Recovery Ventilators
 - .3 Control Dampers
 - .4 Air Flow Valves
 - .5 Ductwork
 - .6 Grilles and Diffusers
 - .7 Air Filters
 - .8 Air Intakes
 - .9 Glycol systems
 - .10 Heat Exchangers
 - .11 Hydronic Coils
 - .12 Expansion Tanks
 - .13 Heating units
 - .14 Chemical treatment and procedures
 - .15 Pumps
 - .16 Facility Fuel System
 - .17 Testing Adjusting and Balancing

- .3 Fire and life safety systems:
 - .1 Portable Fire extinguishers.
- .4 Noise and vibration control systems for mechanical systems.
- .5 Seismic restraint and control measures.
- .3 Commission electrical systems and equipment:
 - .1 Disconnects
 - .2 Panelboards
 - .3 Smoke and CO Detectors
 - .4 Cabling (Electrical and Telecommunication)
 - .5 Motor controls
 - .6 Interior Lighting
 - .7 Exterior Lighting
 - .8 Photovoltaic Systems and controls
 - .9 Heat Trace Cabling and associated controls
- .4 Building Control Systems:
 - .1 Control panels. Duplicate of Control Panel Wiring schematic inside each enclosure
 - .2 Energy Recovery Ventilator and Air Flow Valves
 - .3 Water and Sanitary Tank Level Controls
 - .4 Dampers
 - .5 Valves
 - .6 Pumps
 - .7 Photovoltaic
 - .8 Heat Trace Systems
 - .9 Mechanical and Electrical Alarm/Detection Systems

1.8 DELIVERABLES RELATING TO O&M PERSPECTIVES

- .1 General requirements:
 - .1 Compile English documentation using SI units.
 - .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.

1.9 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 Startup, pre-Cx activities and documentation for systems, and equipment.
 - .2 Completed installation checklists (ICL).
 - .3 Completed performance verification (PV) report forms.
 - .4 Results of Performance Verification Tests and Inspections.
 - .5 Description of Cx activities and documentation.
 - .6 Description of Cx of integrated systems and documentation.
 - .7 Tests of following witnessed by PWGSC Design Quality Review Team and/or Departmental Representative.
 - .8 Tests performed by Owner/User.
 - .9 Training Plans.
 - .10 Cx Reports.
 - .11 Prescribed activities during warranty period.
- .4 Departmental Representative to witness and certify tests and reports of results provided to Commissioning Authority.
- .5 Commissioning Authority to participate.

1.10 PRE-CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Items listed in this Cx Plan include the following:
 - .1 Conduct pre-start-up tests: contractor to conduct pressure, static, flushing, cleaning, and "bumping" during construction as specified in technical sections. To be monitored, witnessed and certified by Commissioning Agent.
 - .2 Commissioning Agent to review contractor's Pre-Start-Up reports for accuracy and completeness.
 - .3 Commissioning Agent to identify deficiencies, issues and required corrective actions.

- .4 Upon satisfactory, Commissioning Agent to prepare final reports and checklists using approved forms and confirm readiness of equipment and systems for start-up.
- .5 Report to be reviewed and approved by Commissioning Authority.
- .6 Commissioning Authority will monitor some of these pre-start-up inspections.
- .7 Include completed documentation in Cx report.
- .2 Pre-Cx activities - ARCHITECTURAL:
 - .2 Refer to Section 07 08 13- Building Enclosure Performance Testing.
- .3 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 Commissioning Authority.
- .4 Pre-Cx activities - ELECTRICAL:
 - .1 Low voltage distribution systems under 750 V:
 - .1 Requires independent testing agency to perform pre- energization and post-energization tests.
 - .2 Lighting systems:
 - .1 Tests to include verification of lighting levels and coverage.

1.11 START-UP

- .1 Start up components, equipment and systems.
- .2 Commissioning Agent to monitor start-up activities.
 - .1 Rectify start-up deficiencies to satisfaction of Commissioning Agent.
- .3 Commissioning Agent to monitor the Performance Verification (PV) completed by the contractor, manufacturer representative or specialist testing contractor as applicable:
 - .1 Repeat when necessary until results are acceptable to Commissioning Agent.
 - .2 Use procedures modified generic procedures to suit project requirements.

- .3 Commissioning Agent to witness and certify reported results using approved PI and PV forms.
- .4 Contractor to provide start-up reports, data, results, adjustment and setting to Commissioning Agent.
- .5 Commissioning Agent to collect and verify completed PV reports and provide to Commissioning Authority.
- .6 Commissioning Authority verify up to 30 % of reported results at random.
- .7 Failure of randomly selected item shall result in rejection of PV report or report of system start-up and testing.

1.12 CX ACTIVITIES AND RELATED DOCUMENTATION

- .1 Perform Cx by specified Cx agency using procedures developed by Commissioning Agent and approved by Commissioning Authority.
- .2 Commissioning Agent to monitor Cx activities.
- .3 Upon satisfactory completion, Cx agent to prepare Cx Report using approved PV forms.
- .4 Commissioning agent to witness, certify reported results of, Cx activities and forward to Commissioning Authority.
- .5 Commissioning Authority reserves right to verify a percentage of reported results at no cost to contract.

1.13 CX OF INTEGRATED SYSTEMS AND RELATED DOCUMENTATION

- .1 Cx to be performed by specialist testing contractor, using procedures developed by Commissioning Agent and approved by Commissioning Authority.
- .2 Tests to be witnessed by Commissioning Agent and documented on approved report forms.
- .3 Commissioning agent to submit completed Integrated Systems Testing Reports to the Commissioning Authority for review and approval.
- .4 Commissioning Agent reserves right to verify percentage of reported results.
- .5 Integrated systems to include:
 - .1 HVAC and associated systems forming part of integrated HVAC systems:

1.14 INSTALLATION CHECK LISTS (ICL)

- .1 Include the following data:
 - .1 Product manufacturer's installation instructions and recommended checks.
 - .2 Special procedures as specified in relevant technical sections.
 - .3 Items considered good installation and Consulting industry practices deemed appropriate for proper and efficient operation.

- .2 Equipment manufacturer's installation/start-up check lists are acceptable for use. As deemed necessary by Commissioning Agent supplemental additional data lists will be required for specific project conditions.
- .3 Use check lists for equipment installation. Document check list verifying checks have been made, indicate deficiencies and corrective action taken.
- .4 Certified Equipment Manufacture technician shall sign start-up report and check lists upon completion, certifying stated checks and inspections have been performed; contractor to submit completed reports to the Commissioning Agent, Commissioning Authority, and design Consultant. Check lists will be required during Commissioning and will be included in Building Maintenance Manual (BMM) at completion of project. Following Equipment Reports are required:
 - .1 Major HVAC equipment;
 - .2 Major Plumbing equipment;
 - .3 Chemical Treatments;
 - .4 Building Management Systems;
 - .5 Motor Starters and Variable Frequency Drives units;
 - .6 Communication Systems "Wiring" (Voice, Data system tests and certifications)
 - .7 Insulation Resistance Testing of Electrical Feeders.
 - .8 As required by individual divisions 21 to 26 of specification sections.
- .5 Use of check lists will not be considered part of commissioning process but will be stringently used for equipment pre-start and start-up procedures.

1.15 PRODUCT INFORMATION (PI) REPORT FORMS

- .1 Product Information (PI) forms compiles gathered data on items of equipment produced by equipment manufacturer, includes nameplate information, parts list, operating instructions, maintenance guidelines and pertinent technical data and recommended checks that is necessary to prepare for start-up and functional testing and used during operation and maintenance of equipment. This documentation is included in the BMM at completion of work.
- .2 Prior to Performance Verification (PV) of systems complete items on PI forms related to systems and obtain Commissioning Authority's approval.

1.16 PERFORMANCE VERIFICATION (PV) REPORT

- .1 PV forms to be used for checks, running dynamic tests and adjustments carried out on equipment and systems to ensure correct operation, efficiently and function independently and interactively with other systems as intended with project requirements.
- .2 PV report forms include those developed by Contractor records measured data and readings taken during functional testing and Performance Verification procedures.
- .3 Prior to PV of integrated system, complete PV forms of related systems and obtain Commissioning Authority's approval.

1.17 SAMPLES OF COMMISSIONING FORMS

- .1 Commissioning Agent will develop and provide to Contractor required project-specific Commissioning forms in electronic format complete with specification data.
- .2 Contractor to complete Commissioning forms to suit project requirements as per reviewed shop drawings and return Cx Agent for review and final approval at least 12 weeks prior to final commissioning.
- .3 Revise items on Commissioning forms to suit project requirements.

1.18 CHANGE AND DEVELOPMENT OF NEW REPORT FORMS

- .1 When additional forms are required, but are not available from Commissioning Agent develop appropriate verification forms and submit to Commissioning Agent for approval prior to use.
 - .1 Additional commissioning forms to be in same format as provided by Commissioning Agent.

1.19 COMMISSIONING FORMS

- .1 Use Commissioning forms to verify installation and record performance when starting equipment and systems.
- .2 Strategy for Use:
 - .1 Commissioning Agent provides Contractor project-specific Commissioning forms.
 - .2 Contractor will provide required shop drawings information and verify correct installation and operation of items indicated on these forms.
 - .3 Confirm operation as per design criteria and intent.
 - .4 Identify variances between design and operation and reasons for variances.
 - .5 Verify operation in specified normal and emergency modes and under specified load conditions.
 - .6 Record analytical and substantiating data.
 - .7 Verify reported results.
 - .8 Form to bear signatures of recording technician and reviewed and signed off by Commissioning Agent.
 - .9 Submit immediately after tests are performed.
 - .10 Reported results in true measured SI unit values.
 - .11 Provide Commissioning Agent with originals of completed forms.
 - .12 Maintain copy on site during start-up, testing and commissioning period.
 - .13 Forms to be both hard copy and electronic format with typed written results in Building Commissioning Manual.

1.20 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.

1.21 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: 3 months after award of contract.
 - .5 Cx Report format: 3 months after contract award.
 - .6 Discussion of heating/cooling loads for Cx: 3 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.
 - .13 Implementation of training plans.
 - .14 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 Departmental Representative.
 - .3 6months in Cx schedule for verification of performance in all seasons and wear conditions.
- .2 After approval, incorporate Cx Schedule into Construction Schedule.
- .3 Contractor, Cx agent, Cx Authority and Departmental Representative will monitor progress of Cx against this schedule.

1.22 CX REPORTS

- .1 Submit reports of tests, witnessed and certified by Commissioning Agent to Commissioning Authority 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 Commissioning Agent.

1.23 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.

1.24 TESTS TO BE PERFORMED BY OWNER/USER

- .1 None is anticipated on this project.

1.25 TRAINING PLANS

- .1 Refer to Section 01 79 00 - Demonstration and Training.

1.26 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.

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 06 10 00 – Rough Carpentry

1.2 REFERENCES

- .1 ASTM International Inc.
 - .1 ASTM A36/A36M-14, Standard Specification for Carbon Structural Steel.
 - .2 ASTM A307-12, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM A325M-13, Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Minimum Tensile Strength [Metric].
 - .4 ASTM A490M-12, Standard Specification for High-Strength Steel Structural Bolts, Classes 10.9 and 10.9.3, for Structural Steel Joints.
- .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 G40.20-13/G40.21-13, 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-S16-14, Limit States Design of Steel Structures.
 - .4 CAN/CSA-S136-12, North American Specifications for the Design of Cold Formed Steel Structural Members.
 - .5 CSA W47.1-09, Certification of Companies for Fusion Welding of Steel.
 - .6 CSA W48-14, Filler Metals and Allied Materials for Metal Arc Welding.
 - .7 CSA W55.3-08 (R2013), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.
 - .8 CSA W59-13, Welded Steel Construction (Metal Arc Welding).
- .5 Master Painters Institute
 - .1 MPI-EXT 5.1-08, Structural Steel and Metal Fabrications.

1.3 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Fabrication drawings:
 - .1 Submit fabrication drawings showing designed assemblies, components and connections.
- .3 Source Quality Control Submittals:
 - .1 Submit copies of mill test reports 4 weeks prior to fabrication of structural steel.
 - .1 Mill test reports to show chemical and physical properties and other details of steel to be incorporated in project.
 - .2 Provide mill test reports certified by metallurgists qualified to practice in the Yukon Territory, Canada.
- .4 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 MATERIALS**

- .1 Structural steel: to CSA-G40.20/G40.21 Grade 350W.
- .2 Anchor bolts: to ASTM A36/A36M.
- .3 Bolts, nuts and washers: to ASTM A325M and / or ASTM A490/A490M.
- .4 Welding materials: to CSA W48 Series or CSA W59 and certified by Canadian Welding Bureau.
- .5 Shop paint primer: to CISC/CPMA2-75 solvent reducible alkyd, grey.
- .6 Hot dip galvanizing: galvanize steel, where indicated, to CAN/CSA-G164, minimum zinc coating of 600 g/m².

2.2 FABRICATION

- .1 Fabricate structural steel in accordance with CAN/CSA-S16 and in accordance with reviewed shop drawings.

- .2 Continuously seal members by continuous welds where indicated. Grind smooth.

2.3 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 foreign matter. Prepare surface according to NACE No.3/SSPC-SP-6.
- .3 Use primer appropriate and compatible with fire rated intumescent coatings. Refer to architectural documents for elements requiring fire rated coatings.
- .4 Apply one coat of primer in shop to steel surfaces to achieve minimum dry film thickness of 2.5 to 3.5 mils.
- .5 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.
- .6 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.
- .7 Strip paint from 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.
- .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.

3.2 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.

3.3 ERECTION

- .1 Erect structural steel, as indicated and in accordance with CAN/CSA-S16 / CAN/CSA-S136 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.

3.4 FIELD QUALITY CONTROL

- .1 Provide safe access and working areas for field review as required by departmental representative.

3.5 FIELD PAINTING

- .1 Paint in accordance with Section 09 91 00 - Painting.
 - .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 SECTION INCLUDES

- .1 Steel supports for millwork.
- .2 Handrails and guardrails.
- .3 Exterior steel tread.
- .4 Checker plate at door sills

1.2 RELATED REQUIREMENTS

- .1 Section 05 73 00 – Decorative Metal Railings.
- .2 Section 06 40 00 – Architectural Woodwork.
- .3 Section 09 91 13 – Exterior Painting.
- .4 Section 09 91 23 – Interior Painting.

1.3 REFERENCE STANDARDS

- .1 Aluminum Association (AA)
 - .1 ABH-21 Aluminum Brazing Handbook
 - .2 ASD-1 Aluminum Standards and Data
 - .3 DAF-45 Designation System for Aluminum Finishes
 - .4 SAA-46 Standards for Anodized Architectural Aluminum
- .2 American National Standards Institute/National Association of Architectural Metal Manufacturers (ANSI/NAAMM)
 - .1 ANSI/NAAMM MBG531-17, Metal Bar Grating Manual.
 - .2 AAMA 605.1 Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - .3 AAMA 606.1 Voluntary Guide Specifications and Inspection Methods of Integral Color Anodic Finishes for Architectural Aluminum.
 - .4 AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
 - .5 AAMA 608.1 Voluntary Guide Specifications and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
- .3 ASTM International
 - .1 ASTM A 53/A 53M-20, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - .2 ASTM A307-21, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - .3 ASTM B 26/ B26M, Specification for Aluminum-Alloy Sand Castings.

- .4 ASTM B 221 Specification for Aluminum-Alloy Bars, Rods, Wires, Shapes and Tubes.
- .5 ASTM B 429 Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- .6 ASTM B 483 Specification for Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications.
- .7 ASTM E 894 Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
- .8 ASTM E 935 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- .9 ASTM E 985 Specification for Permanent Metal Railing Systems and Rails for Buildings.
- .4 CSA Group
 - .1 CSA G40.20-13 /G40.21-13 (R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
 - .2 CAN/CSA G164-18, Hot Dip Galvanizing of Irregularly Shaped Articles.
 - .3 CSA S16-14 (R2019), Design of Steel Structures.
 - .4 CSA W48-18, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
 - .5 CSA W59-13, Welded Steel Construction (Metal Arc Welding) Metric.
- .5 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .6 Steel Structures Painting Council (SSPC), Systems and Specifications Manual, Volume 2.
- .7 National Building Code of Canada, 2015.

1.4 DESIGN REQUIREMENTS

- .1 Design handrail and guardrail construction and connections to NBC vertical and horizontal live load requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Northwest Territories and Nunavut (NAPEG), Canada.
 - .2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.
- .3 Letters of Assurance:
 - .1 Submit letter of assurance of design and field review.

1.6 QUALITY ASSURANCE

- .1 Perform work of this Section by an experienced Contractor in the fabrication and working of metals including, cutting, bending, forming and finishing.
- .2 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .3 Certifications: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Fabricators to be certified by the Canadian Welding Bureau Division 1 and 2 in Accordance with the latest version of CSA W47.1 for fusion welding of steel structures and/or CSA W55.3 for resistance welding of structural components.

1.7 CO-OPERATION

- .1 Schedule manufacture and installation to conform to the Construction Schedule.
- .2 Co-operate with other trades, make connection to and adjustments for other work.
- .3 Deliver and set in place miscellaneous metal items to be built into adjoining work.
- .4 Protect the work of other sections from damage by the work of this Section.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Replace defective or damaged materials with new at no additional cost to the Owner.
- .4 Fabricate large assemblies to permit safe, easy handling to place of installation.
- .5 Exercise care in handling, storing and installing all material to prevent bending, twisting or structural or visual damage.

Part 2 Products**2.1 MATERIALS**

- .1 Steel:
 - .1 Steel sections and plates: to CSA G40.20/G40.21, Grade 300W or 350Wc.
 - .2 Floor plate: to CSA G40.20/ G40.21, Grade 260W

- .1 Thickness: as indicated.
- .2 Width: as indicated.
- .3 Design: as indicated.
- .2 Welding materials: to CSA W59.
- .3 Welding electrodes: to CSA W48 Series.
- .4 Bolts and anchor bolts: to ASTM A307.
- .5 Grout: non-shrink, non-metallic, flowable, 15 MPa at 24 hours.
- .6 Sand: Specially graded and processed to suit epoxy grout mix design.

2.2 FABRICATION

- .1 Use new metals free from defects and of alloys of the best commercial quality suitable for the intended use.
- .2 Use only metals free of excessive rust, mill scale and discolouration.
- .3 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .4 Use counter-sunk, self-tapping shake-proof flat headed screws on items requiring assembly by screws or as indicated. Fasteners to be same material, colour and finish as metal fastened unless noted otherwise.
- .5 Where possible, fit and shop assemble work, ready for erection.
- .6 Weld to avoid distortion, discolouration or damage to the members.
- .7 Exposed welds continuous for length of each joint. File or grind exposed welds smooth and flush.
- .8 Provide all required holes in metalwork for attachment or attaching other materials.
- .9 Reinforce all work to suit the purpose intended and to withstand design loads.
- .10 Provide temporary bracing as required to maintain alignment during shipment and installation.

2.3 FINISHES

- .1 Exterior Steel:
 - .1 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164.
- .2 Interior Steel:
 - .1 Shop coat primer: in accordance with specified paint system in Section 09 91 00 - painting.
- .3 Zinc primer: zinc rich, ready mix to MPI-EXT 5.2C.

2.4 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 Wood.

2.5 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. Paint when temperature minimum 7 degrees C.
- .3 Clean surfaces to be field welded; do not paint.
- .4 Clean all metal prior to painting to completely remove millscale, rust and spatter.
- .5 Clean interior and exterior metal to be painted in accordance with SSPC-SPI Solvent Cleaning followed with SSPC SP.6 Commercial Blast Cleaning.
- .6 Do not use temporary shop primers for exterior and interior painted steel work. Where non-complying primers are used, remove same from all surfaces and prime surfaces in accordance with the requirements of Section 09 91 00 for painted steel work at no additional cost to the Owner.
- .7 Acceptable aluminum system: Aluminum Component Railing System (ACRS) by CR Laurence.

2.6 METAL GRATING STAIR TREAD

- .1 Exterior Steel Stair Tread: galvanized finish
 - .1 Type: Steel Bar Grating Tread
 - .2 Size: 278mm (W) x 1270mm (L)
 - .3 Bar Size: 32x4.8mm Serrated grating
 - .4 Nosing Type: Checker plate nosing
 - .5 Finish: Hot Dip Galvanized
 - .6 Standard of acceptance:
 - .1 Nucor Grating
 - .2 Accurate Screen & Grating
 - .3 Borden Gratings

2.7 METAL GRATING STAIR LANDING

- .1 Exterior Steel Stair Landing: galvanized finish
 - .1 Type: Steel Bar Grating
 - .2 Size: Refer to drawing
 - .3 Bar Size: 25x3.2mm Serrated grating

- .4 Finish: Hot Dip Galvanized
- .5 Standard of acceptance:
 - .1 Nucor Grating
 - .2 Accurate Screen & Grating
 - .3 Borden Gratings

2.8 MISCELLANEOUS ITEMS

- .1 As detailed or indicated on drawings
- .2 Prime finish for site painting.
- .3 Galvanized finish or anodized aluminum for all items located outside the weather barrier.
- .4 Items include, but are not limited to the following:
 - .1 Diamond plate at door thresholds.
 - .2 Millwork Supports.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

3.2 ERECTION - GENERAL

- .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 Supply components for work by other trades in accordance with shop drawings and schedule.
- .6 Make field connections with bolts to CSA S16, or weld.
- .7 Deliver items over for casting into concrete together with setting templates to appropriate location and construction personnel.
- .8 Touch-up rivets, field welds, bolts and burnt or scratched surfaces with primer after completion of:
- .9 Touch-up galvanized surfaces with zinc rich primer where burned by field welding.

- .10 Isolate connections of dissimilar metals

3.3 SCHEDULE

- .1 Door Sills:
 - .1 Install checkerplate doors sills where adjacent finish is not level with door sill.

3.4 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.

3.5 PROTECTION

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

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Aluminum handrails, guardrails, and railing systems, including connectors, fasteners, and required accessories including the following types and applications:
 - .1 Glass panel railing system.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 06 73 00 – Composite Decking.
- .3 Section 08 80 00 – Glazing.

1.3 REFERENCE STANDARDS

- .1 American National Standard / American Society of Safety Professionals (ANSI/ASSP):
 - .1 ANSI/ASSP A1264.1, Safety Requirements for Workplace Walking/Working Surfaces and their Access; Workplace, Floor, Wall and Roof Openings; Stairs and Guardrail Systems.
- .2 ASTM International
 - .1 A27/A27M, Standard Specification for Steel Castings, Carbon, for General Application
 - .2 ASTM A 47-99, Standard Specification for Ferritic Malleable Iron Castings.
 - .3 ASTM A53/A53M, Specification for Pipe, Steel, Black and Hot Dipped, Zinc Coated Welded and Seamless.
 - .4 ASTM A 153/A 153M, Standard Specification for Zinc (Hot-Dip) Coatings on Iron and Steel Hardware.
 - .5 ASTM A500/ A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - .6 ASTM B 221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
 - .7 ASTM B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 - .8 ASTM E935, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- .3 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBCC).

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Sequencing:

- .1 Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

1.5 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 railings and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit manufacturer's installation instructions with project specific annotations to suit project conditions.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Northwest Territory and Nunavut (NAPEG), Canada.
 - .2 Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - .3 Indicate installation of guardrails including but not limited to plans, elevations, sections, details of components, anchor details, and clearances to adjacent assemblies. Indicate critical field dimensions and conflicts.
 - .4 Indicate installation conditions at obstructions or at junction with adjacent construction as necessary to provide continuity of protection.
- .4 Samples:
 - .1 For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - .2 Verification Samples: For each finish product selected, provided three samples, minimum size 150 mm square, representing actual product, color, and patterns.
- .5 Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- .6 Closeout Submittals: Provide manufacturer's maintenance instructions that include recommendations for periodic cleaning and maintenance of all railing components.
- .7 Reports and Letters of Assurance:
 - .1 The Engineer who sealed the shop drawings must submit to the Departmental Representative with the initial shop drawing submission, an Assurance of "Structural Design" and commitment for "Field Review".
 - .2 The Engineer who sealed the shop drawings must provide periodic field review. Written inspection reports of field review must be submitted to the Departmental Representative promptly as field reviews are made.

1.6 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: Company specializing in providing products of the type specified in this section.
- .2 Installer Qualifications: Company specializing in installing products of the type specified.
- .3 Mock Up:
 - .1 Provide a complete mockup of a guardrail and or handrail on site for review by the Departmental Representative. Make revisions to mockup as required by the Departmental Representative.
 - .2 Mock-up must include all components of the system, including typical joints and connection hardware, and typical tie-ins to adjoining systems, all finished as specified.
 - .3 Modify the mock-up at no additional cost to the contract as may be required to meet design and performance requirements.
 - .4 Mock-up, if deemed to be in general conformance with the Specifications and Drawings by the Departmental Representative, must remain on site as finished part of the work.

1.7 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.

1.8 WARRANTY

- .1 Manufacturer's 20-Year Commercial Warranty: provide manufacturer's standard commercial limited warranty for defects in the structure and weld for 20 years; and protection against cracking, peeling, flaking or blistering to be determined per project.

Part 2 Products

2.1 DESIGN CRITERIA

- .1 Installed guardrail assembly and anchorage shall conform to ANSI/ASSP A1264.1, structural requirements of NBCC 2015.
 - .1 In case of conflicting requirements, the more stringent requirement shall apply.
 - .2 Loads and load factors are determined in accordance with the National Building Code. Resistances must be determined by the applicable material design standards.

2.2 MODULAR ALUMINUM GUARDRAIL & HANDRAIL SYSTEM

- .1 Guardrails & Handrail:
 - .1 General: Provide products free from surface blemishes where exposed to view in the finished installation.

- .2 Design:
 - .1 Colour: As selected by Departmental Representative from manufacturer standard colours.
- .2 Components:
 - .1 General: Provide all aluminum components of same alloy.
 - .2 Posts: Aluminum, square, minimum 63mm x 63mm.
 - .1 Custom posts for outside the post configuration.
 - .3 Rails: Aluminum, sizes indicated on approved shop drawings.
 - .1 Top rails continuous over posts.
 - .1 Profile: Square, 63mm wide x 51mm high
 - .2 Bottom Rail:
 - .1 Profile: C shape, 38mm wide x 13mm high
 - .3 Pickets:
 - .1 Profile, Square, 16mm x 16mm
- .3 Accessories:
 - .1 Screws: Color matched, stainless steel.
 - .2 Anchors and Inserts: As required to support work specified, in accord with approved shop drawings.
 - .3 Fittings and Fasteners: Same basic material as parts being joined, unless otherwise indicated. Do not use metals corrosive or incompatible with materials being fastened.

2.3 FABRICATION

- .1 Fabricate handrails and railing systems to comply with manufacturer's printed requirements, project design requirements, details, dimensions, finish and member sizes, including post spacing and anchorage, but not less than the structural requirements to support loading.
- .2 Clearly mark component units for site assembly and installation.
- .3 Use connections that maintain structural capacity of joined members.

2.4 FINISHES

- .1 Powder Coated Finish: Factory electrostatically-applied, color as specified.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for handrail installation in accordance with manufacturer's written instructions.

3.2 PREPARATION

- .1 Prepare surrounding construction to receive railing system installations to comply with manufacturer's requirements.
- .2 Review and coordinate setting drawings, shop drawings, templates, and instructions for assembly and installation of railing system.

3.3 INSTALLATION

- .1 Install railing system and related components in strict accordance with manufacturer's printed installation instructions and approved project shop drawings.
- .2 Preassemble railing system, including posts, and panels where shown, in easy to lift sections whenever possible.
- .3 Align rails so that variations from level for horizontal members, and from parallel with rake of steps and ramps for sloping members, do not exceed 6 mm in 3.65 m.
- .4 Separate aluminum from building materials where electrolytic action may occur by means of asphaltic paint or other approved method.
- .5 Adjust, level, and securely install railing system components.
- .6 Install bottom rails in unspliced lengths between posts.
- .7 Install posts of continuous sections from mounting base to top rail.

3.4 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.

3.5 PROTECTION

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

3.6 FIELD QUALITY CONTROL

- .1 The Design Engineer, responsible for the production of the shop drawings, must provide periodic field review during construction and must submit reports.
- .2 Additional inspection and testing of materials workmanship may be carried out by a qualified independent Inspection Agency appointed by the Departmental Representative.
- .3 Review must include
 - .1 Checking that mill test reports are properly correlated to materials.
 - .2 Sampling fabrication and erection procedures for general conformity to the requirements of the specification.
 - .3 Checking that the welding conforms to the requirements of this specification.

- .4 Checking fabricated members against specified member shapes.
- .5 Checking that the base structure has sufficient back framing installed to receive the connection from the guard rails.
- .6 Visual inspection of all welded connections including sample checking of joint preparation and fit-up.
- .7 Sample checking of screwed and bolted joints.
- .8 Sample checking that tolerances are not exceeded during fit-up or erection.
- .9 Additional inspection and testing of welded connections as required by CSA W59.
- .10 General Inspection of field cutting and alternations required by other trades.
- .11 Submission of reports to the Departmental Representative, the Contractor, and the authorities having jurisdiction covering the work inspected with details of deficiencies discovered.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 12 00 – Structural Insulated Panels

1.2 REFERENCE STANDARDS

- .1 Canadian Wood Council
 - .1 Wood Design Manual 2017
 - .2 Engineering Guide for Wood Frame Construction 2014
- .2 CSA Group (CSA)
 - .1 CSA O86:19 Engineered Design in Wood
 - .2 CSA O112.9-10 (R2019), Evaluation of Adhesives for Structural Wood Products (Exterior Exposure).
 - .3 CSA O112.10-08 (R2017), Evaluation of Adhesives for Structural Wood Products (Limited Moisture Exposure).
 - .4 CSA O121-17, Douglas Fir Plywood.
 - .5 CSA O141:05 (R2019), Softwood Lumber.
 - .6 CSA O151-17, Canadian Softwood Plywood.
 - .7 CSA O153:19, Poplar Plywood.
 - .8 CSA O325:21, Construction Sheathing.
- .3 National Lumber Grades Authority (NLGA)
 - .1 Standard Grading Rules for Canadian Lumber 2017.
- .4 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section [01 33 00 - Submittal Procedures].
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for wood products and accessories and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Include manufacturer's pre-engineered floor, ceiling and roof joist span charts, and manufacturer's pre-engineered installation details.
 - .3 Submit certified test reports for prefabricated structural members from approved independent laboratory indicating compliance with specifications for specified performance characteristics and physical properties.

- .4 Submit CCMC Product Evaluation Report for engineered wood products.
- .5 Submit manufacturer's installation instructions.
- .3 Shop Drawings:
 - .1 For structural applications or conditions beyond the scope of the manufacturer's pre-engineered design information, submit drawings stamped and signed by professional engineer registered or licensed in Yukon Territory, Canada.
 - .2 Include on drawings:
 - .1 Design data in accordance with CAN/CSA-O86 and CWC Engineering Guide for Wood Frame Construction.
 - .2 Indicate configuration and spacing of joists, hanger and connector types, fasteners, locations and design values; bearing details.
 - .3 Submit stress diagrams or print out of computer design indicating design loads for members. Indicate allowable load and stress increase.
 - .4 Indicate arrangement of webs or other members to accommodate ducts and other specialties.

1.4 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store materials off ground with moisture barrier at both ground level and as a cover forming a well-ventilated enclosure, with drainage to prevent standing water.
 - .3 Store wood I-beams and I-joists on edge.
 - .4 Stack, lift, brace, cut and notch engineered lumber products in strict accordance with manufacturer's instructions and recommendations.
 - .5 Store and protect architecturally exposed lumber from nicks, scratches, and blemishes.
 - .6 Replace defective or damaged materials with new.
 - .7 Store separated reusable wood waste convenient to cutting station and work areas.

Part 2 Products

2.1 STRUCTURAL FRAMING

- .1 Lumber: softwood, S4S, moisture content 19% (S-dry) or less in accordance with following standards:
 - .1 CSA O141
 - .2 NLGA Standard Grading Rules for Canadian Lumber
- .2 Plant fabricated structural wood:
 - .1 Proprietary prefabricated I-joists of solid, laminated veneer lumber glue laminated lumber flanges or oriented strandboard panel web.
 - .2 Adhesive: Exterior rated phenol-formaldehyde or phenol-resorcinol: to CSA O112.9
- .3 Structural Composite Lumber (SCL) in accordance with CSA 086, for following uses:
 - .1 Laminated veneer lumber (LVL): beams and joists as indicated.
 - .2 Parallel strand lumber (PSL): beams and headers as indicated.
 - .3 Laminated strand lumber (LSL): beams and headers as indicated.
- .4 Framing and board lumber: in accordance with NBC, except as follows:
 - .1 2x: SPF species, NLGA No. 2 or better grade. Refer to structural drawings for locations where various grades are used.

2.2 FURRING AND BLOCKING

- .1 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers:
 - .1 D. Fir and SPF species, No. 2 or better grade. Refer to structural drawings for locations where various grades are used.

2.3 PANEL MATERIALS

- .1 Plywood, OSB and wood based composite panels: to CAN/CSA-0325.
- .2 Douglas fir plywood (DFP): to CSA 0121, standard construction.

2.4 ACCESSORIES

- .1 Subflooring adhesive: to CAN/CGSB-71.26, cartridge loaded
- .2 General purpose adhesive: to CSA O112.9
- .3 Nails, spikes and staples: to ASTM F1667
- .4 Bolts: 16 mm diameter unless indicated otherwise, complete with nuts and washers.
- .5 Joist hangers, connectors and fasteners: in accordance with accepted shop drawings, minimum 1 mm thick sheet steel, galvanized to minimum ZF001 coating designation.
- .6 Fastener Finishes:
 - .1 Galvanizing: to CAN/CSA-G164, use galvanized fasteners for interior highly humid areas and fire-retardant treated lumber.

- .7 Sill Plate Gasket: Closed cell polyethylene foam gasket in width to match sill plate width, 6 mm thick.

Part 3 Execution

3.1 SYSTEMS INTEGRATION

- .1 Install air barrier and vapour retarder sheeting around framing members to ensure continuity of protection and to lap and seal to main sheets.
- .2 Install insulation in exterior wall framing cavities that will not be accessible after completion of framing.
- .3 Install sill plate gasket in continuous lengths between concrete surfaces and wood framing.

3.2 FRAMING INSTALLATION

- .1 Comply with Requirements of NBC 2015 Part 9 supplemented by following paragraphs.
- .2 Install engineered framing and plant fabricated structural wood components, including all hangers, connectors and fasteners, in accordance with accepted shop drawings and manufacturers' instructions.
- .3 Install members true to line, levels and elevations, square and plumb.
- .4 Construct continuous members from pieces of longest practical length.
- .5 Install spanning members with "crown-edge" up.
- .6 Install 16 / 19 mm sheathing in accordance with requirements of NBC and drawings.
- .7 Install rough bucks, nailers and linings to rough openings as required to provide backing for frames and other work.
- .8 Install wood cants, fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.
- .9 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.
- .10 Install specified panel product for each application.
- .11 Use dust collectors and high-quality respirator masks when cutting or sanding wood panels.

3.3 FURRING AND BLOCKING

- .1 Install furring and blocking as required to space-out and support casework, cabinets, wall and ceiling finishes, facings, fascia, soffit, siding electrical equipment mounting boards, and other work as required.
- .2 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.

- .1 Align and plumb faces of furring and blocking to tolerance of [1:600].
- .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 fasteners.
- .5 Install sleepers as indicated.

3.4 PROTECTION

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

END OF SECTION

PART 1 GENERAL**1.1 RELATED REQUIREMENTS**

- .1 Section 01 33 00 Submittal Procedures
- .2 Section 01 61 00 Common Product Requirements
- .3 Section 06 10 53 - Miscellaneous Rough Carpentry
- .4 Section 07 21 13 Board Insulation
- .5 Section 07 46 19 Steel Siding
- .6 Section 07 62 00 Flashing and Sheet Metal

1.2 SYSTEM DESCRIPTION

- .1 A. Structural Insulated Panels (SIPs) consist of performance-rated oriented strand board (OSB) structurally laminated to expanded polystyrene (EPS) rigid insulation core. A SIP system incorporates manufacturer-specific spline connectors, sealants and SIP screws.

1.3 REFERENCES

- .1 American Society of Civil Engineers (ASCE) Publications
 - .1 ASCE 7 – Minimum Loads for Buildings and Other Structures.
- .2 ASTM International Publications:
 - .1 ASTM C578 – Standard Specifications for Rigid, Cellular Polystyrene Thermal Insulation.
 - .2 ASTM D7446 – Standard Specification for Structural Insulated Panel (SIP) Adhesives for Laminating Oriented Strand Board (OSB) to Rigid Cellular Polystyrene Thermal Insulation Core Materials
 - .3 ASTM E72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
 - .4 ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials
 - .5 ASTM E1803 – Standard Test Method for Determining Structural Capacities of Insulated Panels.
- .3 Underwriters' Laboratories of Canada (ULC) Publications:
 - .1 CAN/ULC-S701 – Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S101 - Standard Methods of Fire Endurance Tests of Building Construction and Materials
- .4 Canadian Construction Materials Centre (CCMC) Publications:

- .1 CCMC Technical Guide – Stressed Skin Panels (with structural ribs) for Walls and Roofs.
- .5 APA The Engineered Wood Association Publications:
 - .1 DOC PS2 – Performance Standard for Wood-Based Structural-Use Panels.
 - .2 APA PRP-108 – Performance Standards and Qualification Policy for Structural-Use Panels
- .6 Canadian Standards Association (CSA) Publications
 - .1 CAN/CSA-O325 – Construction Sheathing
- .7 ICC-ES Acceptance Criteria:
 - .1 ICC-ES AC04 – Acceptance Criteria for Sandwich Panels.
 - .2 ICC-ES AC05 – Acceptance Criteria for Sandwich Panel Adhesives.
 - .3 ICC ES AC12 – Acceptance Criteria for Foam Plastic Insulation.
- .8 Canadian Commission on Building and Fire Codes/National Research Council of Canada
 - .1 National Building Code of Canada (NBC).
 - .2 National Fire Code of Canada (NFC).

1.4 DESIGN REQUIREMENTS

- .1 Provide SIPs which have been manufactured, fabricated and installed to withstand specified loads as determined by design in accordance with the local building codes and to maintain performance criteria as stated by the SIP manufacturer without defects, damage or product failure.

1.5 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data: Submit product data for specific products.
 - .1 SIP Code Compliance: Provide code report for SIP to demonstrate compliance with requirements for construction as per current applicable code. Submit current CCMC evaluation report showing compliance with the National Building Code of Canada (NBC).
 - .2 EPS Code compliance: Provide evaluation report for EPS insulation with evidence of compliance with current applicable code. Submit CCMC evaluation listing showing conformance to the NBC.
- .3 Calculation: Provide structural calculation prepared by a design professional registered in the Northwest Territories and Nunavut (NAPEG) when required by Departmental Representative.
- .4 Shop drawings: Submit signed and sealed engineered SIP shop drawings showing panel layout, elevations, SIP connection details, product components and accessories prepared by an Engineer registered in the Northwest Territories and Nunavut (NAPEG).
- .5 Quality Assurance Submittals:

- .1 Third-Party Quality Control: Provide proof of manufacturer participation in recognized third party certification program to assure conformance with specified performance characteristics and physical properties in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit copy of third party certification label demonstrating that manufacture of panels complies with specified performance characteristics and physical properties.
- .3 Submit manufacturer-specific installation instructions for SIP system.

1.6 QUALITY ASSURANCE

- .1 Installer Qualifications: Installer to have demonstrated experience acceptable to SIP Manufacturer for installation work similar in scope and size to this project. Manufacturer to confirm availability of site advisory service.
- .2 Field Measurements: Request field measurements prior to completion of shop drawings and fabrication. Coordinate fabrication schedule with construction schedule to avoid delay of work
- .3 Source limitations: Obtain all SIPs through one source. All accessories to be furnished or recommended by the SIP manufacturer.

1.7 REGULATORY REQUIREMENTS:

- .1 SIPs shall be recognized for compliance with the applicable building code with a CCMC evaluation report demonstrating compliance with the National Building Code of Canada (NBC).
- .2 Pre-installation Meeting: Conduct pre-installation meeting to verify project requirements, foundation/structural system/substrate conditions, review SIP manufacturer installation instructions and requirements for SIP manufacturer warranty.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Delivery: Deliver materials from SIP manufacturer with identification labels or markings intact.
- .2 Storage: SIPs shall be fully supported in level storage and prevented from contact with the ground. Stack SIPs with a minimum of three supports for every eight feet of SIP length.
- .3 Protection: SIPs shall be fully protected from the weather. Protect against exposure to rain, water, dirt, mud, and other residue that may affect SIP performance. Cover stored SIPs with breathable protective wraps. Sips shall be stored in a protected area.

1.9 WARRANTY

- .1 Project Warranty: Refer to Conditions of the Contract for project warranty conditions and provisions.
- .2 SIP Manufacturer Warranty: Submit SIP manufacturer standard warranty document for

execution by an authorized company official. SIP Manufacturer Limited Warranty is in addition to and not a limitation of other rights the Owner may have under Contract Documents.

Part 2 PRODUCTS

2.1 MATERIALS

- .1 SIPs consist of the following:
 - .1 Graphite-enhanced Expandable Polystyrene (GPS) core –GPS insulation complying with CAN/ULC-S701.1, Type 1 Insulation type and manufacturer shall be identified with label of accredited Third Party Certification agency.
 - .2 Oriented Strand Board (OSB) – a performance rating mark shall be identified on the panel, with an Exposure 1 durability rating; minimum material properties shall be as described in DOC PS2, APA PRP-108 and CSA 0325.
 - .3 Laminating Adhesives – a structural grade laminating adhesive that has demonstrated compliance with ICC ES AC05 – Acceptance Criteria for Sandwich Panel adhesives, CCMC technical evaluation guide for SIPs and ASTM D7446.

2.2 ACCESSORIES

- .1 Splines:
 - .1 OSB, dimensional lumber, engineered wood or I-beam for use in joining SIPs shall be supplied by the SIP manufacturer as specified on structural drawings and subsequently approved SIP shop drawings.
- .2 Fasteners:
 - .1 Nails as per SIP manufacturer design requirements shall be used for spline and plate attachments following fastening requirements specified on approved SIP shop drawings. Nails for field installation of spline and plates to be supplied by the SIP installer.
 - .2 Panel Screws as per SIP manufacturer design requirements shall be used following fastening requirements specified on structural drawings and subsequently approved SIP shop drawings. Panel screws are to be supplied by the SIP manufacturer or approved equal supplied by the SIP installer.
- .3 SIP Sealant:
 - .1 Sealants shall be specifically designed for use with SIPs. Sealant must be compatible with all components of the SIP. Sealant is to be supplied by the SIP manufacturer or approved equal supplied by the SIP installer.
- .4 SIP Panel Seal Tape:
 - .1 Tape with an adhesive suitable for indoor use, minimum 6" (152 mm) wide for use on flat SIP joints and minimum 12" (304 mm) wide for use on opposing

angled surfaces including ridge and roof-to-wall connections. SIP tape shall be supplied by the manufacturer.

2.3 FABRICATION

- .1 Panel sizes shall be fabricated in accordance with approved shop drawings. Fabrication tolerances shall comply with values in manufacturer product specification.
 - .1 Manufacturing Standards: SIPs shall be manufactured under a third party certification program monitored by an accredited agency.
- .2 SIP Thermal Resistance at a Mean Temperature of 75° F (24° C) for SIP only consisting of 7/16" (11 mm) OSB structurally laminated to both faces of EPS insulation core.
 - .1 12 ¼" (311 mm) thick SIP with R-54.7 (RSI-9.63).

Part 3 EXECUTION

3.1 MANUFACTURER INSTRUCTIONS

- .1 Compliance: Comply with SIP manufacturer CCMC evaluation reports, published Load Design Charts, Construction Assembly Drawings, Approved Shop Drawings and product data including Technical Bulletins and Product Information Bulletins for design and installation.
- .2 Construction Documents and Shop drawings shall be reviewed by a qualified architect/engineer and shall be signed and sealed. Deviations from standard details or load design values shall be calculated for the specific use and the calculations and details shall be signed and sealed by a registered design professional and provided to the manufacturer.

3.2 EXAMINATION

- .1 Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other related sections) are acceptable for product installation in accordance with SIP manufacturer instructions and guidelines.
 - .1 Verify conditions of foundation/structural system/substrate and other conditions which affect installation of SIPs. Any adverse conditions shall be reported in writing to the SIP manufacturer and the lead design professional. Do not proceed with installation until adverse conditions are corrected and documented.

3.3 INSTALLATION

- .1 SIP Installation:
 - .1 SIP Support: Provide level and square foundation/structural system/substrate that support wall and/or roof SIPs. For wall SIPs hold sill plate back from edge of deck ½" (12.7 mm) to provide full bearing of both OSB skins. Provide adequate

- bracing of SIPs during panel erection. Remove debris from plate area prior to application of sealant and SIP placement.
- .2 Electrical: If required, provide 1 ½" (38 mm) diameter access holes in top and bottom plating to align with electrical wire chases in SIPs. Align all horizontal electrical chases in SIPs and maintain debris free electrical chases.
 - .3 SIP Fastening: Connect SIPs using screws or nails as shown on structural drawings and subsequently approved shop drawings. Where manufacturer supplied SIP Screws are used, a minimum of 1 ½" (38mm) of penetration is required into wood support.
 - .4 SIP Sealant: Sealant must be installed in a continuous bead at all connections.
 - .5 SIP Tape: Apply SIP tape at joints between roof SIPs, at the roof-to-wall connection and at the ridge. Tape shall only be installed after all spline connections are completed as per Manufacturer installation instructions.
- .2 Restrictions: Do not install SIPs directly or in contact with concrete/dirt. Do not install plumbing in a SIP without consulting SIP manufacturer. Do not over-cut panel skins for approved field-cut openings. Do not cut skins to install electrical chases. Do not expose EPS core of SIPs to any solvents or solvent-based adhesives.
 - .3 Remove and replace any SIP wall or roof panels which have become wet or damaged before proceeding with the installation of additional SIPs or other work that may cover a compromised SIP.

3.4 PROTECTION

- .1 Protection: Protect installed product from exposure and damage during construction.
 - .1 SIP Temporary Protection: Protect SIPs from weather with temporary protection at the end of each day or when rain or snow is imminent. Apply sheathing membrane to exposed panel faces as soon as practical after installation.
 - .2 After installation is complete, cover SIPs to prevent contact with excessive water on all exposed SIP edges and faces.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Wood baseboards.
- .2 Wood window and door casing.
- .3 Wood window sills.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry: Furring, blocking, nailing strips, grounds and rough bucks and sleepers.
- .2 Section 09 91 23 – Interior Painting: Site finishing for finish carpentry.

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI A208.1, Particleboard.
 - .2 ANSI A208.2, Medium Density Fibreboard (MDF) for Interior Applications.
 - .3 ANSI/HPVA HP-1, American National Standard for Hardwood and Decorative Plywood.
 - .4 ANSI/BHMA A156.16, Auxiliary Hardware
 - .5 ANSI/ASME 18.6.1 Wood Screws (Inch Series).
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Woodwork Institute
 - .1 North American Architectural Woodwork Standards 4.0.
- .3 ASTM International
 - .1 ASTM A 153/A 153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM E1333 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large-Scale Chamber.
 - .3 ASTM F1667, Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .4 Forest Stewardship Council (FSC)
 - .1 FSC-STD-01-001, FSC Principle and Criteria for Forest Stewardship.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature, data sheets and catalogue pages for specified products. Include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
- .3 Shop Drawings:
 - .1 Prepare and submit shop drawings in general accordance with AWMAC AWS manual.
 - .2 Indicate profiles and dimensions, assembly techniques, jointing, methods of fastening, terminations and other related details.
 - .3 Indicate materials, thicknesses, finishes and hardware.
 - .4 Include schedule or key plan.
 - .5 Show profiles, elevations and details at scales recommended by AWMAC AWS .
 - .6 Where necessary, show location and type of blocking and backing required within supporting assemblies.
- .4 Samples:
 - .1 Submit triplicate 300 mm long representative samples of each typical item of finish carpentry.
 - .1 Standing and running trim: 300 mm long.
 - .2 Panel Materials: 300mm x 300mm.
 - .2 Shop applied coating samples:
 - .1 For transparent finish, submit triplicate samples of each species and cut of wood veneer to be used, finished as specified.
 - .2 For opaque finish, submit [triplicate] samples for each colour selection, finished as specified

1.5 QUALITY ASSURANCE

- .1 Perform Work of this Section by experienced finish carpentry contractor.
- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00- Quality Control.
 - .2 Shop prepare typical example of each specified item of standing and running trim at windows, complete with shop applied finishes, and install where directed by Departmental Representative.
 - .3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with Work.
 - .4 When accepted, mock-up will demonstrate minimum standard for Work.
 - .5 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.
 - .6 Accepted mock-up may remain as part of finished work.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements and with AWS recommendations and as follows.
- .2 Deliver finish carpentry materials only when area of work is enclosed, plaster and concrete work is dry, area is broom clean and site environmental conditions are acceptable for installation.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Maintain indoor temperature and humidity within range recommended by AWS for location of the Work.
 - .3 Store products on site as specified for minimum 72 hours prior to installation.
 - .4 Store and protect finish carpentry products from moisture, nicks, scratches, and blemishes.
 - .5 Replace defective or damaged materials with new.

Part 2 Products**2.1 QUALITY GRADE**

- .1 Provide all materials and perform all work of this Section in accordance with AWMAC AWS Custom Grade.
- .2 In case of conflict between Contract Documents and AWMAC AWS grade requirements, Contract Documents govern.

2.2 MATERIALS

- .1 Softwood and hardwood lumber: Sound lumber to specified AWS grade requirements, kiln-dried to moisture content recommended for location of the Work.
 - .1 Machine stress-rated lumber is acceptable for all purposes.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .3 Hardwood plywood: to ANSI/HPVA HP-1.

2.3 MANUFACTURED TRIM

- .1 Interior Standing and running trim:
 - .1 Paint grade stock for opaque finish: finger jointed pine (FJP).
 - .1 Profile: 11 x 102 mm high.
- .2 Window casings:
 - .1 Paint grade stock for opaque finish: finger jointed pine (FJP).
 - .1 Profile: 17 x 89 mm high.

- .3 Window aprons:
 - .1 Solid Douglas Fir, straight vertical grain (SVG)
 - .1 Profile: 19 x 76 mm high.
- .4 Window sills:
 - .1 Douglas Fir, straight vertical grain (SVG) hardwood plywood.
- .5 Door casing:
 - .1 Paint grade stock for opaque finish: finger jointed pine (FJP).
 - .1 Profile: 17 x 76mm.

2.4 MANUFACTURED HANDRAILS

- .1 Stair handrails:
 - .1 Maple, Paint grade stock for opaque finish

2.5 FASTENINGS

- .1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.
- .2 Exposed fasteners to match finish of hardware.
- .3 Nails and staples: to ASTM F1677, plain finish.
- .4 Wood screws: to ANSI/ASME 18.6.1, countersunk flush type unless indicated otherwise, in sizes to suit application, plain.
- .5 Splines: wood.
- .6 Panel adhesive: Type to suit application.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for wood products installation in accordance with AWS tolerances and requirements of Contract Documents.

3.2 PREPARATION

- .1 Back prime woodwork before installation, to AWS.

3.3 INSTALLATION

- .1 Install items of finish carpentry in accordance with AWMAC AWS grade specified for respective items.
- .2 In case of conflict between Contract Documents and AWS grade requirements, Contract Documents govern.

- .3 Install items of finish carpentry at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
 - .2 Fasten and anchor securely.
- .4 Scribe and cut as required, fit to abutting walls, and surfaces, fit properly into recesses and to accommodate piping, columns, fixtures, outlets, or other projecting, intersecting or penetrating objects.
- .5 Form joints to conceal shrinkage.

3.4 CONSTRUCTION

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

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.

3.6 TOUCHUP AND PROTECTION

- .1 Fill and retouch all nicks, chips and scratches in factory finishes and substrate materials to AWS standards. Replace damaged items that cannot be repaired to AWS standards.
- .2 Protect installed products and components from damage during construction.

- .3 Repair damage to adjacent materials caused by finish carpentry installation.
- .4 Leave work to be site finished ready for finishing by Section 09 91 00 - Painting.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Architectural millwork, including hardware.
- .2 Manufactured quartz countertops.

1.2 RELATED REQUIREMENTS

- .1 Section 07 92 00 - Joint Sealants: Sealant materials and application.
- .2 Section 09 91 23 – Interior Painting: Site finishing materials and application.

1.3 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI)
 - .1 ANSI/ASME 18.6.1 Wood Screws (Inch Series), current version.
 - .2 ANSI/BHMA A156.9, Cabinet Hardware.
 - .3 ANSI/BHMA A156.16, Auxiliary Hardware.
 - .4 ANSI/BHMA A156.18, Materials and Finishes.
 - .5 ANSI A208.1, Particleboard.
 - .6 ANSI A208.2, Medium Density Fiberboard (MDF) for Interior Applications.
 - .7 ANSI/HPVA HP-1, Standard for Hardwood and Decorative Plywood.
 - .8 ISO 4586, High-Pressure Decorative Laminates (HPDL).
- .2 Architectural Woodwork Manufacturers Association of Canada (AWMAC AWS)
 - .1 North American Architectural Woodwork Standards 4.0.
- .3 ASTM International
 - .1 ASTM A 153/A 153M, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - .2 ASTM D6007 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Small-Scale Chamber.
 - .3 ASTM F1667-21 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- .4 CSA Group (CSA)
 - .1 CSA O121, Douglas Fir Plywood.
 - .2 CSA O141, Softwood Lumber.
 - .3 CSA O151, Canadian Softwood Plywood.
 - .4 CSA O153, Poplar Plywood.

1.4 ADMINISTRATION REQUIREMENTS

- .1 Coordination
 - .1 Coordinate with other work for satisfactory and expeditious completion of the work of this section. Coordinate with partition accessories, electrical, communications, and finish components to ensure that proper provisions are made for the installation of the work of this section and for work by others.
 - .2 Where woodwork is to be fitted to other construction, check actual dimension of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delays in the Work.
 - .3 Provide forms, templates, anchors, sleeves, inserts and accessories required to be fixed to or inserted in the work of this section and set in place. Instruct applicable Subcontractors as to their locations.
 - .4 Provide cut-outs for raceways, sleeves, grommets and other manufactured accessories which are required for the work of this section and for work by others.
 - .5 Architectural woodwork specified under this section includes woodwork items which are closely integrated with both prefinished and field painted architectural metalwork, stonework, glass, and built-in electrical components, and consequently requires close coordination with such allied trades. This section is responsible for ensuring correct installation procedures and results.

1.5 PRE-INSTALLATION MEETING

- .1 Prior to enclosing framing, convene a meeting of contractor, casework fabricator, casework installer, framing subcontractor and Departmental Representative.
 - .1 Review locations of backing required for casework installation as shown on shop drawings and as necessary for installation.
 - .2 Review method of attachment for backing to wall system.
 - .3 Review coordination with other affected sections.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Prepare and submit material list in accordance with AWMAC, cross-referenced to specifications.
 - .2 Include manufacturer's instructions, printed product literature, data sheets and catalogue pages for all materials and products to be incorporated into architectural wood casework and include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.
- .3 Hardware List:

- .1 Submit hardware list cross-referenced to specifications.
- .2 Include manufacturer's specification sheets indicating name, model, material, function, finish, BHMA designations and other pertinent information.
- .4 Shop Drawings:
 - .1 Prepare and submit shop drawings in accordance with AWMAC as follows.
 - .2 Submit two sets of shop drawings for initial review in accordance with requirements of Division 01. Revise as directed, submit for final acceptance and distribution.
 - .3 Indicate details of construction, profiles, jointing, fastening and other related details.
 - .1 Scales: profiles full size, details half full size.
 - .4 Indicate materials, thicknesses, finishes and hardware.
 - .5 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.
 - .6 Show location on casework elevations of backing required in supporting structure for attachment of casework.
 - .7 Indicate AWMAC quality grade where different from predominant grade specified.
 - .8 Include color schedule of all casework items, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.
- .5 Samples:
 - .1 Prepare and submit samples in accordance with AWMAC and as follows.
 - .2 Apply sample finishes to specified substrate or core material minimum 300 x 300 mm. For veneers with transparent finish submit three samples to illustrate range and colour of grain expected.
 - .3 Shop applied coatings:
 - .1 For transparent finish, submit triplicate samples of each species and cut of wood to be used, finished as specified.
 - .4 Submit duplicate samples of laminated plastic for each specified colour selection.
 - .5 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - .6 Submit statement of experience and qualifications of architectural wood casework fabricator.

1.7 QUALITY ASSURANCE

- .1 Perform Work of this Section by single architectural wood casework fabricator with current architectural casework production experience.

- .2 Mock-ups:
 - .1 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Shop prepare one counter top and base cabinet unit for each type, complete with hardware and shop applied finishes, and install where directed by Departmental Representative.
 - .3 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with Work.
 - .4 When accepted, mock-up will demonstrate minimum standard for Work.
 - .5 Do not proceed with work prior to receipt of written acceptance of mock-up by .
 - .6 Accepted mock-up may remain as part of finished work.

1.8 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.
- .2 Deliver wood casework only when area of work is enclosed, plaster and concrete work is dry, and area is broom clean and site environmental conditions are acceptable for installation.
- .3 Protect millwork against dampness and damage during and after delivery.
- .4 Store millwork in ventilated areas, protected from extreme changes of temperature and humidity, and within range recommended by AWMAC for location of project.
- .5 Store materials indoors in clean, dry, well-ventilated area.
- .6 Protect architectural woodwork and hardware from nicks, scratches, and blemishes.
- .7 Replace defective or damaged materials with new.

Part 2 Products

2.1 QUALITY GRADE

- .1 Provide all materials and perform all fabrication in accordance with AWMAC Custom Grade.
- .2 In case of conflict between Contract Documents and AWMAC grade requirements, Contract Documents govern.

2.2 LUMBER

- .1 Softwood and Hardwood Lumber: Sound lumber to specified AWMAC quality grade requirements, kiln-dried to moisture content recommended by AWMAC for location of the Work.
- .2 Machine stress-rated lumber is acceptable for all purposes.
- .3 Hardwood lumber: moisture content 15 % or less in accordance with following standards:

- .1 National Hardwood Lumber Association (NHLA).
- .2 AWMAC custom grade, moisture content as specified.

2.3 PANEL MATERIALS

- .1 MDF (medium density fibreboard) core: to ANSI A208.2, density 769 kg/m³.
- .2 Douglas fir plywood (DFP): to CSA O121, standard construction.
- .3 Hardwood plywood: to ANSI/HPVA HP-1.

2.4 LAMINATED PLASTIC MATERIALS

- .1 Laminated plastic for flatwork: to NEMA LD3.
 - .1 High pressure decorative laminated (HPDL) plastic.
 - .1 Manufacturer: Wilsonart, Formica or Tafisa
 - .2 Type: GP (general purpose).
 - .3 Horizontal Surfaces: HGS to suit application, 1.2 mm thick.
 - .4 Vertical Surfaces: VGP to suit application, 0.71 mm thick.
 - .5 Lower and upper Cabinets Colour/Pattern/Finish as follows:
 - .1 Pattern and Finish: printed pattern with Satin or Matte Finish.
 - .2 Colour: Colour from manufacturer's standard colour range. To be selected by Department Representative.
 - .2 Laminated plastic for backing sheet:
 - .1 Type: backer.
 - .2 Grade: BKH.
 - .3 Thickness: not less than 0.5 mm thick or same thickness as face laminate.
 - .4 Colour: same colour as face laminate.
 - .3 Laminated plastic liner sheet: CLS grade, White colour.
 - .4 Thermofused Melamine: to NEMA LD3 Grade LPDL, VG.
 - .1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).
 - .5 Edge finishing for doors, drawer fronts, shelves and false fronts:
 - .1 PVC solid colour to match face.
 - .6 Laminated plastic adhesive: as recommended by manufacturer.

2.5 CASEWORK FABRICATION - GENERAL

- .1 Fabricate casework of specified core and surface finish materials to specified AWMAC quality grade.
 - .1 Construction type: frameless.
 - .2 Door-cabinet interface: flush overlay.

- .2 Set nails and countersink screws apply wood filler to indentations, sand smooth and leave ready to receive finish.
- .3 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.
- .4 Shelving to cabinetwork to be adjustable unless otherwise noted.
- .5 Provide cut-outs for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.
- .6 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.
- .7 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

2.6 LAMINATED PLASTIC CASEWORK FABRICATION

- .1 Do laminated plastic fabrication in compliance with NEMA LD3, Annex A and specified AWMAC quality grade.
- .2 Ensure adjacent parts of continuous laminate work match in colour and pattern.
- .3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 3000 mm. Keep joints 600 mm from sink cut-outs.
- .4 Form shaped profiles and bends as indicated, using post-forming grade laminate to laminate manufacturer's instructions.
- .5 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.
- .6 Apply laminate backing sheet to reverse side of core of plastic laminate work.
- .7 Apply laminated plastic liner sheet to interior of cabinetry.
- .8 Drawer Construction:
 - .1 Sides:
 - .1 Custom grade: LPDL (melamine) or HPDL on MDF, thickness 12 mm.
 - .2 Bottoms: MDF with melamine surfaces, thickness 6 mm.
 - .3 Joinery: Meeting requirements of AWMAC for Grade specified.
 - .4 Drawer bottoms fully housed into sides and sub front and mechanically fastened to back or plowed into back.

2.7 SHOP APPLIED FINISH COATINGS

- .1 Finish system: AWMAC system.

- .2 Apply finish system component materials in accordance with manufacturer's instructions.

2.8 CABINET HARDWARE

- .1 Cabinet hardware: to AWMAC quality grade specified and to ANSI/BHMA A156.9, designated by letter B and numeral identifiers as listed below.
- .2 Finish:
 - .1 Exposed hardware: brushed stainless steel
 - .2 Semi-exposed hardware: Manufacturer's standard finish.
- .3 Casework door hinges: concealed European style Grade II hinges minimum 120° opening type full overlay.
 - .1 Acceptable Manufacturer: Blum, Hettich International, Sugatsune.
- .4 Pulls:
 - .1 96mm long for cabinet doors and all cabinet drawers
 - .1 Acceptable Manufacturer:
 - .1 Richelieu 873,
 - .2 Amerock BP36570FB
 - .3 Marathon 9322
- .5 Shelf rests: shelf rest installed in holes drilled, adjustable, bright zinc finish.
- .6 Drawer slides:
 - .1 Slide type: bottom edge mounted drawer slides, roller bearing, easy close, 45 kg/pair.
 - .2 Extension and capacity: full extension meeting requirements of AWMAC AWS for type and size of drawer.
 - .3 Acceptable manufacturer: Blum, or approved alternative.
- .7 Closets:
 - .1 Closet Rods: Chrome plated, 1" diameter with chrome escutcheons.
 - .2 Supports: central supports as required.

2.9 ACCESSORIES

- .1 Wood screws: plain, type and size to suit application.
- .2 Nails and staples: to CSA B111 and ASTM F1667.
- .3 Splines: wood.
- .4 Sealant: in accordance with Section 07 92 00- Joint Sealants.

2.10 LAMINATED PLASTIC COUNTERTOPS

- .1 Core material: exterior grade hardwood plywood with a non-telegraphing grain.
 - .1 Countertops to receive plumbing fixtures: Veneer core plywood with type II adhesive.
- .2 Back splashes: butt joint.
- .3 Front edges: self-edge.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for architectural woodwork installation in accordance with manufacturer's instructions.

3.2 INSTALLATION

- .1 Install architectural wood casework in accordance with AWMAC grade for respective items.
- .2 In case of conflict between Contract Documents and AWMAC grade requirements, Contract Documents govern.
- .3 Install prefinished millwork at locations shown on drawings.
 - .1 Position accurately, level, plumb straight.
- .4 Fasten and anchor millwork securely.
 - .1 Supply and install heavy duty fixture attachments for wall mounted cabinets.
- .5 Countersink mechanical fasteners at exposed and semi-exposed surfaces, excluding installation attachment screws and screws securing cabinets end to end.
- .6 Use draw bolts in countertop joints.
- .7 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.
- .8 At junction of counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00- Joint Sealants.
- .9 Apply moisture barrier between wood framing members and masonry or cementitious construction.
- .10 Fit hardware accurately and securely in accordance with manufacturer's written instructions.
- .11 Make cut-outs for inset equipment and fixtures using templates provided.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.
 - .1 Clean outside surfaces, inside cupboards and drawers.
 - .2 Remove excess glue, pencil and ink marks from surfaces.

3.4 PROTECTION

- .1 Protect millwork from damage until final inspection.
- .2 Protect installed products and components from damage during construction.
- .3 Repair damage to adjacent materials caused by architectural woodwork installation.
- .4 Leave work to be site finished ready for finishing by Section 09 91 00.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 05 73 00 – Decorative Metal Railings.
- .2 Section 06 10 53 - Miscellaneous Rough Carpentry.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C177: Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
 - .2 ASTM D 570: Water Absorption of Plastics
 - .3 ASTM D 1761: Standard Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials
 - .4 ASTM D-7031: Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products, ASTM International
 - .5 ASTM D-7032: Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails), ASTM International.
 - .6 ASTM E-84: Test Method for Surface Burning Characteristics of Building Materials, ASTM International.

1.3 DESIGN REQUIREMENTS

- .1 Structural Performance:
 - .1 Deck: Uniform Load – 4,448.2N (100lbf/sq.ft).
- .2 Fire-Surface Burning Characteristics per ASTM E-84.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for composite decking and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Provide drawings showing layout of deck pedestals, including all required pedestals, tabs, extenders, shims, levellers, braces, and bases.
- .4 Samples:

- .1 For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns
- .2 Verification Samples: For each finish product specified, two samples, representing actual product color, size, and finish

1.5 QUALITY ASSURANCE

- .1 Manufacturer Qualifications: have experience manufacturing similar.
- .2 Installer Qualifications: have experience installing similar products.
- .3 Pre-Installation Meeting: Convene minimum two weeks prior to starting work of this section.

1.6 DELIVERY, STORAGE AND HANDLING

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

1.7 WARRANTY

- .1 Provide manufacturer's warranty against rot, decay, splitting, checking, splintering, fungal damage, and termite damage for a period of 10 years.
- .2 Provide a warranty against food staining and fading beyond 5 Delta E (CIE units) for a period of 10 years.

Part 2 Products

2.1 MATERIALS

- .1 Wood-Plastic Composite Lumber: Composite Decking consisting of recycled Linear Low-Density Polyethylene (LLDPE) and recycled wood extruded into shapes and sizes.
 - .1 Dimensions: 25mm x 140mm.
 - .2 Lengths: 1.8 to 6 m or longer with a minimum of 90% planks exceeding 3 m. Square end trimmed. For single spans shorter than 3 m use decking of same length as span.
 - .3 Colour: To be selected by Departmental Representative from manufacturer's standard colours.
 - .4 Physical and Mechanical Properties:
 - .1 Flame Spread, ASTM E 84: 85.
 - .2 Thermal Expansion, ASTM D 1037: 48x254,-15 mm/mm/degree C (1.9 x 10-5 inch/inch/degree F.
 - .3 Moisture Absorption, ASTM D 1037: Less than 1%.
 - .4 Screw Withdrawal, ASTM D1761: 10.5 kg/mm (588 lbs/in).
 - .5 Fungus Resistance, ASTM D1413: Rating - no decay.
 - .6 Termite Resistance, AWPAE1-72: Rating = 9.6.

- .7 Compression Parallel, ASTM D198: 10,948 kpa (1588 psi) ultimate, 3,723 kpa (540 psi) design.
- .8 Compression Perpendicular, ASTM D143: 9,908 kpa (1437 psi) ultimate, 3,723 kpa (540 psi) design.
- .9 Bending Strength, ASTM D198: 22,615 kpa (3280 psi) ultimate, 3,447 kpa (500 psi) design.
- .10 Shear Strength, ASTM D143: 12,142 kpa (1761 psi) ultimate, 2482 kpa (360 psi) design.
- .11 Modulus of Elasticity, ASTM D4761: 2,757,902 kap (400,000psi) ultimate, 1,378,951 kpa (200,000 psi) design.
- .12 Modulus of Rupture, ASTM D4761: 25,855 kpa (3750 psi) ultimate, 3,447 kpa (500 psi) design.
- .13 Ultimate strength values are not meant for design analysis. Design values are for temperatures up to 130 degree F (54 degree C).
- .5 Standard of Acceptance:
 - .1 Enhance Decking Boards by Trex.
 - .2 Premier Collection by TimberTech or
 - .3 Good Life by Fiberon.
- .2 Fasteners: Screws as recommended by manufacturer.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for composite decking installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION – DECK PEDESTALS

- .1 Install in accordance with manufacturer's installation instructions.
- .2 Ensure pedestals have been shimmed/adjusted for rocking, uneven, or un-level pavers prior to substantial completion.

3.3 INSTALLATION – COMPOSITE DECKING

- .1 Install in accordance with manufacturer's installation instructions.
- .2 Cut, drill, and rout using carbide tipped blades
- .3 Do not use composite wood material for structural applications.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning and manufacturer's recommendations.

3.5 PROTECTION

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

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES:**

- .1 Information regarding minimum expectations and requirements of the envelope commissioning process.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM E779-19, Standard Practice for Determining Air Leakage Rate By Fan Pressurization.
 - .2 ASTM E1186-17, Standard Practice for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.
 - .3 ASTM E1827-11 (2017), Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door.
 - .4 ASTM E783
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-149.10-2019, Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Schedule meetings with contractors to the building enclosure in accordance with Section 01 31 19 - Project Meetings.
- .2 Coordinate quality assurance and quality control procedures for installed building enclosure components and assemblies with Section 01 45 00 - Quality Control.
- .3 Contractor's Quality Management Program: establish standardized approach to managing quality of materials and workmanship during execution of the work associated with the building enclosure including the following:
 - .1 Quality Assurance: activities, actions, corrective remedies and procedures performed before and during execution of the Work by the Contractor to protect against defects and deficiencies, and confirming that construction is consistent with specified regulatory and performance requirements, qualification statements and certification requirements listed within the specifications.
 - .2 Quality Control: tests, inspections, procedures, and related actions performed by the Contractor during and after execution of the Work using a testing agency acceptable to the Departmental Representative to verify that completed construction complies with specified performance requirements, standards and technical requirements within the specifications.

- .3 Limitations: quality management activities performed by the Contractor do not include contract administration and reporting performed by the Consultant or quality auditing activities performed by the Departmental Representative.
- .4 Cold Weather Protection: describe approaches to protection of building envelope membranes and transitions from condensation prior to installation of building insulation during cold weather conditions when building is under temporary heating conditions:
 - .1 Build-up of condensation behind membranes during cold weather will occur and cause damage to those membranes or adjacent materials unless membranes are protected by insulation materials.
 - .2 Perimeters of glazed openings, vents and louvers, and other envelope penetrations are particularly vulnerable to accumulations of condensation that will cause damage to transition membranes and must be insulated, with secondary interior air seals installed concurrent with installation of these Products.
- .4 Scheduling: schedule construction of sample panels and mock-ups, and associated pre-construction testing and corrections to proposed construction methods to account for site specific installation conditions.
- .5 Pre-Construction Conferences: arrange pre-construction meetings attended by Contractor, Departmental Representative, and building enclosure Subcontractors before starting work on the building enclosure to verify construction methods used for controlling air leakage and maintaining thermal continuity as follows:
 - .1 Quality Management Plan: review Contractor's quality control plan.
 - .2 Best-Practices: obtain written commitment to building enclosure best-practices for installation of building enclosure materials, components and assemblies and include in Contractor's quality management program.
 - .3 Document and Product Review: review drawings and specifications and confirm compatibility between overlapping and adjacent components supplied and installed by multiple Subcontractors contributing different Products associated with assembly of the building enclosure.
 - .4 Acceptable Extraneous Membrane Leakage: establish limitations to extraneous air leaks when ASTM E783 is used to verify membrane air leakage performance as agreed upon between the Departmental Representative and contractors.
- .6 Post Mock-Up Debrief: arrange for post mock-up debrief meetings attended by Contractor and Departmental Representative:
 - .1 Schedule debrief meeting immediately after testing results and observations of the mock-ups is completed.
 - .2 Incorporate lessons-learned arising from observed conditions and testing into the Contractor's quality management plan.
 - .3 Modify best-practice approach to constructing building enclosure assemblies where changes are required to conform with specified performance requirements.

- .7 Protection of Installed Products: take all necessary precautions to prevent puncturing, tearing, weakening or damaging of building envelope membranes during construction; and repair any damage as directed by the Departmental Representative.

1.4 DEFINITIONS

- .1 Air Change Rate (ACH): a measure of how frequently the air volume in a space is replaced with outdoor air. This value is found by dividing the flow rate into a space by the volume of that space. The volume of the space used for this calculation should be the entire volume enclosed by the air barrier elements being tested.
- .2 As Operated: the measurement of total air leakage of a building under normal operating conditions. Energuide requires that intentional openings, such as dryer vents, combustion air inlets and fireplace chimneys to be left as-is and included in the results.
- .3 Building Science Principles: best building envelope practices and recommended construction procedures, methods and materials that enhance air tightness, moisture resistance and water vapour control of building envelopes as researched and tested by National Research Council of Canada; Canada Mortgage and Housing Corporation; or other recognized building envelope research organizations.
- .4 Blower Door: A machine used to measure the airtightness of a building.
- .5 Blower Door Testing: analysis of the building envelope by conducting an air depressurization test to provide specific information concerning the airtightness of the building. Equipment operated by qualified energy auditor technician having specific knowledge of building science principles as they relate to building enclosures and materials, and as follows:
- .1 Quantitative Inspection: inspection procedure using measurements of airtightness, assigning specific numeric values to observed deficient patterns, and presenting that information in Quantitative Blower Door Testing Report.
- .2 Identify presence of leaks using a smoke pencil. Makes note and rates their importance in the report.
- .6 Blower Door Testing Report: organized document stating inspection purpose, climatic data during inspection, general findings not limited to appropriately analyzed testing data with corresponding visual photographs to express observed deficient conditions, statements interpreting observed deficient conditions.
- .1 Quantitative Blower Door Testing Report: developed by means of quantitative blower door testing where measurement of airtightness is used to determine relative fault severity. Recommendations identify corrective measures required to fix deficient conditions.
- .7 Total Air Leakage (TAL): TAL is the air leakage rate through the building envelope during the air tightness test done using the Fan Depressurization Method and measured in L/s.
- .8 Normalized Leakage Rate (NLR₇₅): Leakage rate normalized to envelope area at an indoor to outdoor pressure differential of 75 Pa. It is calculated by dividing the TAL by the total building envelope area. It has units of L/s-m²

- .9 Suite Enclosure Assembly: The series of assemblies including, but not limited to, exterior walls, demising walls, fire separations, ceiling assemblies, floor assemblies, windows, and doors, used to isolate each suite from the exterior and the adjacent spaces.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide required information in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Informational Submittals: provide the following submittals:
 - .1 Contractor's Quality Management Plan: submit quality management plan; before pre-construction conference, describing Contractor's approach to maintaining material and installation quality including the following:
 - .1 List any third-party standards, guidelines or reference documents forming a part of the Contractor's proposed construction best-practices used to achieve specified performance requirements;
 - .2 Substrate preparation and installation of air and vapour membranes;
 - .3 Installation of building enclosure components (such as doors, frames, glazing, flashings, and louvers and other penetrations);
 - .4 Treatment of transitions between building enclosure components;
 - .5 Confirmation of compatibility between building enclosure components;
 - .6 Proposed list of observations and tests forming a part of Contractor's quality assurance and quality control activities;
 - .7 Methods for addressing corrective action plans addressing deficient or incompatible installation procedures;
 - .8 Format and frequency of reports, records of pre-construction meetings and site modifications; and
 - .9 Proposed construction schedule indicating stages of building enclosure construction and potential dates for Departmental Representative's review activities.
 - .3 Submit Blower Door Testing Report containing specific test results listed in this section, organized in accordance with CAN/CGSB-149.10-2019 and as follows:
 - .1 Scoping statement and problem identification.
 - .2 Names and qualifications of personnel performing inspections, interpreting data and preparing Blower Door Testing Report.
 - .3 Ambient conditions under which inspections were performed including, but not limited to, as follows:
 - .1 Time of day that scans were performed.
 - .2 Wind conditions during inspection.
 - .3 Pressure differential readings for duration of inspection and prior to inspection.
 - .4 Temperature ranges at which blower door testing data was collected.

- .4 Types of equipment used and methods of confirmation including, but not limited to, as follows:
 - .1 Blower door testing equipment including frame, gauges, fans, cloth door, and air current testers.
 - .2 Blower door testing software used.
 - .3 Values and equipment used to calibrate airtightness readings.
- .5 Diagnoses and identification including photographs and commentary indicating severity and types of air leakage detected:
 - .1 Record anomalies related to air leakage, onto analogue and/or digital storage mediums or files.
 - .2 Convert relevant information to photo quality images for inclusion in written Blower Door Testing Report.
- .6 Interpretation of observed conditions and deficiencies including probable causes of each anomaly detected.
- .7 Recommendations for solutions and related additional inspections that may be required to verify that repairs have been completed.
- .8 Attachments and appendices including, but not limited to, drawings, visual images, thermographic images, and calculations used to determine air leakage.
- .4 Submit calibration report dated within one year prior to inspection demonstrating that blower door testing equipment is accurately calibrated and measuring pressure differentials in accordance with equipment manufacturer's specifications.
- .5 Submit information obtained during testing and for preparing Blower Door Testing Report for use of Departmental Representative; submit original data used to prepare Blower Door Testing Report as separate package.

1.6 CLOSEOUT SUBMITTALS

- .1 Field Quality Control Submittals: submit as built information in accordance with Section 01 78 00 - Closeout Submittals confirming that manufacturer's installation requirements for building enclosure performance were met, as follows:
 - .1 Environmental Conditions: describe changes to installation resulting from variations in ambient temperature, wind velocity or precipitation during application.
 - .2 Site Variations: describe changes to installation to maintain performance of installed components resulting from site conditions that differ from manufacturer's standard installation requirements.

1.7 QUALITY MANAGEMENT

- .1 Contractor's Testing Agency: engage third-party testing agency acceptable to Departmental Representative that specialize in building enclosure testing, and that have documented experience with construction of similar extent and complexity as that required for the Project.

- .2 The Contractor is responsible for ensuring that all sub-contractors are aware of and adhere to the project airtightness requirements.
- .3 The Contractor shall appoint a staff member other than the site superintendent who will be designated the “airtightness champion” and is responsible for maintaining the integrity of the air barrier, and is to report any issues to the Departmental Representative.
- .4 The roles and responsibilities of the “airtightness champion” are as follows:
 - .1 Understand & communicate the airtight/vapour control layer and wind/weather barrier layer strategy. Ensure its adoption by all trades on-site.
 - .2 Know where the individual layers are and which materials form them. Supervise and inspect all relevant works affecting these internal and external planes.
 - .3 Ensure that regular site meetings emphasize Air Leakage and the necessity to avoid damage to all barrier planes.
 - .4 Manage relevant variations, which can often compromise the Air Barrier.
 - .5 Operate an inspection checklist for key elements, interfaces and penetrations. Keep a camera on hand to take photographic evidence of any damage to the individual layers.
 - .6 Take regular temperature and humidity readings: some tapes seals and membranes will not cure or seal effectively if the atmospheric relative humidity is above 80%.
 - .7 Being knowledgeable about the correct application conditions for each product being used in the airtightness layer.
 - .8 Ensure all materials that form part of the layers are correctly prepared and used and that proprietary products (including cleaning and priming materials) are available on site well before they are required.
 - .9 Liaise with airtightness testing specialists to organize visits for audits and tests, ensuring all necessary preparatory works are complete in time.
 - .10 Using Environment Canada advanced forecast, verify that weather conditions are satisfactory for testing in advance of issuing a final test confirmation.
 - .11 Ensure that envelope area and volume for the building is correctly calculated and confirmed with the airtightness tester.
 - .12 Ensure that recommendations from post-testing air leakage audits are acted upon.
 - .13 Airtightness compliance logs for trades and contractors: ensure records are up to date and any variations recorded/remediated.
 - .14 Use a leakage check kit to check the effectiveness of any remedial sealing works.

1.8 DESCRIPTION OF WORK

- .1 Construct all envelope assembly details as indicated.
 - .1 Ensure the air barrier materials in each unit enclosure assembly are continuous.

- .2 Seal all penetrations through air barrier material(s) to limit air leakage through the assembly. Penetrations include, but are not limited to, communications, plumbing, electrical and HVAC.
- .3 Connect the air barrier material(s) in all intersecting envelope component assemblies to limit air leakage.
- .2 Prepare mock-up for each unit for testing.
- .3 Carry out mock-up, progress and final air tightness testing.

1.9 NON-CONFORMANCE TO TESTING REQUIREMENTS

- .1 Should system components be incorrectly installed or malfunction during testing, correct deficiencies, re-verify 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.

1.10 SEQUENCE OF WORK

- .1 The Contractor shall ensure that the work is sequenced in a way that allows for the water resistive and air barriers to be continuous and sealed throughout the entirety of the building envelope.
- .2 The Departmental Representative will require work to be corrected if correct sequencing is not followed in order to meet the requirements of the Contract.

1.11 MOCK-UPS

- .1 Construct mock-up in accordance with Section 01 45 00 – Quality Control.
- .2 Construct 1.2m wide mock-up of typical exterior wall assembly. Include all components outboard of the sheathing, including structural insulated panel, insulation, vapour permeable air barrier/waterproofing, strapping, siding, flashings, windows; illustrating materials interface and seals at the following locations (exact location to be confirmed by Departmental Representative):
 - .1 Ground Floor at window sill/jamb.
 - .2 Ground Floor at deck beam penetration.
 - .3 Mechanical duct and pipe penetrations.
- .3 Mock-up may remain as part of finished work.
- .4 Construct mock-up a minimum of 2 weeks prior to commencing the work of this Division.
- .5 Purpose of Mock-Ups and Sample Installations: construct mock-ups of each airtight joint type, juncture, and transition between materials and assemblies in accordance with Section 01 45 00 - Quality Control and as follows:

- .1 Quality Management: mock-ups and sample installations will be used to establish quality of installation and workmanship consistent with building enclosure best-practices forming a part of the Contractor's quality management plan.
- .2 Mock-Up Composition: stage each component within mock-ups so that each layer of construction can be reviewed for installation methods, with testing performed during each stage of construction to verify performance before succeeding layers of materials are applied:
 - .1 Construct a sealed interior compartment capable of replicating anticipated interior conditions and pressure differential under normal building conditions during occupancy.
 - .2 Conduct the following tests when the mock-up is ready for review:
- .3 Modifications to Mock-Ups: mock-ups and sample installations may require modifications to account for site conditions and compatibility between adjacent materials and assemblies, and that will be incorporated into subsequent construction through corrective actions described in the Contractor's quality management plan.
- .4 Retention of Mock-Ups: acceptable mock-ups may form a part of the completed installation; remove unacceptable mock-ups from site and replace with acceptable construction.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

- .1 Assembly Performance: assemblies described in the specifications and drawings are expected to achieve the following performance requirements when tested in accordance with CAN/CGSB-149.10:
 - .1 Air Leakage Rate: Install materials to achieve maximum air leakage of 0.4 ACH at 50 Pa as measured using the procedure in CAN/CGSB-149.10 (Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method).

2.2 SOURCE QUALITY CONTROL

- .1 Manufacturer's Quality Control Testing: submit proof of performance for standard building enclosure components indicating that materials supplied to the project meet or exceed specified requirements as follows:
 - .1 Manufacturer's Certificates: third-party verification stating conformance with project requirements, including any material compatibility or limitations specific to project conditions.
 - .2 Test and Evaluation Reports: indicating test methods and results, and stating specifically which attributes apply to the products supplied to the project.

- .3 Manufacturer's Installation Instructions: written installation requirements stating required workmanship practices to achieve assembly performance required for the project.
- .4 Modifications: submit recommendations for modifications to Departmental Representative addressing installation methods to reduce likelihood of deficiencies from occurring because of actual site conditions that may differ from manufacturers standard testing and installation requirements:
 - .1 Departmental Representative will make final recommendation for modifications to Contractor when changes to standard installation details are required.
 - .2 Modifications made to standard installation details without the Departmental Representative's knowledge and acceptance will be removed or resolved as directed by the Departmental Representative when subsequently discovered.
 - .3 Contractor will remain responsible for any modifications to manufacturer's standard details that are not otherwise identified to the Departmental Representative for their acceptance and not subsequently discovered during the course of the Work.

2.3 MOCK-UP UNIT EVALUATIONS

- .2 The purpose of the mock-up suite evaluations is to ensure that the construction details and techniques used to construct each suite will satisfy the air tightness requirement of 2.1. The mock-up suite evaluations will be carried out by the Testing Agency and will include blower door testing.
- .3 The Contractor is responsible for preparing one (1) unit for mock-up evaluations. Mock-up unit must be completed after the air barrier installation before the SIP walls and SIP roof installation to allow review of construction methods and modifications if required to ensure that the air tightness requirement is satisfied. The mock-up suite preparation requirements are as follows:
 - .1 All SIP floors must be installed.
 - .2 All wall, floor, deck and roof structure and substrates must be installed;
 - .3 Air and vapour membranes;
 - .4 All windows and door openings must be blocked and sealed for testing;
- .6 The air barrier materials in all intersecting assemblies must be connected to one another.
 - .1 Transition membranes at framing penetrations;
 - .2 Transition membranes at roof to wall and wall to floor.
 - .3 Transition membranes at windows and doors.
- .7 A functioning 120V power outlet must be present in the suite or within 4.5m (15 feet) of the suite entrance door.

- .8 The Contractor must be present during the mock-up suite evaluations to determine what, if any, corrective or remedial action is required to minimize air leakage to satisfy the requirement of clause 2.1.
- .9 Upon completion of the mock-up suite evaluations the Testing Agency will issue a report summarizing the air tightness results and related findings. If required, the report will include corrective or remedial actions. The Contractor is responsible for carrying out any corrective or remedial work listed in the report. Upon completion of the said work, the Contractor must notify the Testing Agency so that the suites can be re-tested.

1.12 FINAL AIRTIGHTNESS TESTING

- .1 The Testing Agency is responsible for carrying out blower door tests for the whole building.
- .2 Blower door tests must be carried out in accordance with Standard CAN/CSGB-149.10-2019, Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method or Standard ASTM E 779-19, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization.
- .3 Upon completion, the Testing Agency must provide the Departmental Representative/Contractor with records of all blower tests carried out on the mock up suites/whole building and conducted in accordance with the testing and sampling methodology noted above.
- .4 Upon completion of the Final Airtightness test the Testing Agency will issue a report summarizing the air tightness results and related findings. If required, the report will include corrective or remedial actions. The Contractor is responsible for carrying out any corrective or remedial work listed in the report. Upon completion of the said work, the Contractor must notify the Testing Agency so that the building can be re-tested.

Part 3 Execution

3.1 PREPARATION

- .1 Protection of Existing Conditions: Protect construction during field quality control activities performed by the Contractor:
 - .1 Protect construction from weather and other sources of moisture that are deleterious to the tested assemblies.
 - .2 Repair or replace building enclosure components that are damaged as a consequence of exposure to weather conditions deleterious to the final construction.

3.2 TEST CONDITIONS

- .5 Measure the exterior conditions before and during testing, and compare these to the allowable range specified in the test standard. If the exterior conditions do not fall into the allowable range, the test will need to be rescheduled.

- .6 It is recommended to undertake testing overnight to limit the influence of wind and stack effect.

3.3 EQUIPMENT

- .1 Blower door testing equipment:
 - .1 Fan:
 - .1 Variable speed control (solid-state control)
 - .2 Must operate on 110 to 125 vac/60 Hz supply
 - .3 Minimum flow at maximum fan speed to be at least 2500 L/s (5300 CFM) at 50 Pa pressure difference
 - .4 Must be able to both pressurize and depressurize the size of building being tested.
 - .5 Calibration curves and test verification certificate must be included with each fan.
 - .6 Calculate number of fans required and required location to provide required fan capacity to complete testing. Use a safety factor of 1.2.
 - .2 Blower Door Frame:
 - .1 Width: adjustable from 81.3 cm to 99 cm to fit a wide variety of doors or a suitably close range.
 - .2 Height: adjustable from 129.5 cm to 221 cm or a suitably close range
 - .3 Door frame edge seal: flexible gasket or inflatable edge seal
 - .4 Door frame material: wood, aluminum or metal
 - .5 Door frame cover: nylon bag or moulded plastic or fibreglass
 - .3 Pressure and fan flow gauges:
 - .1 Analogue gauges (Dwyer Magnahelic) for measuring the building pressure and flow (one for low flow and second for high flow) or digital pressure gauge for simultaneous or switchable display of pressure and airflow readings
 - .2 Pressure gauge unit: Pa
 - .3 Pressure range: 0 to 60 Pa (suggested for building pressure)
 - .4 Measurement resolution: 1 Pa for analogue gauges; 0.1 Pa for digital micro-mammometers
 - .5 Wind damping should be built into pressure gauge or available as add-on
 - .6 Calibration of pressure measurement as per CGSB Standard No. 149.10-2019
 - .7 Flow measurement unit: L/s.
 - .8 Flow measurement resolution: 1/100 times the flow reading
 - .9 Flow range: capable of measuring a minimum airflow of 30 L/s within its operating range

- .10 Calibration of flow measurement as per CGSB Standard No. 149.10-2019
- .4 Software and Calculation Procedures
 - .1 Calculation software based on current calibration data for blower door selected to determine airtightness results. Data analysis procedure and reporting must meet requirements set in CGSB Standard No. 149.10-2019
 - .2 Calibration characteristics and technical manuals
- .2 Related Equipment: provide related equipment for performing blower door testing including, but not limited to, as follows:
 - .1 Ambient Air Thermometer.
 - .2 Anemometer.
 - .3 Air Flow Meter.
 - .4 Smoke Candles or generators.
 - .5 Visible Still Image (35 mm) or Digital Cameras having minimum 10 mega pixel image resolution.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 Remove the blower door and return the building to pre-test conditions after the completion of each test. Seal and restore surfaces where openings were required for test equipment and return HVAC systems to normal operational modes.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 – Rough Carpentry

1.2 REFERENCE STANDARDS

- .1 ASTM International Inc.
 - .1 ASTM D412, Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension
 - .2 ASTM D570, Standard Test Method for Water Absorption of Plastics
 - .3 ASTM D882, Standard Test Method for Tensile Properties of Thin Plastic Sheeting
 - .4 ASTM D903, Standard Test Method for Peel or Stripping Strength of Adhesive Bonds
 - .5 ASTM D1876, Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)
 - .6 ASTM D2243, Standard Test Method for Freeze-Thaw Resistance of Water-Borne Coatings
 - .7 ASTM D5385, Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes
 - .8 ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials
 - .9 ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials
 - .10 ASTM E154, Standard Test Methods for Water Vapour Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
- .2 Underwriters Laboratories' of Canada (ULC)
 - .1 CAN/ULC-S701, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.
 - .2 CAN/ULC-S702.2, Standard for Mineral Fibre Thermal Insulation for Buildings.
 - .3 CAN/ULC-S704, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .4 CAN/ULC-S706, Standard for Wood Fibre Thermal Insulation for Buildings.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Convene pre-installation meeting one week prior to beginning waterproofing Work, with roofing contractor's representative and Consultant in accordance with Section 01 32 16 - Construction Progress Schedule 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.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Provide technical waterproofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit manufacturers' complete set of standard details for the sheet applied waterproofing membrane showing a continuous plane of water tightness below grade.
- .3 Manufacturer's Certificate: certify that products meet or exceed specified requirements.
- .4 Manufacturer's Installation Instructions: indicate special precautions required for seaming the membrane.

1.5 QUALITY ASSURANCE

- .1 Qualifications: Provide proof of qualifications when requested by Consultant:
 - .1 Submit in writing, a document stating that the applicator of the sheet applied waterproofing membrane specified in this section is recognized by the manufacturer as suitable for the execution of the Work.
 - .2 Perform Work in accordance with the manufacturer's written instructions of the sheet applied waterproofing membrane and this specification.
 - .3 Maintain one copy of manufacturer's written instructions on site.
 - .4 At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the sheet applied waterproofing membrane manufacturers' representative.
 - .5 Components used in this section shall be sourced from one manufacturer; including sheet applied waterproofing membrane, sealants, primers, mastics and adhesives.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Provide and maintain dry, off-ground weatherproof storage.
- .2 Store rolls of felt and membrane in upright position.
 - .1 Store membrane rolls with salvage edge up.
- .3 Remove only in quantities required for same day use.
- .4 Place plywood runways over completed Work to enable movement of material and other traffic.
- .5 Store sealants at +5 degrees C minimum.

- .6 Handle waterproofing materials in accordance with manufacturer's written directives, to prevent damage or loss of performance.

1.7 SITE CONDITIONS

- .1 Ambient Conditions
 - .1 Do not install membrane when temperature remains below -18 degrees C for torch application.
 - .2 Minimum temperature for solvent-based adhesive is -5 degrees C.
 - .3 No installation work shall be performed on wet covered surfaces.
- .2 Install membrane 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.
- .3 Protection
 - .1 Provide adequate protection of materials and work of this section from damage by weather backfilling operations and other causes.
 - .2 Protect work of other trades from damage resulting from work of this section. Make good such damage at own expense to satisfaction of the consultant.
 - .3 Apply protection board as soon as possible after installation of membrane.

1.8 WARRANTY

- .1 For Work of this Section 07 13 52 - Modified Bituminous Sheet Waterproofing, 12 months warranty period is extended to 5 years.

Part 2 Products

2.1 SHEET APPLIED WATERPROOFING MEMBRANE

- .1 Self-adhering waterproofing membrane consisting of SBS modified bitumen and a cross-laminated polyethylene film, having the following properties:
 - .1 Thickness: 1.5 mm (60 mils)
 - .2 Water Vapour Transmission (ASTM E96): Maximum 1.14 ng/Pa.m².s., (0.02 perms)
 - .3 Peel Strength (ASTM D903): Minimum 1576N/m
 - .4 Minimum Puncture Resistance – Membrane (ASTM E154): Minimum 222 N/m
 - .5 Hydrostatic Head (ASTM D1876): Minimum 70m of Water
 - .6 Moisture Absorption (ASTM D570): 0.1% Maximum
 - .7 Tensile Strength (ASTM D412-modified): Minimum 2.24 MPa
 - .8 Elongation (ASTM D412-modified): 300%
 - .9 Acceptable Products:
 - .1 Resisto Self-Adhesive Membrane.
 - .2 Blueskin WP200 by Henry Company.

- .3 Colphene 3000 by Soprema

2.2 ADHESIVE

- .1 Adhesive for self-adhering membrane: as recommended by membrane manufacturer for application temperature.

2.3 CARPENTRY

- .1 Refer to Section 06 10 00 - Rough Carpentry.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions:
 - .1 Examine substrates to receive work and surrounding adjacent surfaces for conditions affecting installation.
 - .2 Concrete surfaces shall be smooth and without large voids, spalled areas or sharp protrusions.
 - .3 New concrete should be cured for a minimum of seven (7) days after forms are removed. Structural lightweight concrete must be cured fourteen (14) days.
 - .4 Notify Consultant in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.
- .2 The installing contractor shall examine and determine that surfaces and conditions are ready to accept the Work of this section in accordance with published literature. Commencement of Work or any parts thereof shall mean installers acceptance of the substrate.

3.2 PREPARATION

- .1 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants.
- .2 Provide adequate protection of materials and work of this section from damage by weather, backfilling operations and other causes.
- .3 Protect adjacent surfaces and Work of other trades from damage resulting from Work of this section. Make good such damage at no additional cost to the Owner.
 - .1 Provide sound handling and installation procedures to prevent and protect against spillage and overspray of materials specified in this Section.
- .4 Use appropriate waterproofing membrane adhesive as recommended by manufacturer based on air and surface temperature at time of application.

3.3 HORIZONTAL WATERPROOFING MEMBRANE INSTALLATION

- .1 Follow material product data sheets and published general requirements for installation instructions.
- .2 Unroll horizontal blind side waterproofing membrane loose-laid onto the prepared substrate, or onto specified drainage mat/protection board where applicable per design requirements.
- .3 Remove the side-lap release film, and use a roller to seal the self-adhesive portion of the side-lap. Use an approved roofing torch or hot-air welder to seal the 2 in heat welded portion of the side lap.
- .4 All end lap joints shall be overlapped a minimum of 150 mm (6").
- .5 End-laps shall be staggered 300 mm (12") or more. Where T-joints are formed at the end-laps, cut away a 100 mm (4") corner at a 45° angle from the overlying end-lap.
- .6 All waterproofing membrane tie-ins shall be heat-welded to the adjacent ply.
- .7 Each day, the contractor shall physically inspect all side and end-laps, and ensure the membrane is fully sealed watertight.
- .8 Inspect the installation each day to ensure the plies are secure and adhered.
- .9 Repair deficiencies using specified heat-welded or self-adhesive membrane. For self-adhesive repairs, prime surfaces using specified self-adhesive primer. Repairs shall extend 150 mm (6") beyond the damaged membrane.

3.4 FIELD QUALITY CONTROL

- .1 Final Observation and Verification:
 - .1 Review of sheet applied waterproofing membrane shall be carried out by the Consultant and the contractor.
 - .2 Contact Manufacturer for warranty issuance requirements.
- .2 Sheet applied waterproofing membrane is not designed for permanent UV exposure. Apply protection board as soon as possible after installation of sheet applied waterproofing membrane. Refer to manufacturer published literature for product limitations.

3.5 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.

END OF SECTION

Part 1 General**1.1 SECTION INCLUDES**

- .1 Rigid and semi-rigid board insulation.
- .2 Composite sub-framing accessories.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 07 01 20 – General Envelope Requirements.
- .3 Section 07 26 00 – Vapour Retarders.
- .4 Section 07 27 00 – Air Barrier.
- .5 Section 07 46 19 – Steel Siding.
- .6 Section 07 62 00 – Sheet Metal Flashing and Trim.

1.3 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .3 ASTM C272/C272M – Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
 - .4 ASTM C303 – Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.
 - .5 ASTM C518- - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - .6 ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 - .7 ASTM C612, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.
 - .8 ASTM D1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 - .9 ASTM D2842 – Standard Test Method for Water Absorption of Rigid Cellular Plastics.
 - .10 ASTM E96/E96M, Standard Test Methods for Water Vapour Transmission of Materials.
 - .11 ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC S102, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.
 - .2 CAN/ULC S114, Standard Method of Test for Determination of Non-Combustibility in Building Materials.
 - .3 CAN/ULC-S701.1, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Coverings.
 - .4 CAN/ULC-S702, Standard for Mineral Fibre Insulation for Buildings.
- .3 The Master Painters Institute (MPI) / Architectural Painting Specification Manual
 - .1 MPI # 18, Organic Zinc Rich Primer.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for board insulation and sub-framing accessories, and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- .1 Convene pre-installation meeting one week prior to beginning work of this Section in accordance with Section 01 32 16 - Construction Progress Schedule to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordinate with other building subtrades.
 - .4 Review manufacturer's installation instructions and warranty requirements.

1.6 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 INSULATION

- .1 Type 1, Roof, Wood Framed Walls and Floor Semi-Rigid Insulation: to CAN/ULC-S702
 - .1 Type: 1
 - .2 Density: 176 kg/m³ to ASTM C303.

- .3 Thickness: as indicated.
- .4 Size: 1219 mm x 1829 mm
- .5 Performance Criteria
 - .1 Fire performance:
 - .1 Non-combustibility: To CAN/ULC S114.
 - .2 Surface Burning Characteristics: To CAN/ULC S102.
 - .1 Flame spread: 0.
 - .2 Smoke developed: maximum 0.
 - .3 Thermal resistance: RSI value/25.4 mm at 24 ° C: 0.70 m²K/W to ASTM C518 (R 4.3 / inch).
 - .4 Water vapour permeance: 2160 ng/Pa.s.m² minimum.
 - .5 Moisture absorption: <1.2 % maximum to ASTM C1104
 - .6 Fungi resistance: Zero mould growth to ASTM C1338.
 - .7 Corrosive resistance:
 - .1 Steel to ASTM C665: Pass.
 - .2 Stainless steel to ASTM C795: Conforms.
 - .6 Standard of Acceptance:
 - .1 Comfortboard 110 by Rockwool.
 - .2 Thermafiber Rainbarrier CI High Compressive (80) by Owens Corning.
 - .3 JM CladStone 45 Water & Fire Block Insulation by Johns Manville.

2.2 INSULATION ACCESSORIES

- .1 Adhesive: Type recommended by insulation manufacturer for application on this project.
- .2 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.
- .3 Type 5: Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
 - .1 Minimum screw size: #12 screws
 - .2 Maximum screw vertical spacing: 400 mm
 - .3 Minimum embedment into wood studs: 25 mm

2.3 SUB-FRAMING ACCESSORIES

- .1 Sub-framing Thermal Spacer: 100% pultruded glass fibre and thermoset polyester resin insulation clip.
 - .1 Thermal Spacer thickness for top, base and web: 4.8 mm nominal.
 - .2 Thermal spacer depth: As indicated.

- .3 Depth tolerance: ± 0.127 mm.
- .4 Standard of Acceptance:
 - .1 Cascadia Clip by Cascadia Windows Inc.
 - .2 TcLip Thermally Broken Façade Substructure by Engineered Assemblies Inc.
 - .3 GreenGirt Clip Series 600, Smartci System by Advanced Architectural Products.
 - .1 Distributed in Canada by The Fransyl Group, 1-800-363-2307.
- .2 Spacer Fasteners: High hex head washer head with sharp twin lead threaded design of heat-treated corrosion resistant coated steel.
 - .1 Fastener for wood framing: 1/4 - 10 x 254 mm long with hex head. Fasteners to be supplied by clip manufacture, minimum 38mm longer than the clip depth to allow for sheathing and penetration on the support.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for board insulation application in accordance with manufacturer's written instructions.
- .2 Prior to commencement of work ensure:
 - .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and clean of dust and debris.

3.2 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.

3.3 INSTALLATION

- .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 plumbing pipes and other protrusions.
- .4 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.
- .5 Offset both vertical and horizontal joints in multiple layer applications.

- .6 Do not enclose insulation until it has been inspected and approved by Departmental Representative.
- .7 Refer to insulation manufacturer's current installation guide for detailed information regarding installation.

3.4 SUB-FRAMING INSTALLATION

- .1 Preparation:
 - .1 Sub-framing: Ensure thermal spacer type is selected to accommodate orientation of vertical and horizontal sub-framing.
 - .2 Sub-framing Thermal Spacer Installation: Install thermal spacers in accordance with spacer manufacturer's written recommendations.
- .2 Thermal Spacer Installation: Clip thermal spacer to Z-girt and fasten directly to substrate as indicated and as per manufacturer's instructions.
- .3 Installation sequence for spacers, sub-framing:
 - .1 Pre-punch holes or pre-drill holes in Z-girts and tracks to accommodate fasteners.
 - .2 Position Z-girts or hat channels directly over thermal spacer before installation of fasteners.
 - .3 Completely install thermal spacers, screws and sub-framing, prior to installing insulation.
 - .4 Friction fit insulation in place as follows:
 - .1 For semi-rigid insulation batts or boards, score or cut insulation down its centreline to 50 % maximum of its depth to enable fitting insulation in correct position.
 - .2 Fold edges of insulation board back to enable friction fitting in correct position. Position edges of partially folded board into space between girts and thermal spacers, and flatten partially folded board against substrate.
 - .3 Ensure insulation is tightly fitted with sides of insulation slightly compressed at each insulation spacer.
 - .5 Install corrosion resistant stick pins or other mechanical insulation retention devices 400 mm maximum on centre along centreline of insulation batts or boards and in accordance with insulation manufacturer's written recommendations.
 - .1 Use sufficient number of stick pins or retention devices to ensure insulation remains flat and in correct position.
 - .2 Use 3 minimum stick pins or retention devices for each 1.2 m long batt or board.
 - .6 Ensure insulation pieces are in contact with no linear gaps between spacers.

3.5 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 09 22 16 – Non-Structural Metal Framing.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C553, Standard Specification for Mineral Fibre Blanket Thermal Insulation for Commercial and Industrial Applications.
 - .2 ASTM C665, Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - .3 ASTM C1320, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .2 Underwriters Laboratories of Canada (ULC)
 - .1 CAN/ULC-S702.1, Standard for Mineral Fibre Insulation for Buildings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for blanket insulation and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .4 Test Reports:
 - .1 Submit certified test reports showing compliance with specified performance characteristics and physical properties.

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.

Part 2 Products

2.1 INSULATION

- .1 Batt and blanket mineral fibre: to CAN/ULC-S702.
 - .1 Thermal Insulation (Exterior Walls and Roof):
 - .1 Type: 1.
 - .2 Walls:
 - .1 Thickness: 150 mm
 - .2 Thermal Resistance: RSI 3.87 (R22)
 - .3 Roof: As indicated.
 - .4 Standard of Acceptance:
 - .1 Comfortbatt by Rockwool.
 - .2 Thermafiber VersaBoard 40 by Owens Corning.
 - .3 Sustainable Insulation by CertainTeed

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for blanket insulation application in accordance with manufacturer's written instructions.

3.2 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 such as recessed light fixtures.
- .5 Do not enclose insulation until it has been inspected and approved by Departmental Representative.

3.3 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 07 21 16 – Blanket Insulation

1.2 REFERENCE STANDARDS

- .1 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-51.34, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for vapour retarders and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Certificates:
 - .1 Submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 QUALITY ASSURANCE

- .1 Mock-Ups:
 - .1 Submit mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .2 Construct mock-up of sheet vapour barrier installation including one lap joint, one inside corner and at one electrical box. Mock-up may be part of finished work.
 - .3 Mock-up will be used to judge quality of work, substrate preparation, and material application.
 - .4 Locate where directed.
 - .5 Allow 24 hours for inspection of mock-up by before proceeding with vapour barrier work.
 - .6 When accepted, mock-up will demonstrate minimum standard of quality required for this work.

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products**2.1 SHEET VAPOUR BARRIER**

- .1 Polyethylene film for walls: to CAN/CGSB-51.34.
 - .1 Thickness: 0.15 mm (6 mil)

2.2 ACCESSORIES

- .1 Joint sealing tape: air resistant pressure sensitive adhesive tape, type recommended by vapour barrier manufacturer, 50 mm wide for lap joints and perimeter seals, 25 mm wide elsewhere.
- .2 Sealant: To Section 07 92 00- Joint Sealants.
- .3 Staples: minimum 6 mm leg.
- .4 Moulded box vapour barrier: factory-moulded polyethylene box for use with recessed electric switch and outlet device boxes.

Part 3 Execution**3.1 EXAMINATION**

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

3.2 INSTALLATION

- .1 Ensure services are installed and inspected prior to installation of retarder.
- .2 Install sheet vapour retarder on warm side of exterior ceiling and wall assemblies prior to installation of wood framing and gypsum board to form continuous retarder.
- .3 Use sheets of largest practical size to minimize joints.
- .4 Inspect for continuity. Repair punctures and tears with sealing tape before work is concealed.

3.3 PERIMETER SEALS

- .1 Seal perimeter of sheet vapour barrier as follows:
 - .1 Apply continuous bead of sealant to substrate at perimeter of sheets.
 - .2 Lap sheet over sealant and press into sealant bead.
 - .3 Install staples through lapped sheets at sealant bead into wood substrate.
 - .4 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.4 LAP JOINT SEALS

- .1 Seal lap joints of sheet vapour barrier as follows:
 - .1 Attach first sheet to substrate.
 - .2 Apply continuous bead of sealant over solid backing at joint.
 - .3 Lap adjoining sheet minimum 150 mm and press into sealant bead.
 - .4 Install staples through lapped sheets at sealant bead into wood substrate.
 - .5 Ensure that no gaps exist in sealant bead. Smooth out folds and ripples occurring in sheet over sealant.

3.5 ELECTRICAL BOXES

- .1 Seal electrical switch and outlet device boxes that penetrate vapour barrier as follows:
 - .1 Install moulded box vapour barrier.
 - .2 Apply sealant to seal edges of flange to main vapour barrier and seal wiring penetrations through box cover.

3.6 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.

END OF SECTION

Part 1 General**1.1 SYSTEM DESCRIPTION**

- .1 Supply labor, materials and equipment for a fully adhered water-resistive vapor permeable air barrier membrane system.
- .2 Complete Work as shown on the Drawings and specified herein to bridge gaps and seal the water-resistive vapor permeable air barrier membrane against air leakage and water intrusion, including:
 - .1 Connections of the walls to the roof membrane
 - .2 Connections of the walls to the foundations
 - .3 Openings and penetrations of window and door frames, store front, curtain wall
 - .4 Piping, conduit, duct and similar penetrations
 - .5 Screws, bolts and similar penetrations
 - .6 All other air leakage pathways in the building envelope
- .3 Install primary water-resistive vapor permeable air barrier, flashing, and ventilation strip accessories.

1.2 RELATED REQUIREMENTS

- .1 Section 07 08 13 - Building Enclosure Performance Testing
- .2 Section 07 21 13 – Board Insulation.
- .3 Section 07 46 19 – Steel Siding
- .4 Section 07 61 00 – Sheet Metal Roofing
- .5 Section 07 62 00 – Sheet Metal Flashing and Trim
- .6 Section 07 92 00 – Joint Sealants
- .7 Section 08 11 00 – Metal Doors and Frames
- .8 Section 08 54 13 – Fiberglass Windows and Doors.

1.3 REFERENCE STANDARDS

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASTM D5147, Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Mateiral
 - .2 ASTM E154, Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover
 - .3 ASTM D903, Standard Test Methods for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
 - .4 ASTM E96, Standard Test Methods for Water Vapor Transmission of Materials

- .5 ASTM E2178, Standard Test Methods for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials
- .6 ASTM E2357, Standard Test Methods for Determining Air Leakage Rate of Air Barrier Assemblies
- .7 ASTM E330, Standard Test Methods for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
- .2 Underwriters Laboratories of Canada
 - .1 CAN/ULC S741, Air Barrier Material Testing
 - .2 CAN/ULC S742, Standard for Air Barrier Assemblies - Specification

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedure.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Quality Assurance Submittals: submit following in accordance with Section 01 45 00 - Quality Control.
 - .1 Existing Substrate Condition: report deviations, as described in PART 3 - EXAMINATION in writing to Departmental Representative.
 - .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, and cleaning procedures.
 - .4 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 QUALITY ASSURANCE

- .1 Single Source: Self-adhered water-resistive vapor permeable air barrier membrane components and accessories must be obtained as a single-source membrane system to ensure total system compatibility and integrity.
- .2 Manufacturer Qualifications:
 - .1 Manufacturer of specified products listed in this Section to have experience in the manufacture and supply of highly vapor permeable water resistive air barrier products successfully installed in similar project applications.
 - .2 Manufacturer of specified products listed in this Section to have experienced in-house technical and field observation personal qualified to provide expert technical support.

- .3 Installer Qualifications:
 - .1 Applicator:
 - .1 Completed installation must be approved by the material manufacturer.
- .4 Mock-Up:
 - .1 Construct mock-up in accordance with Section 01 45 00- Quality Control.
 - .2 Construct typical exterior wall panel, door frame, insulation, window, mechanical penetration; illustrating materials interface and seals.
 - .3 Locate where directed.
 - .4 Mock-up may remain as part of finished work.
 - .5 Allow 24 hours for inspection of mock-up by Departmental Representative before proceeding with air barrier Work.

1.6 DELIVERY, STORAGE AND HANDLING

- .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 Avoid spillage: immediately notify Departmental Representative if spillage occurs and start clean up procedures.
- .4 Clean spills and leave area as it was prior to spill.

1.7 AMBIENT CONDITIONS

- .1 Install solvent curing sealants and vapour release adhesive materials in open spaces with ventilation.
- .2 Maintain temperature and humidity recommended by materials manufactures before, during and after installation.

1.8 SEQUENCING

- .1 Sequence work in accordance with Section 01 32 16.19 – Construction Progress Schedule – Bar (GANTT) Charts.
- .2 Sequence work to permit installation of materials in conjunction with related materials and seals.
 - .1 Air barrier vapor permeable membrane to include self-adhered air barrier, transition membranes and sealants at penetrations.
 - .2 Drainage plane to include drainage cavity, water resistive barrier and flashings to the exterior.

1.9 WARRANTY

- .1 Provide three-year warranty under provisions of Section 01 78 00 - Closeout Submittals.

- .2 Warranty: include coverage of installed sheet materials which:
 - .1 Fail to achieve air tight and watertight seal.
 - .2 Exhibit loss of adhesion or cohesion.
 - .3 Do not cure.

Part 2 Products

2.1 MATERIALS

- .1 Self-adhesive air and vapour barrier membrane:
 - .1 Thickness: 10 mil (0.254 mm) thick, non-permeable multilayer proprietary film with acrylic adhesive and silicone coated release liner. Comply with ASTM E2178 and CAN/ULC S741-8.
 - .1 Elongation at Break: 700 percent per ASTM D882.
 - .2 Tensile Strength: 2153 psi (12 MPa); ASTM D882.
 - .3 Lap Adhesion: 6.74 lbf/in (1.18 N/mm); ASTM D1876.
 - .4 Low Temperature Flexibility: At -22 degrees F (-30 degrees C) passes bend test and no leakage during water head test ASTM D1970, Section 7.9.
 - .5 Nail Sealability: 5 inches (0.127 mm) of water head after 3 days, dry and passes ASTM D1970, Section 7.9.
 - .6 Water Resistance: 21.6 inches (55 cm) of water for 5 hours; no leakage per AATCC-127.
 - .7 Surface Burning Characteristics: ASTM E84
 - .1 Flame Spread Index: Less than 0.
 - .2 Smoke Developed Index: Less than 10.
 - .2 Primer: As recommended by manufacturer
 - .3 Edge Sealant: As recommended by manufacturer.

2.2 WINDOW FLASHING SYSTEM

- .1 As recommended by air barrier manufacturer.

2.3 SEALANTS

- .1 Penetration Sealant: Provide sealant for penetrations as recommended by manufacturer.

2.4 ACCESSORIES

- .1 Non-Permeable Flashing Tape: 10 mil (0.25 mm) thick, non-permeable multilayer proprietary film with acrylic adhesive and silicone coated release liner. Comply with ASTM E2178 and CAN/ULC S741-8.
- .2 Adhesive Flashing Tape: 38 mil (0.97 mm) thick translucent acrylic adhesive tape.

- .3 Transition Flashings: flexible 2mm extruded silicone
 - .1 Dynamic movement: +200% / -50% to ASTM C1523
 - .2 Elongation: 400% to ASTM D412
 - .3 Tensile Strength: 2 MPa to ASTM D412
 - .4 Tear Strength: 3 N/mm to ASTM D624.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 GENERAL

- .1 Perform Work in accordance with National Air Barrier Association - Professional Contractor Quality Assurance Program and requirements for installation.

3.3 EXAMINATION

- .1 Verify that surfaces and conditions are ready to accept work of this section.
- .2 Ensure surfaces are clean, dry, sound, smooth, continuous and comply with air barrier manufacturer's requirements.
- .3 Report unsatisfactory conditions to Departmental Representative in writing.
- .4 Do not start work until deficiencies have been corrected.
 - .1 Beginning of Work implies acceptance of conditions.

3.4 PREPARATION

- .1 Remove loose or foreign matter, which might impair adhesion of materials.
- .2 Ensure substrates are clean of oil or excess dust; and concrete surfaces free of large voids, spalled areas or sharp protrusions.
- .3 Ensure substrates are free of surface moisture prior to application of self-adhesive membrane.
- .4 Ensure metal closures are free of sharp edges and burrs.
- .5 Prime substrate surfaces to receive adhesive in accordance with manufacturer's instructions.

3.5 INSTALLATION

- .1 Install materials in accordance with manufacturer's instructions.

- .2 Tie-in to structural beams, columns, floor and intermittent floors, roofing systems and at the interface of dissimilar materials with self-adhering air barrier transition and flashing membrane.
- .3 Align and position fully self-adhered air barrier transition and flashing membrane, remove protective film and press firmly into place. Provide minimum 75 mm lap on to substrates.
- .4 Ensure minimum 75 mm overlap at side and end laps of membrane and 150 mm at inside and outside corners, if joints occur at corner locations.
- .5 Roll membrane and lap seams with roller to ensure positive contact and adhesion, immediately.
- .6 Vertical Applications:
 - .1 For vertical applications, align sheets with an 'inside' or 'outside' corner to avoid wrinkles and misalignment of subsequent applications.
 - .2 Measure and pre-cut into manageable sized fully self-adhered sheets to suit the application conditions.
 - .3 Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.
 - .4 Roll up pre-cut material lengths with release paper facing OUTWARD.
 - .5 Starting at a corner of the roll, peel back approx. 150 mm of release film from across the width of the pre-cut material roll.
 - .6 Using hand pressure, lightly apply the exposed adhesive surface to the substrate.
 - .7 Allow the rolled-up material to drop down the wall, with the remainder of the release film still attached (facing the wall), and extend down to lowest point of wall, checking for proper alignment, repositioning as necessary.
 - .8 Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.
 - .9 Align and position fully self-adhered membrane, remove release film and press firmly into place. Provide minimum 75 mm overlap at side and end laps of membrane.
 - .10 Continue to remove release film and apply pressure to ensure positive contact onto wall substrate.
 - .11 Install subsequent sheets of fully self-adhered vapor permeable air barrier sheets in overlapping weatherboard format. Ensure sheets lay smooth and flat to surfaces. Roll membrane and lap seams with two handed roller to ensure contact and adhesion.
- .7 Horizontal Applications:
 - .1 For horizontal applications, align sheets and begin installation of water-resistant weather barrier at bottom or lowest point of wall.
 - .2 To avoid wrinkles and misalignment of subsequent applications, it is recommended to pre-mark or "Snap" a level line to work from.

- .3 Measure and pre-cut into manageable sized sheets to suit the application conditions.
- .4 Allow for excess material at bottom of wall to accommodate tie-ins and connections to adjacent surfaces.
- .5 Align and position fully self-adhered membrane, remove release film and press firmly into place. Provide minimum 75 mm overlap at all side and end laps of membrane. Roll membrane and lapped seams with a two-handed roller to ensure contact and adhesion.
- .6 Continue to remove release film and apply pressure to ensure positive contact onto wall substrate.
- .7 Install subsequent sheets of fully self-adhered vapor permeable air barrier sheets in overlapping weatherboard format. Ensure sheets lay smooth and flat to surfaces. Roll membrane and lapped seams with a two-handed roller to ensure contact and adhesion.
- .8 Mechanical Equipment & Electrical Services Penetrations:
 - .1 Mechanical pipe, electrical conduit and/or duct work openings must be drilled/cut prior to installation of fully self-adhered air barrier membrane.
 - .2 Electrical services penetrating the wall assembly and fully self-adhered air barrier membrane must be placed in appropriate conduit and secured solid into position.
 - .3 Provide additional self-adhered air barrier membrane skirt to the interior side for future tie in.
 - .4 Install manufactured flanged penetration sleeves as recommended by sleeve manufacturer.
 - .5 For straight sided penetrations, cut and fit fully self-adhered air barrier to accommodate sleeve, install liquid applied breathable waterproof flashing to seal the air barrier membrane to ductwork or preformed flange sleeve.
 - .6 For pipe penetrations, refer to manufacturer's standard details.
- .9 Windows, Doors, and Other Wall Openings:
 - .1 As recommended by manufacturer.

3.6 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

3.7 PROTECTION OF WORK

- .1 Protect finished work in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Do not permit adjacent work to damage work of this section.

- .3 Ensure finished work is protected from climatic conditions.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 13 – Board Insulation.
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim.
- .3 Section 07 92 00 – Joint Sealants.

1.2 REFERENCES

- .1 American Society of Mechanical Engineers (ASME)
 - .1 ASTM C920; Standard Specification for Elastomeric Joint Sealants
 - .2 ASTM C1193; Standard Guide for Use of Joint Sealants
 - .3 ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting
 - .4 ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics
 - .5 ASTM E84; Test Method for Surface Burning Characteristics of Building Materials
 - .6 ASTM E96; Test Method for Water Vapor Transmission of Materials
 - .7 ASTM E1677; Specification for Air Retarder Material or System for Framed Building Walls
 - .8 ASTM E2178; Test Method for Air Permeance of Building Materials
 - .9 ASTM B18.6.3, Machine Screws, Tapping Screws, and Metallic Drive Screws (Inch Series)
- .2 Underwriters Laboratories (UL)
 - .1 UL 2761 Sealants and Caulking Compounds.
- .3 ULC Standards
 - .1 CAN/ULC-S706, Standard for Wood Fibre Insulating Boards for Buildings.
 - .2 CAN/ULC-S741, Standard for Air Barrier Materials - Specification.
- .4 National Building Code of Canada
- .5 Canadian Sheet Steel Building Institute 20M
- .6 CSA International
 - .1 CSA-S136 for the design of Cold Formed Steel Structural Members.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal siding and include product characteristics, performance criteria, physical size, finish and limitations.

- .3 Shop Drawings:
 - .1 Indicate dimensions, profiles, attachment methods, schedule of wall elevations, trim and closure pieces, metal furring, and related work.
- .4 Samples:
 - .1 Submit duplicate 100 x 100 mm samples of siding material, of colour and profile specified.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for [installed products] for incorporation into manual.
- .3 Warranty Documentation: submit warranty documents specified.

1.5 QUALITY ASSURANCE

- .1 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties.
- .2 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .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 Co-ordinate type and location of mock-ups with project requirements.
 - .3 Accepted units will be used as standard for acceptance of production units.
 - .4 Remove and replace units which are not accepted.
 - .5 Do not proceed with remaining work until workmanship, colour, and finish are reviewed by Departmental Representative.
 - .6 Refinish mock-up area as required to produce acceptable work.
 - .7 When accepted, mock-up will demonstrate minimum standard of quality required for this work.
 - .1 Approved mock-up may remain as part of finished work.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

1.7 WARRANTY

- .1 Manufacturer's warranty: Submit, for Departmental Representative acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty in addition to and not limit other rights Owner may have under Contract Documents.

Part 2 Products

2.1 STEEL CLADDING AND COMPONENTS

- .1 Vertical Standing Seam siding: to CAN/CGSB-93.4, vertical, Class plain.
 - .1 Cladding Colour A:
 - .1 Standard Acceptance:
 - .1 Vicwest Prestige
 - .2 Westform Prolock
 - .3 Forma Steel Clip Loc
 - .2 Thickness: 24 gauge
 - .3 Profile width: maximum 400mm on centre
 - .4 Colour: Dark Grey from Standard Colour Range
 - .2 Cladding Colour B/C:
 - .1 Standard Acceptance:
 - .1 Vicwest 7/8" Corrugated
 - .2 Westform WF 7/8" Corrugated
 - .3 Forma 37-7/8" Corrugated
 - .2 Thickness: 24 gauge
 - .3 Colour: Silver and Orange as shown from Standard Colour Range
 - .3 Cladding Colour D:
 - .1 Standard Acceptance:
 - .1 Vicwest Bellara
 - .2 Westform Proboard
 - .3 Forma Plank
 - .2 Thickness: 26 gauge
 - .3 Profile width: range between 101.6mm to 152.4mm
 - .4 Colour: Printed Wood grain from Standard Colour Range
- .2 Exposed trim:

- .1 Colour: to match adjacent siding colour, including custom colours, Silicone Modified Polyester.
- .2 Thickness: 26 gauge base metal thickness.
- .3 Profile: custom as indicated.

2.2 STRAPPING

- .1 Refer to Section 06 10 00 – Rough Carpentry.

2.3 HAT TRACKS

- .1 Refer to Section 07 21 13 – Board Insulation.

2.4 FASTENERS

- .1 Colour matched neoprene gasketed fasteners as recommended by manufacturer.

2.5 CAULKING

- .1 Sealants: in accordance with Section 07 92 00 - Joint Sealants.

2.6 VAPOUR PERMEABLE WATER RESISTIVE BARRIER MATERIAL

- .1 Spunbonded polypropylene, non-woven, non-perforated, vapour permeable weather membrane, having the following properties:
 - .1 Type I Air Barrier to ASTM E1677
 - .2 Type II Water Resistive Barrier to ASTM E2556
 - .3 Water Vapour Transmission: 10 perms or greater to ASTM E1677
 - .4 Air Penetration Resistance: <0.004 cfm/ft² at 1.57 psf to ASTM E2178.
 - .5 Water Penetration Resistance: 250 cm to AATCC Test Method 127.
 - .6 Air Resistance: 1200 seconds to TAPPI Test Method T-410.
 - .7 Breaking Strength: 30/30 lb/in to ASTM D882.
 - .8 Tear Resistance: 8/6 lbs to ASTM D1117.
 - .9 Surface Burning Characteristics: Class A, Flame-spread: 15, Smoke Developed: 15 to ASTM E84.
 - .10 Acceptable Products:
 - .1 Tyvek HomeWrap
 - .2 Tyvar Building Wrap
 - .3 Wallshield IT Integrated Tape

2.7 ACCESSORIES

- .1 Exposed trim: inside corners, outside corners, cap strip, drip cap, undersill trim, starter strip and window/door trim of same material, colour, and gloss as cladding, with fastener holes pre-punched.

- .2 Through Wall Flashings: 0.05mm Stainless Steel Sheet with 0.2mm butyl adhesive backing
- .3 Through Wall Flashing Tape: 15.5 mil (0.40 mm) thick, self-adhering non-permeable membrane with acrylic adhesive, 7.5 mil (0.19 mm) polyethylene backing film, and polycoated kraft liner.
- .4 Non-Permeable Flashing Tape: 10 mil (0.25 mm) thick, non-permeable multilayer proprietary film with acrylic adhesive and silicone coated release liner. Comply with ASTM E2178 and CAN/ULC S741-8.
- .5 Adhesive Flashing Tape: 38 mil (0.97 mm) thick translucent acrylic adhesive tape.
- .6 Transition Flashings: flexible 2mm extruded silicone
 - .1 Dynamic movement: +200% / -50% to ASTM C1523
 - .2 Elongation: 400% to ASTM D412
 - .3 Tensile Strength: 2 MPa to ASTM D412
 - .4 Tear Strength: 3 N/mm to ASTM D624.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrate previously installed under other Sections or Contracts acceptable in accordance with manufacturer's written instructions.

3.2 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.

3.3 INSTALLATION

- .1 Install cladding in accordance with manufacturer's written instructions.
- .2 Install one layer exterior air barrier sheet as per manufacturer's written instructions.
- .3 Install continuous starter strips, inside and outside corners, edgings, soffit, drip, cap, sill and window/door opening flashings as indicated.
- .4 Install outside corners, fillers and closure strips with carefully formed and profiled work.
- .5 Maintain joints in exterior cladding, true to line, tight fitting, and hairline joints.
- .6 Attach components in manner not restricting thermal movement.
- .7 Caulk junctions with adjoining work with sealant. Do work in accordance with Section 07 92 00 - Joint Sealants.

3.4 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
- .1 Leave Work area clean at end of each day.

3.5 PROTECTION

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Batten-style metal roofing, including accessories.
- .2 Preformed metal siding/roofing panels, including accessories.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM A240/A240M-[11a], Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
 - .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
 - .5 ASTM B32-[08], Standard Specification for Solder Metal.
 - .6 ASTM D523, Standard Test Method for Specular Gloss.
 - .7 ASTM D822/D822M, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.
- .2 Canadian Sheet Steel Building Institute Standard 20M.
- .3 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 National Research Council Canada (NRC)/Institute for Research in Construction (IRC) - Canadian Construction Materials Centre (CCMC)
 - .1 CCMC-2011, Registry of Product Evaluations.
- .5 National Building Code of Canada 2015 (NBC).
- .6 Transport Canada (TC)
 - .1 Transportation of Dangerous Goods Act (TDGA), 1992.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sheet metal roofing and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Proof of manufacturer's CCMC listing and listing number.
 - .3 Submit 2 copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .3 Samples:
 - .1 Submit duplicate 300 x 300 mm samples of each sheet metal material.

1.5 QUALITY ASSURANCE

- .1 Provide a manufacturer's written warranty: Furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish within the warranty period. Warranty period for finish: 40 years after the date of Substantial Completion.

1.6 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect sheet metal roofing from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SHEET METAL MATERIALS

- .1 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade 33 with AZ150 coating, surface prefinished as specified in 2.2, 0.61 mm (24 gauge) base metal thickness.
- .2 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade 33 with AZ180 coating, regular spangle surface, chemically treated (passivated) for unpainted finish, 0.61 mm (24 gauge) base metal thickness.

2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied silicone modified polyester.
 - .1 Colour selected by Departmental Representative from manufacturer's standard range.
 - .2 Specular gloss: 30 units +/-5 to ASTM D523.
 - .3 Coating thickness: 20 micrometres minimum.
 - .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
 - .1 Outdoor exposure period 1000 hours minimum.
 - .2 Humidity resistance exposure period 1000 hours minimum.

2.3 ROOF PANELS

- .1 Batten-style snap-on (nail strip) standing seam roofing to match wall:
 - .1 Batten height: 38 mm
 - .2 Panel width: maximum 400 mm on centre
 - .3 Trims: Colour matched.
 - .4 Colour: As selected by Departmental Representative from manufacturer's standard colours.
 - .5 Metal Gauge 24 GA
 - .6 Fasteners: concealed
 - .7 Acceptable Products:
 - .1 Traditional 150 by Vicwest
 - .2 Prolok by Westform.
 - .3 Snap-Lok by Westman

2.4 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .2 Pipe flashing: Profiled non-fading EPDM rubber roof flashing sealing collar.
- .3 Underlayment: Synthetic or self-adhered high-temperature underlayment intended for metal roofs with the following minimum performance specifications:
 - .1 Tensile Strength: $\geq 20\text{kN/m}$ to ASTM E96-00.
 - .2 Water Transmission: Pass to ASTM D4869.
 - .3 Water Vapour Transmission: ≥ 17 Perm (972 ng/Pa•s•m²) to ASTM E96.
 - .4 Water Absorption: $\leq 0.1\%$ to ASTM D1970.
 - .5 UV Exposure: ≥ 6 months to ASTM G90
 - .6 Acceptable Products:

- .1 Cosella Dörken: Delta Trela
- .2 Vaproshield: Slopeshield or Slopeshield SA
- .3 Soprema: Lastobond Stick VP
- .4 Sealant: Asbestos-free sealant, compatible with systems materials, recommended by system manufacturer.
- .5 Sealant Tape: As recommended by manufacturer
- .6 Rubber-asphalt sealing compound
- .7 Flashings: Refer to Section 07 62 00 – Sheet Metal Flashing and Trim.
- .8 Fasteners: as recommended by manufacturer. Length to suit application.
- .9 Closures: Foam or metal closures to suit profile supplied by roof panel manufacturer.
- .10 Touch-up paint: as recommended by sheet metal roofing manufacturer.

2.5 FABRICATION

- .1 Factory fabricate panels.
- .2 Panel Lengths: Fabricate panels in one continuous length.
- .3 Hem exposed edges on underside 12 mm.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install in accordance with manufacturer's instructions.
- .2 Coordinate metal roofing with other work, including but not limited to drainage, flashing and trim, deck substrates, and other adjoining work.
- .3 Install metal roofing panels to profiles, patterns and drainage indicated, in accordance with manufacturer's instructions, and as necessary to achieve specified performance and a leak-free installation. Allow for structural and thermal movement.
- .4 Separate dissimilar metals using bituminous coating to prevent galvanic action.
- .5 Use fasteners recommended by panel manufacturer.
- .6 Conceal fasteners on batten-style roofing except where approved in writing by Departmental Representative before installation.

- .7 Provide uniform, neat seams; provide sealant-type joint where indicated and form joints to conceal sealant.
- .8 Include underlay under sheet metal roofing over roof sheathing.
 - .1 Secure in place and lap joints in accordance with manufacturer's instructions.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 33 00 – Submittal Procedures.
 - .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 00 – Cleaning.

3.4 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 07 21 13 – Board Insulation
- .2 Section 07 27 00.01 - Air Barriers - Descriptive or Proprietary
- .3 Section 07 46 19 – Steel Siding.
- .4 Section 07 92 00 - Joint Sealants.
- .5 Section 08 11 00 – Metal Doors and Frames.
- .6 Section 08 54 13 – Fiberglass Doors and Windows.

1.2 REFERENCES

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .2 ASTM A792/A792M, Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - .3 ASTM D523, Standard Test Method for Specular Gloss.
- .2 Canadian Roofing Contractors Association (CRCA)
 - .1 Roofing Specifications Manual Latest Version.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature for sheet metal flashing systems 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 35 29.06 - Health and Safety Requirements.
- .3 Shop Drawings:
 - .1 Shop drawings: submit drawings of sheet metal flashing profiles.
- .4 Samples:
 - .1 Submit duplicate 50 x 50 mm samples of each type of sheet metal material, finishes and colours.

1.4 QUALITY ASSURANCE

- .1 Mock-Up

- .1 Build mock-ups for each type of flashing and counter flashing complete with all fasteners as per drawings and specifications and obtain Departmental Representative's approval prior to fabrication of any further metal flashings.

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 SHEET METAL MATERIALS

- .1 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade 33 with AZ180 coating, regular spangle surface, chemically treated for unpainted finish, not chemically treated for paint finish, 24 gauge base metal thickness unless indicated otherwise.
 - .1 Where no thickness specified, provide base sheet metal in thickness recommended in SMACNA Architectural Sheet Metal Manual for type of item being fabricated, but not less than the thickness required by the authority having jurisdiction.

2.2 PREFINISHED STEEL SHEET

- .1 Prefinished steel with factory applied silicone modified polyester (SMP)
 - .1 Colour selected by Departmental Representative from manufacturer's standard range.
 - .2 Specular gloss: 30 units +/- in accordance with ASTM D523.
 - .3 Coating thickness: not less than 22 micrometres.
 - .4 Resistance to accelerated weathering for chalk rating of 8, colour fade 5 units or less and erosion rate less than 20 % to ASTM D822 as follows:
 - .1 Outdoor exposure period 2500 hours.
 - .2 Humidity resistance exposure period 5000 hours.

2.3 PERFORATED STEEL INSECT SCREEN

- .1 Aluminum-zinc alloy coated steel sheet: to ASTM A792/A792M, commercial quality, grade 33 with Z275 coating, regular spangle surface, chemically treated for unpainted finish, 24-gauge base metal thickness unless indicated otherwise.

2.4 ACCESSORIES

- .1 Isolation coating: alkali resistant bituminous paint.
- .1 Self-adhesive membrane underlay and tie-in membrane for metal flashings: To CSA A123.22 or ASTM D1970.
- .2 Sealants: UV resistant one part polyurethane, colour to match adjacent surface.

- .3 Clips and cleats: of same material, and temper as sheet metal, minimum 50 mm wide. 24 gauge minimum.
- .4 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. Provide a minimum 25 mm penetration into substrate.
- .5 Washers: of same material as sheet metal, 1 mm thick with rubber packings.
- .6 Touch-up paint: as recommended by prefinished material manufacturer.
- .7 High Temperature Underlayment Membrane: Self-adhering high temperature membrane complete with compatible primer and sealant. Acceptable product, Soprema Lastobond Shield HT, Bakor Blueskin PE 200HT, Protecto Wrap Jiffyseal 140/60.

2.5 FABRICATION

- .1 Fabricate metal flashings and other sheet metal work in accordance with applicable SMACNA, RCABC and CRCA S-lock and standing seam details and as indicated.
- .2 Form pieces in 2400 mm maximum lengths.
 - .1 Make allowance for expansion at joints.
- .3 Hem exposed edges on underside 19 mm.
 - .1 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.

2.6 METAL FLASHINGS

- .1 Form flashings, copings, fascias, and trims to profiles indicated of prefinished 24 gauge prefinished steel sheet metal.

2.7 VENTILATION SCREEN

- .1 Form ventilation screens to profiles indicated of perforated steel.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

- .1 Install sheet metal work in accordance with RCABC and CRCA standards.
- .2 Use concealed fastenings except where approved before installation.

- .3 Provide underlay under sheet metal.
 - .1 Secure in place and lap joints 100 mm.
 - .2 Provide self-adhesive membrane to tie into adjacent assemblies.
- .4 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs. Flash joints using S-lock seams forming tight fit over hook strips.
- .5 Install continuous starter strips where indicated or required to present a true, non-waving, leading edge. Anchor to back-up to provide rigid, secure installation.
- .6 Corner joints where adjacent lengths of metal flashing meet shall be made using folded joints. Apply a continuous bead of sealant as an additional protection
- .7 Lock end joints and caulk with sealant.
- .8 Make all roof and sill areas watertight. Flash openings and other items projecting through roofing. Bend up flashing as required, fold and clip neatly and secure in straight lines free from wrinkles and undulations.
- .9 Install base metal flashing on all vertical surfaces, walls, curbs etc where hot asphalt is used to adhere flashing membranes.
- .10 Ensure wide girth flashings are adequately sloped to the inside of roof areas and do not pond water. Back-sloped flashings will be rejected by the Departmental Representative. Fastenings to be concealed and watertight. Carefully place, form and trim breaks. Bond and neutralize soldering.
- .11 Turn back edges of all exposed flashing to form 6 mm stiffeners.
- .12 Keep all metal flashings a minimum of 100 mm above all roof surfaces.
- .13 Install flashing in maximum 2 400 mm lengths, to profiles indicated.
- .14 Construct internal and external mitres with properly shaped capping pieces.
- .15 Form all flashing on a bending brake. Execute all hand trimming, shaping and soldering with appropriate tools. Install with hold down clips.
- .16 Allow for expansion and contraction to finished work without deformation.
- .17 Install scuppers in accordance with RCABC Standards, set scupper flanges in a full trowelling of mastic.
- .18 Neutralize all acid flux before painting.
- .19 Slope all horizontal wall flashings 2% to exterior.
- .20 Form 50 mm end dams for all wall flashings.

3.3 CLEANING

- .1 Proceed in accordance with Section 01 74 00 - Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Snow retention system for metal roofs.

1.2 RELATED REQUIREMENTS

- .1 Section 07 61 00 – Sheet Metal Roofing
- .2 Section 07 62 00 – Sheet Metal Flashing and Trim

1.3 REFERENCES

- .1 Aluminum Association (AA) - Aluminum Standards and Data, 2017 Edition.
 - .1 American Society for Testing and Materials International, (ASTM)
- .2 B85-03 - Standard Specification for Aluminum-Alloy Die Castings.
 - .1 B221-04a - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 SYSTEM DESCRIPTION

- .1 Attachment system to attach to metal roof as follows:
 - .1 With only minor dimpling of panel seams.
 - .2 Without penetrations through roof seams or panels.
 - .3 Without use of sealers or adhesives.
 - .4 Without voiding roof warranty
- .2 Components
 - .1 Non-penetrating aluminum brackets, and aluminum rods with coupling system.
 - .2 Aluminum “ice flags” centered in the middle of the panel to prevent sliding ice. Use over pedestrian areas.
- .3 Design Requirements
 - .1 Bracket spacing and loading is based on specific project design.
 - .2 Based on snow load, climatic conditions, length of roof panel and width of panel; multiple rows of snow guards may be needed.
 - .3 Loading: Design snow guard system to resist minimum in-service vector load determined based on vertical snow load.
 - .4 Factor of safety: Utilize a factor of safety ≥ 2 to determine allowable loads from ultimate tested clamp tensile load values.

1.5 SUBMITTALS

- .1 Product data: Submit manufacturer's printed product literature, specifications and data sheet 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 Instructions.
 - .2 Show locations of snow guards on roof and attachment spacing.
- .3 Manufacturer's Instructions:
 - .1 Submit manufacturer's installation instructions.
- .4 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.

1.6 QUALITY ASSURANCE

- .1 Installer to be experienced in the installation of metal roofing and snow retention systems in the area of the project.

1.7 DELIVERY, STORAGE AND HANDLING

- .1 Inspect material upon delivery and order replacements for any missing or defective items. Keep material dry, covered and off the ground until installed.

Part 2 Products

2.1 CLAMPS & STRAPS

- .1 Manufactured from 6061-T6 aluminum extrusions conforming to ASTM B221 or aluminum castings conforming to ASTM B85 and to AA Aluminum Standards.
- .2 Set screws: 300 series stainless steel, 18-8 allow, 10mm diameter with round nose point.

2.2 BRACKETS:

- .1 Manufactured from 6061-T6 or 6005-T5 alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data or cast aluminum.
- .2 Screws for attachment of brackets to roof: Type best suited to application: Metal to metal applications: ¼-14 self drilling point, 2 inch length, 3/8 inch hex washer head, Zinc/Aluminum cap.
- .3

2.3 CROSS-MEMBERS

- .1 Manufactured from 6061-T6 or 6005-T5 alloy and temper aluminum extrusions conforming to ASTM B221 and AA Aluminum Standards and Data or cast aluminum.
- .2 Receptacle in face to receive colour-matched metal strips.
- .3 Provide splice connectors ensuring alignment and structural continuity at end joints.

2.4 COLOUR STIPS

- .1 Same material and finish as roof panels; obtain from roof panel manufacture.

2.5 ICE AND SNOW CLIPS

- .1 Aluminum, with rubber foot, minimum 75mm wide.

2.6 FINISH

- .1 Powder coated finish to match metal roof colour.

Part 3 Execution

3.1 EXAMINATION

- .1 Prior to beginning installation, verify that:
 - .1 Panel seaming is complete.
 - .2 Panel attachment is sufficient to withstand loads applied by snow guard system.
 - .3 Installation will not impeded roof drainage.
 - .4 Installation will not impeded solar panels.
- .2 Prior to beginning installation, verify that:
 - .1 Roof attachment is sufficient to withstand loads applied by snow guard system.
 - .2 Installation will not impede roof drainage.

3.2 PREPARATION

- .1 Clean areas to receive attachments; remove loose and foreign matter that could interfere with installation or performance.

3.3 INSTALLATION

- .1 Install system in accordance with manufacturer's instructions and approved Shop Drawings
- .2 Snow Retention Systems
 - .1 Place clamps at maximum 800 mm on center or as required by in-service loads.
 - .2 Place clamps in straight, aligned rows.
 - .3 Place both set screws on same side of clamp.

- .4 Tighten set screws to manufacturer's recommended torque. Randomly test set screw torque using calibrated torque wrench.
- .5 Insert colour-matched metal strips into cross members, staggering strips to cover cross member joints.
- .6 Attach cross members to clamps; tighten bolts to manufacturer's recommended torque.
- .7 Install splice connectors at cross member end joints.
- .8 Do not cantilever cross members more than 4 inches beyond last clamp at ends.
- .9 Install one snow clip per panel between panel seams.

3.4 CLEANING

- .1 Proceed in accordance with Section 01 74 00 – Cleaning.
- .2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.
- .3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 SUMMARY

- .1 This Section specifies caulking and sealants not specified in other Sections.
- .2 Refer to other Sections for other caulking and sealants.
- .3 Supply all labour, materials and equipment necessary to complete all caulking and sealing of exterior and interior joints where shown on the drawings and as specified herein.

1.2 RELATED SECTIONS

- .1 Section 07 01 20 – General Envelope Requirements.
- .2 Division 7.
- .3 Division 8.
- .4 Division 9.
- .5 Mechanical.
- .6 Electrical.

1.3 REFERENCES

- .1 ASTM International
 - .1 ASTM C 510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
 - .2 ASTM C 661 - Standard Test Method for Indentation Hardness of Elastomeric Type Sealants by Means of a Durometer.
 - .3 ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - .4 ASTM C 794 - Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - .5 ASTM C 834 - Specification for Latex Sealants.
 - .6 ASTM C 920 - Specification for Elastomeric Joint Sealants.
 - .7 ASTM C 1087 - Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
 - .8 ASTM C 1193 - Guide for Use of Joint Sealants.
 - .9 ASTM C 1247 - Standard Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids.
 - .10 ASTM C 1248 - Test Method for Staining of Porous Substrate by Joint Sealants.
 - .11 ASTM C 1311 - Specification for Solvent Release Sealants.
 - .12 ASTM C 1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

- .13 ASTM D 412 - Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
- .15 ASTM D 624 - Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
- .16 ASTM D 2203 - Standard Test Method for Staining from Sealants.
- .17 ASTM D 2240 - Test Method for Rubber Property - Durometer Hardness.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for joint sealants and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Manufacturer's product to describe:
 - .1 Caulking compound.
 - .2 Primers.
 - .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.
- .3 Manufacturer's Instructions:
 - .1 Submit instructions to include installation instructions for each product used.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.6 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Proceed with installation of joint sealants only when:
 - .1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.
 - .2 Joint substrates are dry.
 - .3 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.
- .2 Joint-Width Conditions:

- .1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.
- .3 Joint-Substrate Conditions:
 - .1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

1.7 QUALIFICATIONS OF APPLICATOR

- .1 Caulking installation to be performed by workmen thoroughly skilled and specially trained in the techniques of caulking and who are completely familiar with the published recommendations of the manufacturer of the caulking material to be used.
- .2 Indication of lack of skill on the part of caulking applicators will be sufficient grounds for the Departmental Representative to reject installed caulking and to require its immediate removal and complete re-caulking at no extra cost to the contract price.

1.8 QUALITY ASSURANCE

- .1 Provide a written guarantee, signed and issued in the name of the Owner, stating that caulking work of this Section is guaranteed against leakage, cracking, crumbling, melting, shrinkage, running, loss of adhesion, staining adjacent surfaces, or other failure, for a period of three years from the date of Certificate of Substantial Performance.

1.9 ENVIRONMENTAL REQUIREMENTS

- .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of Material Safety Data Sheets (MSDS) acceptable to Health Canada.
- .2 Ventilate area of work as directed Departmental Representative by use of approved portable supply and exhaust fans.

1.10 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.

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

- .3 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIALS

- .1 Type 1: Multi-component, polyurethane sealant. To meet specified requirements of CGSB specification CAN/CGSB-19.24-M90, Type 2, Class B.
 - .1 Locations: Use at all locations, except where another type is specified.
 - .2 Acceptable Product: Dymeric 240, Dymeric 240 FC by Tremco Ltd., Sikaflex II, Vulkem.
- .2 Type 2: Medium modulus, moisture curing, one-part silicone sealant. Meeting the specified requirements of specification ASTM C920, Type S, Grade NS, Class 25, Use NT, G and A.
 - .1 Locations: Use in glass to glass, glass to fiberglass and fiberglass to fiberglass window joints and sheet metal roofing.
 - .2 Acceptable material, DOW Corning 1199 sealant, TremGlaze S1400 by Tremco Ltd., NuFlex 319 by Nuco.
- .3 Type 3: Mildew resistant, one component neutral cure silicone sealant. Meeting the specified requirements of specification ASTM C920.
 - .1 Locations: Perimeter of bath fixtures, including base of toilets in washrooms.
 - .2 Acceptable Product: Tremsil 600 white or clear by Tremco Ltd., Dowsil F4 by Dow, Clear RTV408 by CRL.
- .4 Type 4: One component, paintable acrylic latex sealant. Meeting the specified requirements of specification ASTM C834.
 - .1 Locations: Interior non-moving joints that may be painted.
 - .2 Acceptable Product: Tremflex 834 by Tremco Ltd., Alex Plus All Purpose by DAP, RHOPLEX 928 by Dow.
- .5 Type 5: Ultra low modulus, one component, moisture curing silicone sealant.
 - .1 Location: Perimeter of exterior openings.
 - .2 Acceptable Product: Spectrem 1 by Tremco Ltd., Sikasil WS-290, Dowsil 790.
- .6 Type 6: One-part moisture curing polyurethane sealant.
 - .1 Location: Use in tile work expansion joints, vertical and horizontal, where no trim is present.
 - .2 Acceptable Product: Vulkem 116, Sikaflex 1a, Polyurethane Construction Sealant by DAP.
- .7 Colours of sealant to be selected by the Departmental Representative from the range of manufacturer's standard colours.
- .8 Joint Cleaner

- .1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.
- .9 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 %.
 - .3 Vertical Surfaces: Extruded Polyolefin foam
 - .4 Horizontal Surfaces: Closed cell polyethylene foam.
 - .10 Primer: in accordance with sealant manufacturer's written recommendations.
 - .11 Bond breaker, where joint configuration does not allow for proper depth/width ratio place a pressure sensitive plastic tape at the back of the joint that will not bond to the sealant.
 - .1 Standard of Acceptance: 3M #226 or #481, Valley Industries #40, T-Rex Tape.

Part 3 Execution

3.1 EXAMINATION

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

3.2 FORMED OPENINGS

- .1 Provide properly formed and prepared expansion joint openings constructed to the exact dimensions and elevations shown on manufacturer's standard system drawings or as shown on the contract drawings.

3.3 SURFACE PREPARATION

- .1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants. Maintain depth of sealant at middle of joint width as follows:

Joint Width	Sealant Depth	Joint Depth
6 mm	6 mm	10 mm
20 mm	10 mm	15 mm
32 mm	13 mm maximum	20 mm

Minimum adhesion surface to be 1.5 times depth.

- .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.

3.4 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.

3.5 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.

3.6 MIXING

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

3.7 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 Locations:
 - .1 Caulk all joints where indicated on the drawings and at all locations where required to provide a complete weathertight building.
 - .2 Install sealants in all locations shown on drawings.
 - .3 Install sealant at the perimeter of all exterior openings where doors, windows, grilles and other items abut or penetrate the exterior wall materials.

- .4 Install sealant at all door saddles, spread a bead of sealant compound over entire seat of saddles at least 3 mm thick before installing saddle.
 - .5 Seal the junctions of differing exterior wall materials.
 - .6 Provide a minimum of two continuous beads of sealant under all prefinished galvanized steel wall flashings.
- .3 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
 - .2 Do not cover up sealants until proper curing has taken place.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Clean adjacent surfaces immediately.
 - .3 Remove excess and droppings, using recommended cleaners as work progresses.
 - .4 Remove masking tape after initial set of sealant.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00 - Cleaning.

3.9 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 00 – Rough Carpentry.
- .2 Section 08 06 10 – Door Schedule.
- .3 Section 08 71 00 – Door Hardware.
- .4 Section 08 80 00 - Glazing
- .5 Section 09 91 00 – Painting
- .6 Section 09 21 16 – Gypsum Board Assemblies.
- .7 Section 09 22 16 – Non-Structural Metal Framing.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials International (ASTM)
 - .1 ASTM A653/A653M-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.
 - .2 CGSB 41-GP-19Ma-84, Rigid Vinyl Extrusions for Windows and Doors.
- .3 CSA Group (CSA)
 - .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-S704-03, Standard for Thermal Insulation, Polyurethane and Polyisocyanurate Boards, Faced.
 - .2 CAN/ULC-S104-M80, Standard Method for Fire Tests of Door Assemblies.
 - .3 CAN/ULC-S105-M85, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.3 SYSTEM DESCRIPTION

- .1 Design Requirements:
 - .1 Arctic combo door steel door with wood frame.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

1.5 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products**2.1 DOOR DESIGN**

- .1 Door surface: Smooth.
- .2 Door Shape: Squared Top.
- .3 Door Style: Solid.
- .4 Panel Profile: Flush panel.
- .5 Finish: Two coats, low-sheen, baked on enamel primer.
- .6 Finger jointed pine jambs house double slab.

2.2 DOOR PANEL

- .1 Door shall be fabricated using 4-piece construction that includes primed white 0.0215" (+/- 0.0015) hot dipped galvanized strike side and hinge side steel facings, coated with multiple protective chemical layers to promote paint adhesion and deter corrosion.
- .2 Wood Edge Stiles and Rails:
 - .1 Top and Bottom Rails: 42.8mm (1.688") Laminated Veneer lumber (LVL).
 - .2 Hinge Stile: 42.8mm (1.688") Laminated Veneer Lumber (LVL).
 - .3 Handle Stile: 56.1mm (2.210") Laminated Veneer Lumber (LVL).
- .3 Thickness: 44mm (1-3/4").
- .4 Edge Construction: Wood.

- .5 Top and bottom rails are finger jointed wood. Ensure bottom rail is moisture and decay resistant.
- .6 Lock areas reinforced for single and double bore configurations.
- .7 Door facings are to be interlocked together utilizing plastic thermal break forming a mechanical bond.
- .8 Insulated core to be pour-in-place, high performance polyurethane foam (2.0 pcf minimum) forming a secure attachment to all door components.
- .9 Bottom rail may be machined to accept weather seal.
- .10 Mounting surface for latching hardware to be reinforced with solid internal blocking.
- .11 Hinge preparations with 12 gauge reinforcement plate are to be placed at manufacture's specifications and are to be machined for standard weight full mortise 102mm (4") butt hinges. Latch preparations are to be placed at manufacture's specifications.
- .12 Face bore(s) for cylindrical lock and deadbolt are to be 2-1/8" diameter at 45mm (1-3/4") or 60mm (2-3/8") backset and 5-1/2" on centre (5-1/2" or 10-1/2" on 8'-0" panels).

2.3 FRAMES: WOOD FRAMES

- .1 Wood frames shall be fabricated as double rabbet jamb design.
- .2 Hinge jamb(s), strike jamb, head jamb, and mullion(s) shall be machined to accept a kerf applied weather seal.
- .3 Hinge jamb preparations are to be placed at manufacture's specifications and are to be machined for standard weight full mortise 102mm (4") butt hinge.
- .4 Strike jamb preparations are to be placed at manufacture's specifications and are to be machined for full lip cylindrical strike plate.
- .5 Inswing or bumper outswing threshold shall be high-dam design.
- .6 Low profile threshold shall be required for handicap accessible openings.

2.4 WEATHER SEAL

- .1 Door frame shall be fabricated featuring a vinyl wrapped foam filled compression design that is kerf installed. Corner seals shall be installed to the rabbet section of the door frame at the bottom of the hinge and lock jamb. Door bottom sweep shall be sealed and securely attached to the operable door panel(s).

2.5 DOOR CORE MATERIALS

- .1 Stiffened: face sheets laminated, insulated core.
 - .1 Polyurethane: to CAN/ULC-S704 rigid, modified poly/isocyanurate, closed cell board. Density 32 kg/m

2.6 ADHESIVES

- .1 Polystyrene and polyurethane cores: heat resistant, epoxy resin based, low viscosity, contact cement.

2.7 PRIMER

- .1 Touch-up primer: to CAN/CGSB-1.181.

2.8 PAINT

- .1 Field paint steel doors and frames in accordance with Section 09 91 00 - Painting. Protect weatherstrips from paint. Provide final finish free of scratches or other blemishes.

2.9 ACCESSORIES

- .1 Door silencers: single stud rubber/neoprene type.
- .2 Top and bottom exterior 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: Refer to Section 08 71 00 – Door Hardware.
- .5 Metallic paste filler: to manufacturer's standard.
- .6 Exterior frame insulation: Refer to Section 07 21 29.03 – Sprayed Insulation – Polyurethane Foam.
- .7 Sealant: Refer to Section 07 92 00 – Joint Sealants.
- .8 Make provisions for glazing as indicated and provide necessary glazing stops.
 - .1 Provide removable stainless steel glazing beads for use with glazing tapes and compounds and secured with countersunk stainless steel screws.
 - .2 Design exterior glazing stops to be tamperproof.
- .9 Sill Angle:
 - .1 Structural pultruded fiberglass.
 - .2 Size: 100 x 100 x 3 mm
 - .3 Fasteners: 1/4 - #10 x 102 mm long with hex head.
 - .1 Master gripper DT2000 or equal.

2.10 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.

2.11 DOOR FABRICATION GENERAL

- .1 Doors: swing type, flush, with provision for glass and/or louvre openings as indicated.
- .2 Exterior doors: thermally broken hollow steel construction. Interior doors: honeycomb construction.
- .3 Fabricate doors with longitudinal edges locked seamed, adhesive assisted. Seams: visible.
- .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 CAN/ULC-S104 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.

2.12 DOORS: HONEYCOMB CORE CONSTRUCTION

- .1 Form face sheets for interior doors from 1.2 mm sheet steel with honeycomb core laminated under pressure to face sheets.

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 from interior parts with continuous interlocking thermal break.
- .4 Apply insulation.

Part 3 Execution**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 INSTALLATION GENERAL

- .1 Install doors and frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

- .1 Set frames plumb, square, level and at correct elevation.
- .2 Secure anchorages and connections to adjacent construction.
- .3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.
- .4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.
- .5 Caulk perimeter of frames between frame and adjacent material.
- .6 Maintain continuity of vapour retarder and air barrier.

3.4 DOOR INSTALLATION

- .1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Doors Hardware.
- .2 Provide even margins between doors and jambs and doors and finished floor and thresholds as follows.
 - .1 Hinge side: 1.0 mm.
 - .2 Latch side and head: 1.5 mm.
 - .3 Finished floor, and thresholds, top of LVT, or non-combustible sill: 13 mm.
- .3 Adjust operable parts for correct function.
- .4 Install louvres.

3.5 FINISH REPAIRS

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

3.6 PAINTING

- .1 Site paint all metal doors and frames in accordance with Section 09 91 00 – Painting.

END OF SECTION

Part 1 General**1.1 SUMMARY**

- .1 Section includes:
 - .1 Stain grade and paint grade flush solid wood doors.
 - .2 Fire rated wood doors.
 - .3 Wood frames.
- .2 Coordination:
 - .1 Cooperate with work of other sections to ensure fastenings set by others are provided and located, their work is installed to their specifications and that those responsible for back priming are notified in sufficient time for them to schedule work.

1.2 RELATED REQUIREMENTS

- .1 Section 08 06 10 – Door Schedule
- .2 Section 08 11 00 – Metal Doors and Frames.
- .3 Section 08 12 16 – Aluminum Doors and Frames.
- .4 Section 08 71 00 – Door Hardware.
- .5 Section 09 91 00 – Painting.

1.3 REFERENCE STANDARDS

- .1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
 - .1 North American Architectural Woodwork Standards (NAAWS) 3.1-2018.
- .2 Canadian Standards Association (CSA Group).
 - .1 CSA O115-M1982(R2001), Hardwood and Decorative Plywood.
 - .2 CAN/CSA O132.2 Series-90(R1998), Wood Flush Doors.
- .3 National Fire Protection Association (NFPA).
 - .1 NFPA 80-1999, Standard for Fire Doors and Fire Windows.
 - .2 NFPA 252-1999, Standard Method of Fire Tests of Door Assemblies.
- .4 Underwriters' Laboratories of Canada (ULC).
 - .1 CAN-4S104M-80(R1985), Fire Tests of Door Assemblies.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

- .2 Shop Drawings:
 - .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
 - .2 Indicate door location using numbering system per door schedule, size, and hand of each door, elevation of each door type; undercuts, bevelling, construction type core and edge construction not covered in product data; and special blocking requirements.
 - .3 Indicate dimensions and locations of factory machining criteria for hardware, extent of hardware blocking.
 - .4 Indicate dimensions and locations of cut-outs including trim for openings.
 - .5 Indicate door face finish requirements including veneer matching.
 - .6 Indicate doors to be factory finished and finish requirements.
 - .7 Indicate fire ratings for fire rated doors.
 - .8 Indicate electrified hardware requirements and preparations.
- .3 Samples:
 - .1 Submit 3 sets of samples minimum 300 mm x 300 mm of veneers showing full range of grain variation, finish and patterns proposed for wood specified.

1.5 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Wood fire rated doors: labelled and listed by an organization accredited by Standards Council of Canada.
- .2 Qualifications:
 - .1 Manufacturer shall be a member in good standing of the Architectural Woodwork Institute or the Architectural Woodwork Manufacturers Association of Canada or the Woodwork Institute.
 - .2 Quality standard:
 - .1 Work shall be in accordance with the NAWS, Custom Grade.

1.6 DELIVERY, STORAGE, AND HANDLING

- .1 Storage and Protection:
 - .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.
 - .2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.
 - .3 Protect doors from scratches, handling marks and other damage. Crate doors.
 - .4 Store doors away from direct sunlight.

1.7 FIELD CONDITIONS

- .1 Environmental conditions:
 - .1 During storage and installation: Obtain and comply with wood door manufacturer's instructions for optimum temperature and relative humidity conditions for wood doors during its storage and installation. Do not install wood doors until these conditions have been attained.
 - .2 During finishing: Comply with wood door manufacturer's temperature and humidity requirements before, during, and after application of finishes.
 - .3 During service life of woodwork: Obtain and comply with wood door manufacturer's advice for optimum temperature and humidity conditions.

Part 2 Products**2.1 DOOR CONSTRUCTION**

- .1 Performance duty level:
 - .1 Doors shall meet the requirements of ANSI/WDMA I.S. 1A-13 for Heavy Duty Performance Level unless otherwise indicated or scheduled.
- .2 Solid particleboard core, veneer faced, non fire rated and 20 minute fire rated wood door construction to NAAWS and as follows:
 - .1 Type PC-5, 545 – 609 kg/m³ (34-38 lbs/ft³) agrifibre core, no added ureaformaldehyde).
- .3 Bonding:
 - .1 Bond stiles and rails to core; abrasive sand core assembly to achieve uniform thickness prior to lamination of door faces.
- .4 Panel edge types:
 - .1 Wood veneer faced doors for transparent finish:
 - .1 For vertical edges (stiles) and exposed horizontal edges (rails). (Exposed horizontal edges are those edges that can be viewed from floors above.):
 - .1 Minimum 11 mm (7/16") thick solid hardwood, species to match face veneer, and referenced quality standard.
 - .2 Inset solid wood edging shall have consistent moisture content as panel core material, be glued securely, and calibrated with panel core thickness prior to being laminated with wood veneer on both sides.
 - .3 Non rated or 20 minute fire rated doors: Solid hardwood edge to be laminated to minimum 25.4 mm (1") structural composite lumber backer.
 - .2 For unexposed horizontal edges (rails):

- .1 Non rated or 20 minute fire rated doors: Minimum 25 mm (1") structural composite lumber.
- .5 Blocking:
 - .1 Provide hardware blocking for doors as follows:
 - .1 Non-rated or 20 minute fire rated doors: Structural composite lumber for hardware blocking.
- .6 Thickness:
 - .1 45 mm minimum unless otherwise indicated or scheduled.
- 2.2 VENEER FACED DOORS FOR TRANSPARENT FINISH**
 - .1 Veneer face grade: Allowable wood veneer face grade characteristics shall comply with NAAWS referenced grade and referenced standards.
 - .2 Veneer thickness: Minimum 1.02 mm (0.040") thick after sanding.
 - .3 Veneer species: Douglas Fir, Straight Vertical Grain.
 - .4 Veneer cut: Quarter.
 - .5 Veneer leaf matching: Book.
 - .6 Veneer assembly matching: Running.
- 2.3 PAINT GRADE WOOD DOORS**
 - .1 Hardboard: composition face.
- 2.4 TRANSOM AND SIDE PANELS**
 - .1 Construction: to match adjacent door.
 - .2 Meeting edges of doors and transom panels: square.
 - .3 Veneer of doors and transom panels: continuous matched.
- 2.5 MANUFACTURED FRAMES**
 - .1 Interior frames:
 - .1 Grade: to match door.
 - .2 Frames to be solid wood.
 - .3 Wood Species to match door and to be factory finished with transparent finish.
- 2.6 ACCESSORIES**
 - .1 Refer to Section 08 71 00 – Door Hardware.

2.7 FABRICATION

- .1 Fire rated doors shall be fabricated, labelled and listed by an organization accredited by Standards Council of Canada in conformance with CAN/ULC-S104-10 and CAN/ULCS105-09 for fire protection ratings as scheduled.
- .2 Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - .1 Clearances: Refer to Part 3 for clearance tolerances.
 - .2 Fit doors for automatic door bottoms.
 - .3 Comply with NFPA 80-2010 for fire-rated doors.
 - .4 Bevel non-fire-rated doors 3-1/2 degrees (1/8 inch in 2 inches) at lock and hinge edges.
 - .5 Bevel fire-rated doors 3-1/2 degrees (1/8 inch in 2 inches) at lock edge; trim stiles and rails only to extent permitted by labelling agency.
- .3 Fabricate doors with hardware blocking required for specified door hardware.
- .4 Factory machine doors for finish hardware that is not surface applied. Do not machine for surface hardware. Locate hardware to comply with Door and Hardware Institute (DHI) "Recommended Locations for Architectural Hardware for Flush Wood Doors (latest edition). Comply with final reviewed hardware schedules, door and frame shop drawings and hardware templates.
 - .1 Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.8 FACTORY FINISHING

- .1 Finish work in factory in accordance with NAAWS and referenced quality standard.
- .2 Prior to finishing, handling marks or effects of exposure to moisture removed with a thorough final sanding over surfaces of the exposed portions, using appropriate grit sandpaper, and shall be cleaned prior to applying sealer or finish. Sanding shall be completed just prior to stain or finishing application.
- .3 Comply with requirements indicated below for finish system, staining, and sheen.
 - .1 Sheen; Sheen range measurements in accordance with NAAWS:
 - .1 Satin.
- .4 Factory finish with transparent, Post Catalyzed Lacquer in accordance with NAAWS.
 - .1 Transparent finish:
 - .1 Stain: Stain colour as selected by Departmental Representative.
- .5 Seal top and bottom door edges.

2.9 SITE FINISHING

- .1 Seal top and bottom door edges of veneer faced doors.
- .2 Site paint paint-grade doors in accordance with Section 09 91 00 – 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 Unwrap and protect doors in accordance with CAN/CSA-O132.2 Series, Appendix A.
- .2 Coordinate installation of doors with installation of frames specified in other Sections and hardware specified in Section 08 71 00.
- .3 Install labelled fire rated doors to NFPA 80.
- .4 Install doors and hardware in accordance with manufacturer's printed instructions and CAN/CSA-O132.2 Series, Appendix A.
- .5 Install work plumb, level and straight, and fasten it securely to backing to support itself and anticipated superimposed loads.
- .6 Align and fit doors in frames with uniform clearances as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - .1 Clearances:
 - .1 Provide clearances as follows except where more stringent clearance is required or indicated.
 - .2 Provide 3 mm maximum clearance between door and frame at heads, jambs, and between pairs of doors.
 - .3 Provide minimum 6 mm clearance from bottom of door and top of floor finish.
 - .4 At door assemblies having fire-protection rating not less than 20-minutes provide clearance not more than 6 mm at the bottom and not more than 3 mm at the sides and top.
- .7 Seal top and bottom edges of wood doors if they are cut to fit, in accordance with door manufacturer's warranty requirements.
- .8 Pilot drill screw and bolt holes.
- .9 Adjust hardware for correct function.

- .10 Secure transom and side panels by means of concealed fasteners or countersunk screws concealed by means of wood plugs matching panel in grain and colour.

3.3 ADJUSTMENT

- .1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.4 CLEANING

- .1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.
- .2 Remove traces of primer, caulking; clean doors and frames.
- .3 Clean glass and glazing materials with approved non-abrasive cleaner.
- .4 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 09 21 16 – Gypsum Board Assemblies
- .3 Section 09 22 16 – Non-Structural Metal Framing
- .4 Section 09 91 13 – Exterior Painting
- .5 Section 09 91 23 – Interior Painting
- .6 Mechanical
- .7 Electrical

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for access door components and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Submit catalogue details for each type of door illustrating profiles, dimensions and methods of assembly.

1.3 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for cleaning and maintenance of stainless-steel finishes for incorporation into manual.

1.4 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.

Part 2 Products**2.1 EXTERIOR ACCESS DOORS**

- .1 Sizes: as per door schedule.
- .2 Construction: 16 gauge galvanized steel door and frame, filled with 2” rigid foam insulation, open celled microcellular polyurethane on inside of door and closed cell neoprene sponge SC42W/ PSA stripping gasketing on the back, continuous stainless

steel piano hinge, chrome-plated zinc 'T' type handle with pivot rod 3 point catch with keyed cylinder lock.

.3 Finish: Powder coat white.

2.2 INTERIOR ACCESS DOORS

.1 Sizes: as per drawing.

.2 Construction: rounded safety corners, concealed hinges, screwdriver latch, anchor straps, able to open 180 degrees.

.3 Materials:

.1 prime coated steel.

.1 Refer to Section 09 91 00 – Painting for final paint finish.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for access door installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION

.1 Installation: locate access doors within view of equipment and ensure equipment is accessible for operating, inspecting, adjusting, servicing without using special tools.

.1 Install gypsum board surfaces: in accordance with Section 09 21 16 - Gypsum Board Assemblies.

3.3 CLEANING

.1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by access door installation.

END OF SECTION

Part 1 General**1.1 SUMMARY**

- .1 Section includes:
 - .1 Fiberglass Windows
 - .2 Operable fiberglass windows

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 07 27 00.01 - Air Barriers - Descriptive or Proprietary
- .3 Section 07 62 00 –Metal Flashing and Trim
- .4 Section 07 92 00 – Joint Sealants: sealing of joints except where specified otherwise in this Section.
- .5 Section 08 80 50 - Glazing

1.3 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM A 123/A 123M, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM E283/E283M, Standard Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - .3 ASTM E331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 - .4 ASTM E1105, Standard Test Method for Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform of Cyclic Static Air Pressure Difference.
- .2 CSA Group (CSA)
 - .1 AAMA/WDMA/CSA 101/I.S.2/A440-17, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
 - .2 CSA A440S1-2017, Canadian Supplement to AAMA/WDMA/CSA 101/1.S.2/A440, NAFS - North American Fenestration Standard for Windows, Doors, and Skylights.
 - .3 CAN/CSA-A440.2-14 /A440.3-14, Fenestration energy performance/User guide to CSA A440.2, Fenestration energy performance.
 - .4 CAN/CSA-A440.4-2018, Window, Door, and Skylight Installation
 - .5 CAN/CSA G40.20/G40.21-13(R2018), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

- .6 CAN/CSA S136, North American Specification for the Design of Cold Formed Steel Structural Members.
- .3 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #79, Primer, Alkyd, Anti-Corrosive for Metal.
- .4 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).
- .5 Screen Manufacturers Association (SMA)
 - .1 SMA 1201 Specification for Insect Screens for Windows, Sliding Doors and Swinging Doors.

1.4 ADMINISTRATIVE REQUIREMENTS

- .1 Co-ordination: co-ordinate work of this Section with installation of fire stopping, flashing placement, air barrier placement, vapour retarder placement, components or materials.
- .2 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other construction subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.

1.5 PERFORMANCE REQUIREMENTS

- .1 Air Tightness:
 - .1 Air infiltration and exfiltration rates at a static air pressure differential of 1.6 psf (75 Pa) when tested in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 and ASTM E283 to be not more than:
 - .2 Fixed Windows (interior or exterior glazed): 0.00 cfm/ft² (0.00 L/s.m²).
 - .3 Outward opening awning-type windows: 0.00 cfm/ft² (0.01 L/s.m²).
- .2 Water Penetration Testing:
 - .1 There shall be no water infiltration at a cycle static air pressure differential as follows when tested in accordance with AAMA 101 and ASTM E1105.
 - .2 Water penetration resistance test pressure for all vent types, including: Fixed windows, casement, awning, and outswing doors: 12 psf (575 Pa).
- .3 Structural Requirements:
 - .1 Performance Grade (PG) and Class of all windows and doors shall be:
 - .1 For fixed windows, CW-95 or higher

- .2 For operable window (inswing or outswing), CW-45 or higher
 - .2 Design glass according to AAMA/WDMA/CSA 101/I.S.2/A440
 - .3 Design fiberglass according to AAMA/WDMA/CSA 101/I.S.2/A440.
 - .4 Design glazing and spanning window frame members, including any required reinforcing, in accordance with AAMA/WDMA/CSA 101/I.S.2/A440. There shall be no deflection in excess of L/175 of the span of any framing member.
 - .5 Allow for deflection of building structure. Ensure no structural loads are imposed on window assemblies. In lieu of other specific requirements the minimum requirements are as specified by the structural engineer.
- .4 Thermal Requirements:
- .1 The Thermal Transmittance U-Value shall be certified in accordance with the National Fenestration Rating Council (NFRC).
 - .1 Overall U-values, utilizing triple glazed IG units, incorporating two LowE coatings:
 - .1 Fixed windows = 0.15 (Imperial) / 0.85 (Metric)
 - .2 Awning = 0.17 (Imperial) / 0.97 (Metric)
 - .3 Casement = 0.16 (Imperial)/ 0.91 (Metric)
 - .4 Outswing Doors = 0.15 (Imperial) / 0.85 (Metric)
 - .2 Energy Star: Windows must be ENERGY STAR® certified. Window manufacturer must provide required documentation and labeling.

1.6 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 window components, anchorage and fasteners, glass and infill, and internal drainage details and include product characteristics, performance criteria, physical size, finish and limitations and water flow diagrams.
- .3 Shop Drawings:
 - .1 Submit drawings stamped and signed by professional engineer registered or licensed in Northwest Territories and Nunavut (NAPEG), Canada.
 - .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.
 - .3 Include description of materials, metal finishing specifications, and other pertinent information.
 - .4 Design loads, typical reactions and support movement allowances, both vertical and horizontal, shall be placed on the shop drawings.

- .5 Shop drawings shall clearly indicate the specification of materials and, where applicable, indicate installation methods and coordination with other sections.
- .6 Shop drawings shall clearly indicate paths and methods of moisture egress (should this occur) and ventilation of framing and spandrel conditions.
- .4 Samples:
 - .1 Submit duplicate 12 x 12 inches sample sections showing prefinished surface, finish, colour and texture, and including section of infill panel.
 - .2 Submit duplicate 12 x 12 inches sample sections of insulating glass unit showing glazing materials and edge and corner details.
- .5 Delegated Design Submittals:
 - .1 Include framing member structural and physical characteristics, calculations, dimensional limitations, special installation requirements.
 - .2 Submit verification that Insulating Glass Units used in window system U-values.
 - .3 Submit professional letters of assurance for the work of this section.
- .6 Test Reports:
 - .1 Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and supportive data.

1.7 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for windows and doors for incorporation into manual.
- .3 Warranty Documentation: submit warranty documents specified.

1.8 QUALITY ASSURANCE

- .1 Regulatory Requirements:
 - .1 Conform to applicable code for structural requirements.
- .2 Certifications: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Mock-Up:
 - .1 Construct mock-ups in accordance with Section 01 45 00- Quality Control.
 - .2 Include intermediate mullion, vision glass light, and insulated infill panel.
 - .3 Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
 - .4 Purpose: To judge quality of work and material installation.
 - .5 Allow Departmental Representative 24 hours minimum prior to review of mock-up.

- .6 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.
- .7 When accepted, mock-up will demonstrate minimum standard of quality required for work of this Section.
- .8 Approved mock-up may remain part of finished work.

1.9 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.

1.10 WARRANTY

- .1 Provide manufacturers standard express limited warranty on fiberglass frame components for a period of 20 years for workmanship and materials.
- .2 Provide manufacturers standard express limited warranty on integral hardware for a period of 10 years for workmanship and materials.
- .3 Provide manufacturers standard express warranty for the insulated glass units to cover premature hermetic seal failure (condensation between the lites at normal service temperatures) appearing within a period of 10 years from the date of substantial completion.

Part 2 Products

2.1 MATERIALS

- .1 All frame and sash profiles are made from Pultruded Fiberglass.
 - .1 Pultrusions shall be manufactured with clamp-action equipment. No surface texture from rollers is permitted.
 - .2 Glass content average for pultruded profiles: 55% or more.
- .2 Frame Insulation: Foam insulation in the frame cavities.
- .3 Fasteners shall be 300 series stainless steel, 400 series stainless steel, or Leland Industries DT2000 coated of sufficient size and quantity to perform their intended function.
 - .1 Fastener corrosion resistance shall be: 2000 hours minimum, when tested in accordance with ASTM B117.
- .4 Glazing tape: black, closed cell copolymer, polyethylene foam coated with an aggressive acrylic adhesive. All upward facing exterior horizontal joints to have an additional cap bead of neutral cure silicone.
- .5 Internal sealants for frame joints and continuous heel beads: 1199 DOW Corning sealant, or equal or better neutral cure silicone sealant.
- .6 Seals: Minimum three gasket seals on operable windows.

- .7 Sheer Block: Internally fastened in corners.
- .8 Insulated Glazing Units: Insulated glazing unit certified by IGMA. Glass thickness shall be in accordance with applicable Building Codes, but not less than 4mm. Refer to Section 08 80 00 – Glazing.
- .9 Hardware:
 - .1 All hardware to be supplied by a single manufacturer:
 - .1 Approved manufacturer: Roto Frank of America.
 - .2 Casement and Awning windows: RotoSil nano corrosion resistant finish on hinge components and stainless steel multi-point lock back, stainless steel locking keepers, and stainless steel rotary crack operator with folding handle.
 - .3 Hardware finish: Colour to be selected from supplier’s standard range.
- .10 Accessories:
 - .1 Flashing attachment angle: Extruded aluminum.
 - .2 Strap anchors: Stainless or galvanized steel
 - .3 Sill Angle: Stainless Steel
 - .4 Sill Angle Cover Cap: Fiberglass to match interior frame colour
- .11 Finish:
 - .1 Hydro Tuff two-component waterborne polyurethane, meeting the requirements of AAMA-625.
 - .1 Interior Frame Finish: Departmental Representative to choose from manufacturer’s standard color range.
 - .2 Exterior Frame Finish: Departmental Representative to choose from manufacturer’s standard color range.
- .12 Glazing Stop:
 - .1 Provide manufacturer pultruded fiberglass glazing stops as required by IGU thickness.
 - .1 Lock-in, screw-less type.
 - .2 No PVC materials shall be used for glazing stop or related accessories.

2.2 FABRICATION

- .1 Fabricate framing from pultrusions of size and shape shown on shop drawings.
- .2 All framing joints shall be accurately machined, assembled, and sealed to provide neat weather-tight connections.
- .3 Provide interior heel bead as required for rain screen system.
- .4 All glazing pockets shall be vented, pressure equalized and drained to the exterior.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts acceptable for product installation in accordance with manufacturer's written instructions.

3.2 INSTALLATION

- .1 Windows shall be installed, glazed and adjusted by experienced personnel in accordance with the manufacturer's instructions and approved shop drawings.
- .2 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- .3 Install windows in accordance with approved shop drawings.
- .4 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- .5 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.
- .6 Install semi-rigid insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- .7 Install glass and infill panels in accordance with Section 08 80 00 - Glazing, to glazing method required to achieve performance criteria.

3.3 ADJUSTING

- .1 Adjust operating sash for smooth operation.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove protective material from prefinished aluminum surfaces.
 - .3 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.
 - .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
 - .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

3.5 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 08 11 00 – Metal Doors and Frames
- .2 Section 08 14 16 – Flush Wood Doors and Frames.
- .3 Section 08 54 13 – Fiberglass Windows and Doors

1.2 REFERENCE STANDARDS

- .1 American National Standards Institute (ANSI) / Builders Hardware Manufacturers Association (BHMA)
 - .1 ANSI/BHMA A156.1-2000, American National Standard for Butts and Hinges.
 - .2 ANSI/BHMA A156.2-2003, Bored and Preassembled Locks and Latches.
 - .3 ANSI/BHMA A156.3-2001, Exit Devices.
 - .4 ANSI/BHMA A156.4-2000, Door Controls - Closers.
 - .5 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.
 - .6 ANSI/BHMA A156.6-2005, Architectural Door Trim.
 - .7 ANSI/BHMA A156.8-2005, Door Controls - Overhead Stops and Holders.
 - .8 ANSI/BHMA A156.10-1999, Power Operated Pedestrian Doors.
 - .9 ANSI/BHMA A156.12-2005, Interconnected Locks and Latches.
 - .10 ANSI/BHMA A156.13-2002, Mortise Locks and Latches Series 1000.
 - .11 ANSI/BHMA A156.14-2002, Sliding and Folding Door Hardware.
 - .12 ANSI/BHMA A156.15-2006, Release Devices - Closer Holder, Electromagnetic and Electromechanical.
 - .13 ANSI/BHMA A156.16-2002, Auxiliary Hardware.
 - .14 ANSI/BHMA A156.17-2004, Self-closing Hinges and Pivots.
 - .15 ANSI/BHMA A156.18-2006, Materials and Finishes.
 - .16 ANSI/BHMA A156.19-2002, Power Assist and Low Energy Power - Operated Doors.
- .2 Canadian Steel Door and Frame Manufacturers' Association (CSDMA)
 - .1 CSDMA Recommended Dimensional Standards for Commercial Steel Doors and Frames - 2009.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:

- .1 Submit manufacturer's instructions, printed product literature and data sheets for door hardware and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Hardware List:
 - .1 Submit contract hardware list.
 - .2 Indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.
- .4 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.
- .5 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for door hardware for incorporation into manual.
- .3 Submit manufacturer's parts lists and instructions for closers, locksets, exit devices and electronics upon completion of work.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Supply maintenance materials in accordance with Section 01 78 00- Closeout Submittals.
 - .2 Tools:
 - .1 Supply two (2) sets of wrenches for door locksets.

1.6 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 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .3 Make a detailed review of the Schedule of Finish Hardware and make whatever allowance in tender price appropriate to accommodate changes which may be necessary.
- .4 Supplier must be an established contract builders' hardware firm. Persons responsible for the complete finish hardware contract for this project, including: scheduling, detailing, ordering and coordinating hardware, shall be experienced Architectural Hardware Consultants (AHC) and members in good standing with the Door and Hardware Institute (DHI).

- .5 All finish hardware to conform to CAN/CGSB 69-GP Series-M90/ANSI/BHMA-A156 Series.

1.7 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.

1.8 PRE-APPROVED ALTERNATES

- .1 Bid only those products specified; or for the purpose of tendering, products listed as equivalents or other pre-approved alternative.
- .2 Substituted non-approved items will be replaced with specified items and all related costs will be borne by the supplier. This project will be inspected upon completion to ensure compliance.
- .3 Submit requests for approval of alternative material or product in writing to the Departmental Representative no later than ten (10) days prior to bid closing. Submissions shall be made in duplicate. Provide samples of the products and finishes proposed if and when requested by the Departmental Representative.

1.9 WARRANTY

- .1 All finish hardware shall be guaranteed by the hardware manufacturer, with written certification, for a period of one (1) year from the date of "substantial completion" against any defects in the design, materials and workmanship, except closers and exit devices. Closers shall have a five (5) year guarantee and exit devices shall have a three (3) year guarantee. Any defects will be made good by the manufacturer at no additional cost to the owner.

Part 2 Products

2.1 DESIGN PRINCIPALS AND STANDARDS

- .1 Hardware for fire doors shall meet Underwriters requirements. Submit written certification of conformance to ULC requirements for each type of hardware prior to delivery.
- .2 All doors shall be accessible to residents in wheelchairs, including public and common areas.
- .3 All doors to be barrier free and shall have lever handles consistent with the specified grade of locks for that application.

2.2 HARDWARE ITEMS

- .1 Use one manufacturer's products only for similar items.
- .2 Hardware shall be best grade, entirely free from imperfections in manufacture and finish and shall be supplied in accordance with the hardware list specified herein.

- .3 The following list of manufacturers and products are considered approved for this project and no variations from the listed or pre-approved items will be permitted:
 - .1 Hinges: McKinney, Pemko, Stanley.
 - .1 Note: All hinges to be 3 knuckle with 2 concealed bearings, material and finish as specified.
 - .2 Entry door lockset/ Mortise Lever Set: Sargent 8200, 7 Line, Baldwin Lakeshore Entrance Trim 5162 levers, Taymor Slip Stream
 - .3 Residential lever Set: Weiser Halifax Roundrose Series, Schlage Broadway Series, Taymor Premier Line.
 - .4 Door Stops/ hinge pin stop: Gallery, Richelieu, Taymor.
 - .5 Ball Catches: Gallery, Richelieu, Directdoor.
 - .6 Door Viewer: Gallery, ASSA Abloy, Taymor.
 - .7 Thresholds, Seals and Door Bottoms: KN Crowder, Pemko, CRL.
 - .1 Thresholds for all doors shall allow for passage of a wheelchair.
- .4 Installed items to be equal in all respects to approved samples.
- .5 Supply all templates as required. Frame manufacturer will allow for maximum swing of doors when templating for closers. On pairs of doors RHR leaf is to be active unless otherwise noted.
- .6 Package hardware with all necessary screws and fittings, clearly labelled with door number as per Door Schedule, as to intended location. Include all necessary installation instructions.
- .7 Any doors not listed shall have hardware as listed for similar locations.

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, padlocks and cabinet locks to be master keyed. Prepare detailed keying schedule in conjunction with Departmental Representative.
- .2 Supply keys in duplicate for every lock in this Contract.
- .3 Supply 6 master keys for each master key or grand master key group.

- .4 Stamp keying code numbers on keys and cylinders.
- .5 Supply construction cores.
- .6 Hand over permanent cores and keys to Owner.

2.5 FINISH

- .1 All hardware finishes shall match throughout the project, generally satin chrome, stainless steel or as noted in the finish hardware schedule.

Part 3 Execution

3.1 GENERAL

- .1 Confer with the various sections of work and refer to the detail drawings before ordering hardware to be sure that it will conform to and fit actual conditions on the job.
- .2 Before furnishing hardware, check drawings for hardware requirements, verify door swings, check shop drawings, frame and door lists, and advise in writing if revisions are required. Ensure early delivery of hardware required for this project.
- .3 Supply complete information and templates required by the metal door and frame manufacturers to provide reinforcing for the application of hardware.
- .4 Submit the names of hardware manufacturers used in the preparation of the Tender. If the manufacturer's names are not stated, it shall be understood to mean that the hardware will be purchased from the manufacturers specified.

3.2 INSTALLATION

- .1 Manufacturer's Instructions: comply with manufacturer's written recommendations, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.
- .2 Supply all door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.
- .3 Supply manufacturers' instructions for proper installation of each hardware component.
- .4 Install hardware to standard hardware location dimensions in accordance with CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction).
- .5 Where door stop contacts door pulls, mount stop to strike bottom of pull.
- .6 Install key control cabinet.
- .7 Use only manufacturer's supplied fasteners.
 - .1 Use of "quick" type fasteners, unless specifically supplied by manufacturer, is unacceptable.
- .8 Remove construction cores when directed by Departmental Representative.
 - .1 Install permanent cores and ensure locks operate correctly.

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 ensure tight fit at contact points with frames.

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 Clean hardware with damp rag and approved non-abrasive cleaner, and polish hardware in accordance with manufacturer's instructions.
 - .3 Remove protective material from hardware items where present.
 - .4 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning]

3.5 DEMONSTRATION

- .1 Keying System Setup and Cabinet:
 - .1 Set up key control system with file key tags, duplicate key tags, numerical index, alphabetical index and key change index, label shields, control book and key receipt cards.
 - .2 Place file keys and duplicate keys in key cabinet on their respective hooks.
 - .3 Lock key cabinet and turn over key to Owner.
- .2 Maintenance Staff Briefing:
 - .1 Brief maintenance staff regarding:
 - .1 Proper care, cleaning, and general maintenance of projects complete hardware.
 - .2 Description, use, handling, and storage of keys.
 - .3 Use, application and storage of wrenches for door closers, locksets, and fire exit hardware.
- .3 Demonstrate operation, operating components, adjustment features, and lubrication requirements.

3.6 PROTECTION

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

3.7 SCHEDULE

- .1 **Hardware group No. 1. (Main Entrance):**

2	Ea. Butt Hinges	TA714 114 x 101	Both Leafs	26D
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1.	Ea.	Entry Lockset	82-47-CR-RAM	Outside Leaf	26D
1	Ea.	Passage	82-15-CR-RAM	Inside Leaf	26D
2	Ea.	Door Viewer	GSH 199B	Outside Leaf	NP
2	Ea.	Hinge Pin Stop	528	Inside Leaf	26D
2	Ea.	Weatherstripping	By Door Supplier	Both Leafs	
1	Ea.	Door Sweep	By Door Supplier	Both Leafs	
-	Ea.	Threshold	As Required		
.2 Hardware group No. 2. (Passage Door):					
3	Ea.	Butt Hinges	TA714 4½ x 4		26D
1	Ea.	Passage Lockset	9SPSL1010-015 83028		26D
1	Ea.	Wall Stop	GSH 240		26D
.3 Hardware group No. 3. (Passage Door):					
3	Ea.	Butt Hinges	TA714 4½ x 4		26D
1	Ea.	Passage Lockset	9SPSL1010-015 83028		26D
1	Ea.	Hinge Pin Stop	528		NP
.4 Hardware group No. 4. (Privacy Door):					
3	Ea.	Butt Hinges	TA714 4½ x 4		26D
1	Ea.	Privacy Lockset	9SPSL3310-015 83028		26D
1	Ea.	Wall Stop	GSH 240		26D
.5 Hardware group No. 5. (Double Closet Door):					
6	Ea.	Butt Hinges	TA714 4½ x 4		26D
2	Ea.	Dummy Levers	9SHD120-015		26D
2	Ea.	Ball Catch	GSH 1		26D
.6 Hardware group No. 6. (Exterior Hatch):					
1	Ea.	Butt Hinges	TA714 114 x 101		26D
1.	Ea.	Storeroom Lockset	7G04-LL		26D
1	Ea.	Hinge Pin Stop	528		26D
1	Ea.	Weatherstripping	By Door Supplier		BL

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 05 73 00 – Decorative Metal Railings.
- .2 Section 08 54 13 – Fiberglass Windows and Doors
- .3 Section 10 28 00 – Toilet and Bath Accessories.

1.2 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM C542-05, Standard Specification for Lock-Strip Gaskets.
 - .2 ASTM C1503-08, Standard Specification for Silvered Flat Glass Mirror.
 - .3 ASTM D790-07e1, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - .4 ASTM D1003-07e1, Standard Test Method for Haze and Luminous Transmittance of Plastics.
 - .5 ASTM D1929-96(R2001)e1, Standard Test Method for Determining Ignition Temperature of Plastics.
 - .6 ASTM D2240-05, Standard Test Method for Rubber Property - Durometer Hardness.
 - .7 ASTM E84-10, Standard Test Method for Surface Burning Characteristics of Building Materials.
 - .8 ASTM E330-02, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.
 - .2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.
 - .3 CAN/CGSB-12.8-97, Insulating Glass Units.
 - .4 CAN/CGSB-12.8-97 (Amendment), Insulating Glass Units.
 - .5 CAN/CGSB-12.9-M91, Spandrel Glass.
 - .6 CAN/CGSB-12.10-M76, Glass, Light and Heat Reflecting.
 - .7 CAN/CGSB-12.11-M90, Wired Safety Glass.
 - .8 CAN/CGSB-12.20-M89, Structural Design of Glass for Buildings.
- .3 Glass Association of North American (GANA)
 - .1 GANA Glazing Manual - 2008.
 - .2 GANA Engineering Standards Manual – 2019.
 - .3 GANA Laminated Glazing Reference Manual - 2009.

- .4 GANA Sealant Manual – 2008.

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this section, with Contractor's Representative and Departmental Representative in accordance with Section 01 31 19- Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other building subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for glass, sealants, and glazing accessories and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit for review and acceptance of each unit.
 - .2 Samples will be returned for inclusion into work.
 - .3 Submit duplicate 300 x 300 mm size samples of glazing and sealant material.
- .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 Obtain compatibility and adhesion test reports from sealant manufacturer indicating that glazing materials were tested for compatibility and adhesion with glazing sealant as well as other glazing materials including insulating units.
- .6 Manufacturer reports:
 - .1 Submit glass fabricator's product information and structural calculations indicating compliance with glazing standards established by the Glass Association of North America (GANA). Submittal to include thermal stress and structural load analysis of the proposed glass types, configuration and sizes.

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00- Closeout Submittals.

- .2 Operation and Maintenance Data: submit operation and maintenance data for [glazing] for incorporation into manual.

1.6 QUALITY ASSURANCE

- .1 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.
- .2 Qualifications:
 - .1 Manufacturers: Fabrication processes, including low emissivity and reflective coatings, insulating, laminated, silk-screening and tempering shall be manufactured by a single manufacturer with fabrication experience and meet ANSI / ASQC 9002 1994.
 - .2 Installers / applicators / erectors: Provide the work of this section executed by specialist Subcontractor who shall be thoroughly trained and experienced in skills required, be completely familiar with referenced standards and requirements of the work of this section, and personally direct installation performed under this section.
 - .1 Foreperson experience: have experience as glazing mechanic.
 - .2 Glazing mechanic experience: have experience as glazers.

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 AMBIENT CONDITIONS

- .1 Ambient 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.

Part 2 Products

2.1 PERFORMANCE/DESIGN REQUIREMENTS

- .1 General:
 - .1 Publications: Comply with recommendations in the publications below, except where more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this section.
 - .1 GANA Glazing Manual.
 - .2 GANA Engineering Standards Manual.
 - .3 GANA Laminated Glazing Reference Manual.
 - .4 GANA Sealant Manual.

- .2 Regulatory requirements:
 - .1 Fire rated glass:
 - .1 Each lite shall bear permanent, non-removable label by accredited and recognized independent testing agency certifying it for use in tested and rated fire protective assemblies.
 - .3 Glass strength:
 - .1 Provide glass products in the thickness and strengths required to meet or exceed the following criteria based on project loads and in-service conditions.
 - .1 Analysis shall comply with CAN/CGSB 12.20-M89.
 - .2 Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following:
 - .1 8 breaks per 1000 for glass installed vertically less than 15 degrees from the vertical plane and under wind action.
 - .3 Maximum lateral deflection; insulating glass units:
 - .1 For insulating glass units supported on four edges, limit centre-of-glass deflection at design wind pressure to not more than 1/175 times the long side length or 19 mm maximum.
 - .2 Glass at guards, balustrades, and where glass is likely to be subjected to human impact shall comply with safety glass requirements of CAN/CGSB 12.20-M89 and CAN/CGSB 12.1-M90, where applicable, and building code.
 - .3 Provide annealed, heat strengthened, and tempered lights where required by the building code, and where required for the various solar exposures on the building.
 - .4 Glass thicknesses and glass types specified, indicated, or scheduled in the Contract Documents are minimums required. Glass designer/engineer to modify as required to satisfy design and building code requirements, and requirements of authorities having jurisdiction, and any such modifications shall be clearly indicated on shop drawings.
- .4 Thermal and optical performance: Provide glass products with performance properties specified or published by glass manufacturer where not specified. Performance properties to be manufacturer's published data as determined according to the following procedures:
 - .1 Centre of glass U-Value: National Fenestration Rating Council (NFRC) 100 methodology using LBNL WINDOW 5.2 computer program.
 - .2 Centre of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.
 - .3 Visible light transmittance: NFRC 200 methodology.
 - .4 Solar optical properties: NFRC 300 or LBNL Optics.

- .5 Glazing systems shall be capable of withstanding normal thermal movements, without failure, including loss due to defective manufacture, fabrication and installation; deterioration of glazing materials; and other defects in construction.
- .6 Provide glass Products of uniform appearance, reflectivity, hue, shade, visible light transmittance, and colour when viewed from distance of 3 m to 30 m perpendicular to the glass or from 45-degree angle to the glass.
- .7 Protect laminated glass interlayer from damage or discolouration resulting from contact with deleterious and incompatible sealants, substances, and materials. Comply with manufacturer's recommended installation instructions.
- .8 Ensure continuity of building enclosure vapour and air barrier using glass and glazing materials as follows:
 - .1 Utilize inner light of multiple light sealed units for continuity of air and vapour seal.

2.2 GLASS MATERIALS

- .1 Flat Glass:
 - .1 Float glass: to CAN/CGSB-12.3, glazing quality.
 - .2 Safety glass: to CAN/CGSB-12.1, transparent:
 - .1 Heat treated (tempered or heat strengthened) float glass:
 - .1 Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - .2 For uncoated glass, comply with requirements for Condition A in accordance with ASTM C1048-12e1.
 - .3 For coated vision glass, comply with requirements for Condition C (other coated glass) in accordance with ASTM C1048-12e1.
 - .4 Heat strengthened glass shall have surface compression of 24-52 MPa (3,500-7,500 psi).
 - .2 Laminated glass:
 - .1 Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations. Use materials that have a proven record of no tendency to bubble, discolour, or lose physical and mechanical properties after fabrication and installation.
 - .2 Glass layers minimum 3.2 mm thick unless otherwise indicated.
 - .3 Interlayer thickness: Provide thickness as needed to comply with requirements and not less than the following:
 - .4 Vertical glazing: not less than 0.76 mm unless otherwise indicated.
 - .3 Interlayer colour: Clear unless otherwise indicated.

- .4 Glass type: annealed or heat strengthened or tempered, as required to suit design requirements.
- .5 Laminated glass products to be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.
- .3 Silvered mirror glass: Annealed glass, to ASTM C1503-08 as follows:
 - .1 Type 1-float glass for high humidity use.
 - .2 Grade: Mirror Cut Size.
 - .3 Quality: Mirror Select Quality, except allowable distortion shall be $\geq 80^\circ$ vision interference angle to ASTM C1036-16 Table 5.
 - .4 Colour: Clear.
 - .5 Thickness: 6 mm.
 - .6 Exposed edges shall be chamfered, ground, and polished.
- .2 Insulating Glass Units:
 - .1 Insulating glass units: to CAN/CGSB-12.8.
 - .1 Warm edge, hermetically sealed, CAN/CGSB 12.8-97, minimum 12 mm air space, 90% argon/10% air filled, double sealed edges (primary to be polyisobutylene, secondary to be polysulphide/polyurethane), desiccant filled warm edge spacer (splice connectors at corner of each glass unit).
 - .1 Triple glazed insulating glass units except as noted; use double glazed units where indicated.
 - .2 Warm edge spacer:
 - .1 Stainless steel: Cardinal 'Endur', RPM Rollforming 'ST-2000', Allmetal 'SST', Fenzi 'Rolltech Stainless Steel'.
 - .2 IGMAC or IGMA/IGCC certified
 - .3 Low 'E' coatings:
 - .1 Type 1:
 - .1 Cardinal 'LoE 180' on surface #2.
 - .2 Type 2:
 - .1 Cardinal 'LoE 180' on surface #5.
 - .3 Overall centre of glass SHGC: 0.56 and VT: 0.70.
 - .4 Substitutions: in accordance with Section 01 25 00.
 - .5 Glass thickness:
 - .1 6 mm minimum, and as required to suit design requirements, for all glazing in doors and windows specified in Sections 08 11 13 – Hollow Metal Doors and Frames
 - .2 For glazing in windows and doors specified in Section 08 53 13 – Fiberglass Windows and Doors, select glass thickness in conformance with paragraph 2.1.3. of Section 08 80 00.
 - .6 Glass colour: clear, unless otherwise indicated.

2.3 GLAZING MATERIALS (NON-FIRE RATED)

- .1 Glazing materials; general: Select glazing sealants, tapes, gaskets and additional glazing materials of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
- .2 Glazing gaskets: Moulded or extruded gaskets of profile and hardness required to maintain watertight seal, made from the following:
 - .1 Preformed silicone to ASTM C1115-06(2011).
- .3 Setting blocks: Moulded or extruded material with Shore, Type A Durometer hardness of 85, plus or minus 5, made from the following:
 - .1 Preformed silicone to ASTM C1115-06(2011).
- .4 Spacers: Moulded or extruded blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated made from the following:
 - .1 Preformed silicone to ASTM C1115-06(2011).
- .5 Edge blocks: Moulded or extruded material of hardness needed to limit glass lateral movement (side walking) made from the following:
 - .1 Preformed silicone to ASTM C1115-06(2011).
- .6 Cleaners, primers and sealers: Type recommended by sealant or gasket manufacturer.
- .7 Polyurethane foam glazing tape:
 - .1 High density, closed-cell, flexible, non-extruding tape, adhesive backed one side only; recommended by manufacturer for exterior applications with nominal pressure in glazing channel.
 - .2 Acceptable manufacturer: Norton Company.
 - .3 Acceptable Products: As recommended by manufacturer suitable for conditions of application and use.
- .8 Mirror clips:
 - .1 Stainless steel 'Vancouver' clips.
 - .2 Mirror adhesive: Palmer Mirro-Mastic, complete with sealer as required.
- .9 Sealant: in accordance with Section 07 92 00- Joint Sealants.

2.4 FABRICATION

- .1 Factory sealed insulating glass units:
 - .1 Fabricate units to requirements of CAN/CGSB 12.8-97.
 - .2 Spacer core shall be straight and evenly set into glass units.
 - .3 glass units shall be manufactured to conform to IGMAC recommendations (Insulated Glass Manufacturers Association of Canada) and the manufacturer

shall be a member of IGMAC. Sealed units shall bear IGMAC certification markings.

- .2 Grind, chamfer, and polish exposed glass edges, unless otherwise indicated.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for glazing installation in accordance with manufacturer's written instructions.

3.2 PREPARATION

- .1 Clean contact surfaces with solvent and wipe dry.
- .2 Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.
- .3 Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- .4 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: GENERAL

- .1 Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- .2 Adjust glazing channel dimensions as required by conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- .3 Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- .4 Clean glazing rebate surfaces of traces of dirt, dust, or other contaminants.
- .5 Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- .6 Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- .7 Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- .8 Provide spacers for glass lites where length plus width is greater than 1270 mm.

- .1 Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
- .2 Provide 3.2 mm minimum bite of spacers on glass and use thickness equal to sealant width.
- .9 Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel.
- .10 Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- .11 Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- .12 Glaze hollow metal doors and frames specified under work of Section 08 11 13 using tape glazing installation.
- .13 Install fire rated glazing in accordance with fire rated glazing Product manufacturer's specifications and complying with current fire-resistance listing for each Product. Field cutting or tampering is not permissible.

3.4 INSTALLATION: DRY METHOD (TAPE)

- .1 Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- .2 Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- .3 Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- .4 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- .5 Do not remove release paper from tape until right before each glazing unit is installed.
- .6 Centre glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centres of openings.

3.5 INSTALLATION: DRY METHOD (GASKET)

- .1 Allow gaskets to relax and cut compression gaskets to lengths recommended by gasket manufacturer to fit openings to suit frame dimensions.
- .2 Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- .3 Installation with drive-in wedge gaskets: Centre glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets

formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centres of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

- .4 Installation with Pressure-Glazing Stops: Centre glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- .5 Install gaskets so they protrude past face of glazing stops.

3.6 INSTALLATION: WET METHOD

- .1 Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- .2 Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- .3 Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 INSTALLATION: MIRRORS

- .1 Provide frameless mirrors except where specified as channel mirrors in Section 10 28 00. Grind and polish exposed mirror edges.
- .2 Mount mirrors in true planes, free of distortions. Surfaces of butted mirrors shall be flush to ≤ 1 mm. Mirror installation shall be flat to within 1.5 mm in 1220 mm
- .3 Locate joints in mirrors at maximum available mirror sizes to Departmental Representative's direction, unless otherwise indicated. Provide butt joints with flat ground and polished edges to provide inconspicuous joint complete with black tape behind joint to hide wall substrate.
- .4 Set mirrors with clips. Anchor rigidly to wall construction.
- .5 Place plumb and level.

3.8 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .1 Remove traces of primer, caulking.
 - .2 Remove glazing materials from finish surfaces.
 - .3 Remove labels.

- .4 Clean glass and mirrors using approved non-abrasive cleaner in accordance with manufacturer's instructions.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.

3.9 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 After installation, mark each light with an "X" by using removable plastic tape or paste.
 - .1 Do not mark heat absorbing or reflective glass units.
- .3 Repair damage to adjacent materials caused by glazing installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry.
- .2 Section 08 11 00 – Metal Doors and Frames
- .3 Section 08 54 13 – Fiberglass Windows and Doors.
- .4 Section 09 22 16 – Non-Structural Metal Framing.
- .5 Section 09 91 23 – Interior Painting.

1.2 REFERENCE STANDARDS

- .1 American Society for Testing and Materials (ASTM), Latest version of the following:
 - .1 ASTM C475/ C475M Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - .2 ASTM C840, Standard Specification for Application and Finishing of Gypsum Board.
 - .3 ASTM C954, Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - .4 ASTM C1002, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - .5 ASTM C1047, Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - .6 ASTM C1177/C1177M, Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - .7 ASTM C1178/C1178M, Standard Specification for Glass Mat Water-Resistant Gypsum Backing Board.
 - .8 ASTM C1280, Standard Specification for Application of Gypsum Sheathing.
 - .9 ASTM C1396/C1396M, Standard Specification for Gypsum board.
- .2 Association of the Wall and Ceilings Industries International (AWCI)
 - .1 AWCI Levels of Gypsum Board Finish-GA-214 Latest Version.
- .3 Underwriters' Laboratories of Canada (ULC),
 - .1 CAN/ULC-S102, Standard Method of Test of Surface Burning Characteristics of Building Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

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

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 and applicable standard designation.
- .3 Exercise care in unloading gypsum board materials shipment to prevent damage.
- .4 Storage and Handling Requirements in accordance with ASTM C 840–16:
 - .1 Store gypsum board assemblies materials level flat in indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect gypsum board assemblies from nicks, scratches, and blemishes.
 - .3 Protect gypsum board from direct exposure to rain, snow, sunlight, or other excessive weather conditions.
 - .4 Protect ready mix joint compounds from freezing, exposure to extreme heat and direct sunlight.
 - .5 Protect from weather, elements and damage from construction operations.
 - .6 Handle gypsum boards to prevent damage to edges, ends or surfaces.
 - .7 Protect prefinished aluminum surfaces with [strippable coating] [wrapping] . Do not use adhesive papers or sprayed coatings which bond when exposed to sunlight or weather.
 - .8 Replace defective or damaged materials with new.

1.5 AMBIENT CONDITIONS

- .1 Maintain temperature 10 °C minimum, 21 °C maximum for 48 hours prior to and during application of gypsum boards and joint treatment, and for 48 hours minimum after completion of joint treatment.
- .2 Apply board and joint treatment to dry, clean, frost free surfaces.
- .3 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

Part 2 Products**2.1 MATERIALS**

- .1 Standard board: to ASTM C1396/C1396M regular, Type X and Type C, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut.
- .2 Water-resistant board: to ASTM C1396/C1396M regular and Type X, 16mm thick, 1200 mm wide x maximum practical length, ends square cut.
 - .1 Location: In all washrooms
- .3 Glass mat water-resistant gypsum backing board: to ASTM C1178/C1178M, 16mm thick, 1200 mm wide x maximum practical length, ends square cut.
 - .1 Locations: Behind fiberglass shower and tub in washrooms.
- .4 Glass mat gypsum substrate sheathing: to ASTM C1177/C1177M, 16 mm thick, 1200 mm wide x maximum practical length, ends square cut.
- .5 Metal furring runners, hangers, tie wires, inserts, and anchors: to suit specified assembly and as recommended by manufacturer.
- .6 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.
- .7 Resilient drywall furring/clips: 0.5 mm base steel thickness galvanized steel for resilient attachment of gypsum board.
- .8 Steel drill screws: to ASTM C1002.
- .9 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, zinc-coated, 0.5 mm base thickness, perforated flanges, one-piece length per location.
- .10 PVC mouldings: Rigid PVC mouldings conforming to ASTM-ZD3678, corner beads, cap or casing beads; prefinished in satin white as commercially available for use against exterior door and window frames.
- .11 Sealants: in accordance with Section 07 92 00- Joint Sealants.
- .12 Insulating strip: rubberized, moisture resistant, 3 mm thick closed cell neoprene strip, 12 mm wide, with self-sticking permanent adhesive on one face, lengths as required.
- .13 Joint compound: to ASTM C475, asbestos-free.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for gypsum board assembly installation in accordance with manufacturer's written instructions.

3.2 ERECTION

- .1 Do application and finishing of gypsum board to ASTM C840 except where specified otherwise.
- .2 Do application of gypsum sheathing to ASTM C1280.
- .3 Erect hangers and runner channels for suspended gypsum board ceilings to ASTM C840 except where specified otherwise.
- .4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.
- .5 Install work level to tolerance of 1:1200.
- .6 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, and grilles.
- .7 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.
- .8 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.
- .9 Install wall furring for gypsum board wall finishes to ASTM C840, except where specified otherwise.
- .10 Furr openings and around built-in equipment, cabinets, and access panels on four sides. Extend furring into reveals. Check clearances with equipment suppliers.
- .11 Furr duct shafts, beams, columns, pipes and exposed services where indicated.
- .12 Erect drywall resilient furring transversely across studs and joists, and between layers of gypsum board, spaced maximum 600 mm on centre and not more than 150 mm from ceiling/wall juncture. Secure to each support with 25 mm drywall screw.
- .13 Install 150 mm continuous strip of 12.7 mm gypsum board along base of partitions where resilient furring installed.

3.3 APPLICATION

- .1 Apply gypsum board after bucks, anchors, blocking, sound attenuation, electrical and mechanical work have been approved.
- .2 Apply single- and double-layer gypsum board to metal and wood furring or framing using screw fasteners for all layers. Maximum spacing of screws 300 mm on centre.
 - .1 Single-Layer Application:
 - .1 Apply gypsum board on ceilings prior to application of walls to ASTM C840.
 - .2 Apply gypsum board on walls vertically or horizontally, providing sheet lengths that will minimize number of board edges or end joints.
 - .2 Double-Layer Application:
 - .1 Install gypsum board for base layer and exposed gypsum board for face layer.

- .2 Apply base layer to ceilings prior to base layer application on walls; apply face layers in same sequence. Offset joints between layers at least 250 mm.
- .3 Apply base layers at right angles to supports unless otherwise indicated.
- .4 Apply base layer on walls and face layers vertically with joints of base layer over supports and face layer joints offset at least 250 mm with base layer joints.
- .3 Apply glass mat water-resistant gypsum board where wall tiles to be applied. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads. Do not apply joint treatment on areas to receive tile finish unless fire rating is required.
- .4 Apply water-resistant gypsum board in washrooms. Apply water-resistant sealant to edges, ends, cut-outs which expose gypsum core and to fastener heads.
- .5 Apply 12 mm diameter bead of acoustic sealant continuously around periphery of each face of partitioning to seal gypsum board/structure junction where partitions abut fixed building components. Seal full perimeter of cut-outs around electrical boxes and ducts, in partitions where perimeter sealed with acoustic sealant
- .6 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.
- .7 Install gypsum board on walls vertically to avoid end-butt joints. At stairwells and similar high walls, install boards horizontally with end joints staggered over studs, except where local codes or fire-rated assemblies require vertical application.
- .8 Install gypsum board with face side out.
- .9 Do not install damaged or damp boards.
- .10 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.4 INSTALLATION

- .1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.
- .2 Install casing beads around perimeter of suspended ceilings.
- .3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.
- .4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.
- .5 Construct control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.
- .6 Locate control joints at changes in substrate construction and at approximate 15 m spacing on ceilings and at approximate 10 m spacing on long corridor runs.

- .7 Install control joints straight and true.
- .8 Ensure that screws or nails are properly applied in process of attaching gypsum board to framing without damaging of gypsum board edges and ends.
- .9 Install cornice cap where gypsum board partitions do not extend to ceiling.
- .10 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.
- .11 Splice corners and intersections together and secure to each member with 3 screws.
- .12 Install access doors to electrical and mechanical fixtures specified in respective sections.
 - .1 Rigidly secure frames to furring or framing systems.
- .13 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.
- .14 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with AWCI Levels of Gypsum Board Finish:
 - .1 Levels of finish:
 - .1 Level 0: no tapping, finishing or accessories required.
 - .2 Level 1: embed tape for joints and interior angles in joint compound. Surfaces free of excess joint compound; tool marks and ridges are acceptable.
 - .1 Location: unexposed ceiling spaces and plenums to maintain fire rating.
 - .3 Level 2: embed tape for joints and interior angles in joint compound and apply one separate coat of joint compound over joints, angles, fastener heads and accessories; surfaces free of excess joint compound; tool marks and ridges are acceptable.
 - .4 Level 3: embed tape for joints and interior angles in joint compound and apply two separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.
 - .5 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.
 - .1 Location: Ceilings and walls exposed to view.
 - .6 Level 5: embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; apply a thin skim coat of joint compound to entire surface; surfaces smooth and free of tool marks and ridges.

- .15 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.
- .16 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board, invisible after surface finish is completed.
- .17 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.
- .18 Completed installation smooth, level or plumb, free from waves and other defects and ready for surface finish.
- .19 Mix joint compound slightly thinner than for joint taping.
- .20 Apply thin coat to entire surface using trowel or drywall broad knife to fill surface texture differences, variations or tool marks.
- .21 Allow skim coat to dry completely.
- .22 Remove ridges by light sanding or wiping with damp cloth.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00- Cleaning.

3.6 PROTECTION

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

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCE STANDARDS

- .1 ASTM International, current edition of the following:
 - .1 ASTM C645, Standard Specification for Nonstructural Steel Framing Members.
 - .2 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - .3 ASTM C754, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .2 The Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
 - .1 MPI #26, Primer, Galvanized Metal, Cementitious.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for metal framing and include product characteristics, performance criteria, physical size, finish and limitations.

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.

Part 2 Products**2.1 MATERIALS**

- .1 Furring Channels: Commercial steel sheet in accordance with ASTM A653, Z180, hot dipped zinc-coated (galvanized), as follows:
 - .1 Hat Shaped, Rigid Furring Channels: ASTM C645, 0.75 mm thickness x 22 mm deep.
 - .2 Resilient Furring Channels: 0.46 mm thickness x 13 mm deep members designed to reduce sound transmission having asymmetrical face attached to single flange by a slotted leg (web).

- .2 Metal channel stiffener: 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.
- .3 Acoustical sealant: in accordance with Section 07 92 00 - Joint Sealants.
- .4 Insulating strip: rubberized, moisture resistant 1/8" (3 mm) thick foam strip, 1/2" (12 mm) wide, with self-sticking adhesive on one face, lengths as required.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for non-structural metal framing application in accordance with manufacturer's written instructions.

3.2 FURRING

- .1 Provide vertical and horizontal furring studs and hangers as detailed and as required for gypsum board finishes for furred concrete masonry walls and suspended ceilings as scheduled. Secure furring to structure.
- .2 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixtures.
- .3 Space furring studs at maximum 400 mm centres. Attach horizontal furring channels securely to adjacent structure or wall framing. Attach vertical furring channels less than 100 mm from abutting walls.
- .4 Furr from floor to above suspended ceilings to form return air plenum areas as indicated. Cap shafts and form openings for return air ductwork.

3.3 BACKING AND REINFORCING

- .1 Provide and install all backing and reinforcing within interior steel stud walls for items being hung from or anchored to walls. Provide 92 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.
- .2 Backing or reinforcing as detailed or as recommended by the manufacturer of steel stud system for each type and weight of item.
- .3 Attachments for securing mechanical and electrical service outlets supplied and installed by respective trades.

3.4 ACOUSTICAL TAPE

- .1 Install foam gasket tape compressed in joint between top of track at sound rated partitions and acoustic tile ceilings. Apply gasket to top of track before placing in position against ceiling.

3.5 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00 - 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 00 - Cleaning.

3.6 PROTECTION

- .1 Protect installed products and components from damage during construction.
- .2 Repair damage to adjacent materials caused by non-structural metal framing application.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Luxury Vinyl Tile and all required accessories.

1.2 RELATED REQUIREMENTS

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry,
- .2 Section 06 20 00 – Finish Carpentry.

1.3 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D 2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
 - .2 ASTM D 3884 - Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method), Abrasion Wheels- H18 with 1000grams load.
 - .3 ASTM D 4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
 - .4 ASTM E 492 - Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine.
 - .5 ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - .6 ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - .7 ASTM E 989 - Standard Classification for Determination of Impact Insulation Class (IIC).
 - .8 ASTM F 137 - Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
 - .9 ASTM F 386 - Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.
 - .10 ASTM F 925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring.
 - .11 ASTM F 970 - Standard Test Method for Static Load Limit.
 - .12 ASTM F 1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change.
 - .13 ASTM F 1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change.
 - .14 ASTM F 1700 - Standard Specification for Solid Vinyl Floor Tile.

- .15 ASTM F 1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- .16 ASTM F 1914 - Standard Test Methods for Short-Term Indentation and Residual Indentation of Resilient Floor Covering.
- .17 ASTM F 2055 - Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method.
- .18 ASTM F 2199 - Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat.
- .19 ASTM F 3261- Standard Specification for Resilient Flooring in Modular Format with Rigid Polymetric Core.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for resilient tile flooring and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Samples:
 - .1 Submit duplicate tile in size specified, 300 mm long.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Materials:
 - .1 Provide 2% maintenance materials of resilient tile flooring, base and adhesive in accordance with Section 01 78 00- Closeout Submittals.
 - .2 Extra materials from same production run as installed materials.
 - .3 Identify each container of floor tile and each container of adhesive.
 - .4 Deliver to Owner, upon completion of the work of this section.
 - .5 Store where directed by Owner.

1.6 QUALITY ASSURANCE

- .1 Installer Qualifications: have experience, and have completed projects of similar magnitude, material and complexity. Upon request, provide project references including contact names and telephone numbers for three projects.
- .2 Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - .1 Finish areas designated by Departmental Representative.
 - .2 Do not proceed with remaining work until workmanship, color, sheen and finished appearance are approved by Departmental Representative.

1.7 DELIVERY, STORAGE AND HANDLING

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

1.8 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees C for 48 hours before, during and for 48 hours after installation.
- .2 Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring.

1.9 WARRANTY

- .1 Provide manufacturer standard commercial and residential warranties against manufacturing defects and wearing for flooring

Part 2 Products

2.1 MATERIALS

- .1 Luxury vinyl tile (LVT):
 - .1 LVT Type 1:
 - .1 Dimensions: 152 mm x 1220 mm
 - .2 Wear Layer: 0.55 mm.
 - .3 Thickness: 4.5 mm
 - .4 Edge: Bevel.
 - .5 Colour: Colour from manufacture's standard colour range. To be selected by Departmental Representative.
 - .6 Backing: Acoustic foam backing.
 - .7 Standard Acceptance:
 - .1 Da Vinci Series by Karndean Designflooring
 - .2 Textured Woodgrains by Interface
 - .3 Essential Series by Harbinger
 - .2 LVT Type 2:
 - .1 Dimensions: 305 mm by 457 mm.
 - .2 Wear Layer Thickness: 0.7 mm.
 - .3 Tile Thickness: 3 mm.
 - .4 Edge: Beveled edge, 2.5 mm thick.
 - .5 Material Compliance: ASTM F 1700.
 - .1 Reaction to Fire: ASTM E 662, ASTM E 648.

- .2 Slip Resistance: ASTM D 2047: Pass (Dry 0.89).
- .6 Colour: Colour from manufacture's standard colour range. To be selected by Departmental Representative.
- .7 Standard acceptance:
 - .1 Da Vinci Series by Karndean Designflooring
 - .2 Texture Stone Series by Interface
 - .3 Essential Series by Harbinger
- .3 Luxury Vinyl Plank Flooring Type 3:
 - .1 Dimensions: 152mm by 1219 mm.
 - .2 Plank Thickness: 2.54 mm
 - .3 Colour: Colour from manufacture's standard colour range. To be selected by Departmental Representative.
 - .4 Standard acceptance:
 - .1 Armstrong Flooring
 - .2 Traffic Master
 - .3 Lifeproof
- .2 Primers and adhesives: waterproof, recommended by flooring manufacturer for specific material on applicable substrate, above, at or below grade to meet the requirements to obtain the manufacture's warranty.
- .3 Sub-floor filler and leveller: as recommended by flooring manufacturer for use with their product.
- .4 Metal edge strips: aluminum extruded, smooth, [polished] [mill finish] with lip to extend under floor finish, shoulder flush with top of adjacent floor finish.
- .5 Sealer: type recommended by flooring manufacturer.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSPECTION

- .1 Ensure floors substrates are dry, by using test methods recommended by tile manufacturer.

3.3 SUB-FLOOR TREATMENT

- .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 to achieve a substrate flatness of 3 mm in 3048 mm.
- .3 Seal concrete and plywood sub-floors to flooring manufacturer's printed instructions.
- .4 Vacuum or broom-clean surfaces to be covered immediately before the application of flooring. Make subfloor free from dust, dirt, grease, and all foreign materials.

3.4 TILE APPLICATION

- .1 Install flooring in strict accordance with the latest edition of Manufacturer's installation instructions.
- .2 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.
- .3 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.
- .4 Lay flooring with joints parallel to building lines to produce symmetrical tile pattern. Border tiles minimum half tile width.
- .5 Center tiles or planks in rooms and hallways so borders are not less than half a tile or plank when possible.
- .6 Cut edges shall always be installed against a wall.
- .7 Install flooring in pattern recommended by manufacturer with pattern grain parallel for units and parallel to length of room.
- .8 As installation progresses, and after installation, roll flooring in 2 directions with 45 kg minimum roller to ensure full adhesion.
- .9 Cut tile and fit neatly around fixed objects.
- .10 Install feature strips and floor markings where indicated. Fit joints tightly.
- .11 Install flooring in pan type floor access covers. Maintain floor pattern.
- .12 Continue flooring through areas to receive movable type partitions without interrupting floor pattern.
- .13 Terminate flooring at centerline of door in openings where adjacent floor finish or colour is dissimilar.
- .14 Install colour/pattern matched transition strips at unprotected or exposed edges where flooring terminates except at tile floor, where metal transition trim is specified.

3.5 STAIR APPLICATION

- .1 Finish stair risers and stair stringers with resilient tile and install prior to tread material.

- .2 Install stair risers and stair treads one piece for full width of stair. Adhere over entire surface and fit accurately.

3.6 BASE APPLICATION

- .1 Lay out base to keep number of joints at minimum. Base joints at maximum length available or at internal or premoulded corners.
- .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, minimum [300] mm each leg. Wrap around toeless base at external corners.
- .8 Install toeless type base before installation of carpet on floors.

3.7 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.

3.8 PROTECTION

- .1 Protect new floors from time of final set of adhesive until final inspection.
- .2 Prohibit traffic on floor for 48 hours after installation.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 20 00 – Finish Carpentry: Wood finishes to be painted.
- .2 Section 08 11 00 – Metal Doors and Frames: Doors and frames to be site painted.
- .3 Mechanical.
- .4 Electrical.

1.2 REFERENCE STANDARDS

- .1 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
 - .2 SW-846, Test Method for Evaluating Solid Waste, Physical/Chemical Methods.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .4 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada 2015 (NFC).
- .5 Society for Protective Coatings (SSPC)
 - .1 Systems and Specifications, SSPC Painting Manual – current edition

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's instructions, printed product literature and data sheets for paint and paint products and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Confirm products to be used are in MPI's approved product list.
 - .3 Upon completion, provide 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 number[s] .
 - .4 MPI Environmentally Friendly classification system rating.

- .5 Manufacturer's Material Safety Data Sheets (MSDS).
- .6 MPI #
- .3 Samples:
 - .1 Provide 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 plate steel, 3 mm for finishes over metal surfaces.
 - .2 Birch, 13 mm plywood for finishes over wood surfaces.
 - .3 50 mm, concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 gypsum board, 13 mm for finishes over gypsum board and other smooth surfaces.
 - .5 10 mm plywood for finishes over wood 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 Provide full range of available colours where colour availability is restricted.
- .4 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.
- .5 Manufacturer's Instructions:
 - .1 Provide manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.
- .3 Include:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour number[s].
 - .4 MPI Environmentally Friendly classification system rating.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.
 - .2 Submit (1) 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.

1.6 QUALITY ASSURANCE

- .1 Qualifications:
 - .1 Contractor: Experienced contractor when requested upon contract award, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.
 - .2 Qualified journeypersons 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 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
 - .7 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.
- .2 Mock-Ups:
 - .1 When requested by Departmental Representative or Paint Inspection Agency, 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 quality of work to MPI Painting Specification Manual standards for review and approval.
 - .2 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application and skill to MPI Architectural Painting Specification Manual standards.
 - .2 Locate where directed.
 - .3 Allow 24 hours for inspection of mock-up before proceeding with Work.
 - .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.7 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.

1.8 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces in accordance with Section 01 51 00 – Temporary Utilities.
 - .2 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.
 - .3 Where required, provide continuous ventilation for seven days after completion of application of paint.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 - .5 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 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
 - .4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
 - .2 Perform no painting work when maximum moisture content of substrate exceeds:
 - .1 15 % for hard wood.
 - .2 17 % for soft wood.

- .3 12 % for plaster and gypsum board.
- .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".
- .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Application Requirements:
 - .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 Additional Exterior Application Requirements:
 - .1 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
 - .2 Do not apply paint when:
 - .1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.
 - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
 - .3 Surface to be painted is wet, damp or frosted.
 - .3 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.
 - .4 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
 - .5 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

- .1 Environmental Performance Requirements:
 - .1 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

2.2 MATERIALS

- .1 Only paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Paint materials for paint systems: to be products of single manufacturer.
- .3 Conform to latest MPI requirements for painting work including preparation and priming.
- .4 Only qualified products with E2 "Environmentally Friendly" rating[s] are acceptable for use on this project.
- .5 Use only MPI listed materials.
- .6 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

2.3 COLOURS

- .1 Departmental Representative will provide colour schedule after Contract award.
- .2 Colour schedule will be based upon selection of 1 base colours and 1 accent colours. No more than 2 colours will be selected for entire project and no more than 2 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 if requested by Departmental Representative.
- .6 For deep and ultra deep colours 4 coats may be required.

2.4 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.
- .2 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 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.5 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.

2.6 EXTERIOR PAINTING SYSTEMS

- .1 Galvanized Metal: not chromate passivated, for all exterior metal doors and frames.
- .1 EXT 5.3J - W.B. light industrial G5 coating (over w.b. primer) for moderate chemical resistance, Premium Grade.
- .2 Dimension Lumber: columns, beams, exposed joists, underside of decking, siding, fencing, etc.
- .1 EXT 6.2B - Waterborne solid colour stain finish (over alkyd/oil primer).
- .2 EXT 6.2P – W.B. Stain Semi-Transparent.

Part 3 Execution**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 GENERAL

- .1 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 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.

- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.4 PREPARATION

- .1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Architectural Painting Specification Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
 - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water-based paints.
 - .6 Use trigger operated spray nozzles for water hoses.
 - .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or such organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in

accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by blowing with clean dry compressed air.

- .8 Touch up of shop primers with primer as specified.
- .9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

- .1 Method of application to be as approved Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces to be free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of 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.
 - .6 Wood, stucco, concrete, cement masonry units CMU's and brick; if sprayed, must be back rolled.
- .4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.
- .5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.

- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish closets and alcoves as specified for adjoining rooms.
- .10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.
- .11 Wood, drywall, plaster, stucco, concrete, concrete masonry units and brick; if sprayed, must be back rolled.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Unless otherwise specified, paint exterior exposed conduits, piping, hangers, duct work and other mechanical and electrical equipment with colour and finish to match adjacent surfaces, except as noted otherwise.
- .2 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .3 Do not paint over nameplates.
- .4 Paint steel electrical light standards. Do not paint outdoor transformers and substation equipment.

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 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.8 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00 – Cleaning:

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 20 00 – Finish Carpentry: Wood finishes to be painted.
- .2 Section 08 11 00 – Metal Doors and Frames: Doors and frames to be site painted.
- .3 Section 09 21 16 – Gypsum Board Assemblies: Gypsum board finish to be site painted.
- .4 Mechanical.
- .5 Electrical.

1.2 REFERENCE STANDARDS

- .1 Environmental Protection Agency (EPA)
 - .1 Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, EPA Method 24 - Surface Coatings.
 - .2 SW-846, Test Method for Evaluating Solid Waste, Physical/Chemical Methods.
- .2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .3 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual - current edition.
- .4 National Research Council Canada (NRC)
 - .1 National Fire Code of Canada 2015 (NFC).
- .5 Society for Protective Coatings (SSPC)
 - .1 Systems and Specifications, SSPC Painting Manual – current edition

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's instructions, printed product literature and data sheets for paint and paint products and include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Confirm products to be used are in MPI's approved product list.
 - .3 Upon completion, provide 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 number[s] .

- .4 MPI Environmentally Friendly classification system rating.
- .5 Manufacturer's Material Safety Data Sheets (MSDS).
- .6 MPI #
- .3 Samples:
 - .1 Provide 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 plate steel, 3 mm for finishes over metal surfaces.
 - .2 Birch, 13 mm plywood for finishes over wood surfaces.
 - .3 50 mm, concrete block for finishes over concrete or concrete masonry surfaces.
 - .4 gypsum board, 13 mm for finishes over gypsum board and other smooth surfaces.
 - .5 10 mm plywood for finishes over wood 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 Provide full range of available colours where colour availability is restricted.
- .4 Certificates: Provide certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties. MPI Gateway #.
- .5 Manufacturer's Instructions:
 - .1 Provide manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

- .1 Provide in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: Provide operation and maintenance data for painting materials for incorporation into manual.
- .3 Include:
 - .1 Product name, type and use.
 - .2 Manufacturer's product number.
 - .3 Colour number[s].
 - .4 MPI Environmentally Friendly classification system rating.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- .1 Extra Stock Materials:
 - .1 Provide maintenance materials in accordance with Section 01 78 00 - Closeout Submittals.

- .2 Submit 1 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.

1.6 QUALITY ASSURANCE

.1 Qualifications:

- .1 Contractor: experienced contractor when requested upon contract award, provide list of last 3 comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Qualified journeypersons 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 Retain purchase orders, invoices and documents to prove conformance with noted MPI requirements when requested by Departmental Representative.
- .7 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.

.2 Mock-Ups:

- .1 When requested by Departmental Representative or Paint Inspection Agency, 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 quality of work to MPI Painting Specification Manual standards for review and approval.
- .2 Construct mock-ups in accordance with Section 01 45 00 - Quality Control.
 - .1 Mock-up will be used:
 - .1 To judge quality of work, substrate preparation, operation of equipment and material application and skill to MPI Architectural Painting Specification Manual standards.
 - .2 Locate where directed.
 - .3 Allow 24 hours for inspection of mock-up before proceeding with Work.

- .4 When accepted, mock-up will demonstrate minimum standard of quality required for this work. Approved mock-up may remain as part of finished work.

1.7 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.

1.8 SITE CONDITIONS

- .1 Ambient Conditions:
 - .1 Heating, Ventilation and Lighting:
 - .1 Ventilate enclosed spaces in accordance with Section 01 50 00 – Temporary Facilities and Controls.
 - .2 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.
 - .3 Where required, provide continuous ventilation for seven days after completion of application of paint.
 - .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
 - .5 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 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's prescribed limits.
 - .4 Relative humidity is above 85 % or when dew point is less than 3 degrees C variance between air/surface temperature.
 - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.

- .2 Perform no painting work when maximum moisture content of substrate exceeds:
 - .1 15 % for hard wood.
 - .2 17 % for soft wood.
 - .3 12 % for plaster and gypsum board.
- .3 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple "cover patch test".
- .4 Test concrete, masonry and plaster surfaces for alkalinity as required.
- .3 Application Requirements:
 - .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 Additional Exterior Application Requirements:
 - .1 Apply paint finishes when conditions forecast for entire period of application fall within manufacturer's recommendations.
 - .2 Do not apply paint when:
 - .1 Temperature is expected to drop below 10 degrees C before paint has thoroughly cured.
 - .2 Substrate and ambient air temperatures are expected to fall outside MPI or paint manufacturer's limits.
 - .3 Surface to be painted is wet, damp or frosted.
 - .3 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.
 - .4 Schedule painting operations such that surfaces exposed to direct, intense sunlight are scheduled for completion during early morning.
 - .5 Remove paint from areas which have been exposed to freezing, excess humidity, rain, snow or condensation. Prepare surface again and repaint.
- .5 Additional interior application requirements:
 - .1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

Part 2 Products**2.1 PERFORMANCE REQUIREMENTS**

- .1 Environmental Performance Requirements:
 - .1 Provide paint products meeting MPI "Environmentally Friendly" E2 ratings based on VOC (EPA Method 24) content levels.

2.2 MATERIALS

- .1 Only paint materials listed in latest edition of MPI Approved Products List (APL) are acceptable for use on this project.
- .2 Paint materials for paint systems: to be products of single manufacturer.
- .3 Conform to latest MPI requirements for painting work including preparation and priming.
- .4 Only qualified products with E2 "Environmentally Friendly" rating[s] are acceptable for use on this project.
- .5 Use only MPI listed materials.
- .6 Water-borne paints and stains, recycled water-borne surface coatings and water borne varnishes must meet a minimum "Environmentally Friendly" E2 rating.

2.3 COLOURS

- .1 Departmental Representative will provide colour schedule after Contract award.
- .2 Colour schedule will be based upon selection of 1 base colours and 1 accent colours. No more than 2 colours will be selected for entire project and no more than 2 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 if requested by Departmental Representative.
- .6 For deep and ultra deep colours 4 coats may be required.

2.4 MIXING AND TINTING

- .1 Perform colour tinting operations prior to delivery of paint to site. On-site tinting of painting materials is allowed only with Departmental Representative's written permission.
- .2 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 Thin paint for spraying according in accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Departmental Representative.
- .5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.5 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.

2.6 INTERIOR PAINTING SYSTEMS

- .1 Galvanized metal: doors, frames, misc.
 - .1 INT 5.3M - High performance architectural latex G5 (over W.B. galvanized primer) finish, premium grade.
 - .1 Location: Metal doors and frames and miscellaneous metals.
- .2 Dressed lumber: including doors, door frames, casings, mouldings:
 - .1 INT 6.3A - High performance architectural latex G5 (over latex primer) finish, premium grade.
 - .1 Location: Paint grade wood doors, mouldings and casings.
- .3 Plaster and gypsum board: gypsum wallboard, drywall, "sheet rock type material", and textured finishes:
 - .1 INT 9.2B - High performance architectural latex (over latex primer/sealer) finish, Premium Grade, G3 gloss level, except as specified below:
 - .1 G1: Gypsum board ceilings.
 - .2 G5: Washrooms (walls and ceilings).

Part 3 Execution**3.1 MANUFACTURER'S INSTRUCTIONS**

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

3.2 GENERAL

- .1 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 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable to be painted in accordance with manufacturer's written instructions.
- .2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.4 PREPARATION

- .1 Perform preparation and operations for exterior painting in accordance with MPI Maintenance Repainting Manual except where specified otherwise.
- .2 Apply paint materials in accordance with paint manufacturer's written application instructions.
- .3 Clean and prepare exterior surfaces to be repainted in accordance with MPI Architectural Painting Specification Manual requirements. Refer to the MPI Manual in regard to specific requirements and as follows:
 - .1 Remove dust, dirt, and surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
 - .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
 - .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
 - .4 Allow surfaces to drain completely and allow to dry thoroughly. Allow sufficient drying time and test surfaces using electronic moisture meter before commencing work.
 - .5 Use water-based cleaners in place of organic solvents where surfaces will be repainted using water-based paints.

- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or such organic solvents to clean up water-based paints.
- .4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before priming and between applications of remaining coats. Touch-up, spot prime, and apply primer, paint, or pre-treatment as soon as possible after cleaning and before deterioration occurs.
- .5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
 - .1 Apply sealer to MPI #36 over knots, pitch, sap and resinous areas.
 - .2 Apply wood filler to nail holes and cracks.
 - .3 Tint filler to match stains for stained woodwork.
- .6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.
- .7 Carried out during shop priming: clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by blowing with clean dry compressed air.
- .8 Touch up of shop primers with primer as specified.
- .9 Do not apply paint until prepared surfaces have been accepted by Departmental Representative.

3.5 APPLICATION

- .1 Method of application to be as approved Departmental Representative. Conform to manufacturer's application instructions unless specified otherwise.
- .2 Brush and Roller Application:
 - .1 Apply paint in a uniform layer using brush and/or roller of types suitable for application.
 - .2 Work paint into cracks, crevices and corners.
 - .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
 - .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces to be free of roller tracking and heavy stipple.
 - .5 Remove runs, sags and brush marks from finished work and repaint.
- .3 Spray Application:
 - .1 Provide and maintain equipment that is suitable for intended purpose, capable of 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.
- .6 Wood, stucco, concrete, cement masonry units CMU's and brick; if sprayed, must be back rolled.

- .4 Use dipping, sheepskins or daubers when no other method is practical in places of difficult access and when specifically authorized by Departmental Representative.
- .5 Apply coats of paint as continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.
- .6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.
- .7 Sand and dust between coats to remove visible defects.
- .8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.
- .9 Finish inside of cupboards and cabinets as specified for outside surfaces.
- .10 Finish closets and alcoves as specified for adjoining rooms.
- .11 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.
- .12 Wood, drywall, plaster, stucco, concrete, concrete masonry units and brick; if sprayed, must be back rolled.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

- .1 Service room, mechanical and electrical rooms: paint exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment.
- .2 Other unfinished areas: leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.
- .3 Do not paint over nameplates.
- .4 Paint both sides and edges of backboards for telephone and electrical equipment before installation. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

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 Retain purchase orders, invoices and other documents to prove conformance with noted MPI requirements when requested by Departmental Representative.

3.8 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00 – Cleaning:

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 08 80 00 – Glazing.
- .2 Mechanical.
- .3 Electrical.

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM) – Current Edition of the following:
 - .1 ASTM A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - .2 ASTM B456, Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - .3 ASTM A653/A653M, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - .4 ASTM A924/A924M, Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
- .2 CSA Group (CSA)
 - .1 CAN/CSA-B651, Accessible Design for the Built Environment.
 - .2 CAN/CSA-G164-M92, Hot Dip Galvanizing of Irregularly Shaped Articles.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Provide manufacturer's printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Shop Drawings:
 - .1 Indicate size and description of components, base material, surface finish inside and out, hardware and locks, attachment devices, description of rough-in-frame, building-in details of anchors for grab bars.

1.4 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 MAINTENANCE MATERIAL SUBMITTALS

- .1 Tools:

- .1 Provide special tools required for 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 Owner.

1.6 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MATERIALS

- .1 Aluminum Sheet: to ASTM B209.
- .2 Sheet steel: to ASTM A653/A653M with ZF001 designation zinc coating.
- .3 Stainless steel sheet metal: to ASTM A167, Type 304.
- .4 Stainless steel tubing: Type 304, 1.2 mm wall thickness.
- .5 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 Grab bars: 38mm diameter, 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. 90-degree grab bar and 610mm straight grab bar at all accessible toilets.
 - .1 Standard of Acceptance: B-6898.99, B-6806.99x24, B-6806.99x30 and B-6806.99x42 by Bobrick.
 - .2 Acceptable Alternate Manufacturer: JRE Hardware
- .2 Shower Rod: 25mm diameter x 1.33 wall thickness chrome plated steel tubing of required length with satin chrome finished flanges. Shower rod material and anchorage to withstand downward pull of 0.9kN.
- .3 Shower seat: wall mount folding hinged unit.
- .4 Bathroom Accessories
 - .1 Toilet tissue dispenser: Zinc, polished chrome finish, 206mm long.
 - .1 Standard Acceptance:
 - .1 YB0408CH, Align Pivoting Paper Holder by Moen.
 - .2 Honesty Pivoting toilet paper holder, polished chrome by Kohler
 - .3 Kendari Tissue Holder by Delta

- .2 Hand Towel Bar: Solid die-cast zinc, polished chrome finish, 233 mm long.
 - .1 Standard Acceptance:
 - .1 YB0486CH, Align Hand Towel Bar by Moen.
 - .2 Kohler Honesty 12" towel bar
 - .3 Kendari 203mm Towel Bar by Delta
 - .3 Robe Hook: Zinc, polished chrome finish, door mounted.
 - .1 Standard of acceptance:
 - .1 YB0403CH Align Single Robe Hook by Moen.
 - .2 Honesty Robe Hook by Kohler
 - .3 Kendari Robe Hook by Delta
 - .4 Mirrors: Refer to Section 08 80 00 – Glazing.
 - .5 Toilet tissue dispenser, towel bar, hand towel bar and robe hook, to come from a single product line from one manufacturer.

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 CAN/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.
- .2 Baked enamel: condition metal by applying one coat of metal conditioner to CGSB 31-GP-107Ma, apply one coat Type 2 primer to CAN/CGSB-1.81 and bake, apply two coats Type 2 enamel to CAN/CGSB-1.88 and bake to hard, durable finish. Sand between final coats. Colour selected from standard range by Departmental Representative.
- .3 Manufacturer's or brand names on face of units not acceptable.

Part 3 Execution**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrates and surfaces to receive toilet and bathroom accessories previously installed under other Sections or Contracts are acceptable for product installation in accordance with manufacturer's instructions prior to toilet and bathroom accessories installation.

3.2 INSTALLATION

- .1 Install and secure accessories rigidly in place as follows:
 - .1 Stud walls: install steel back-plate to stud prior to plaster or drywall finish. Provide plate with threaded studs or plugs.
 - .2 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 00- Glazing.

3.3 ADJUSTING

- .1 Adjust toilet and bathroom accessories components and systems for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.

3.5 PROTECTION

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

3.6 SCHEDULE

- .1 Locate accessories as follows. Exact locations determined by Departmental Representative if not indicated.
- .2 Bathroom accessories: 1 per bathroom.
- .3 Grab bars: as indicated on drawings.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

- .1 This Section of the specification forms part of the Contract Documents and is to be read, interpreted and coordinated with all other parts

1.2 REFERENCE STANDARDS

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (SDS).
- .2 National Fire Protection Association (NFPA)
 - .1 NFPA 10-2022, Standard for Portable Fire Extinguishers.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's printed product literature and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
- .3 Provide shop drawings.
- .4 Closeout Submittals:
 - .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.4 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

- .1 Multi-purpose Dry Chemical ABC (Type 1): Stored pressure with hose and shut-off nozzle or integral shut-off nozzle and mounting brackets, ULC listed, suitable to operating temperatures to -40degC
 - .1 FE-1 Type: 2.3 kg capacity rating 3A:40BC.
 - .2 FE-2 Type: 4.5 kg capacity rating 4A:60BC

2.2 EXTINGUISHER BRACKETS

- .1 Type recommended by extinguisher manufacturer.

2.3 IDENTIFICATION

- .1 Identify extinguishers in accordance with recommendations of CAN/ULC-S508 and ANSI/NFPA 10.
- .2 Attach tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

Part 3 Execution

3.1 INSTALLATION

- .1 Install or mount extinguishers in cabinets or on brackets in accordance with NFPA 10 as indicated.
- .2 Mounting height shall be as indicated on the architectural plans, but in no case shall the mounting height exceed 1200mm above finished floor to the top of the extinguisher for extinguishers with a gross weight up to and including 20 kg and 1100mm above finished floor to the top of the extinguisher for extinguishers with a gross weight over 20 kg. Where otherwise not indicated, mounting height shall be 1100mm to the top of the extinguisher.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

- .1 Vinyl-coated ventilated shelving.
- .2 Adjustable shelf systems.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for shelving and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

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

Part 2 Products

2.1 MANUFACTURERS

- .1 Acceptable Manufacturers:
 - .1 ClosetMaid
 - .2 RubberMaid
 - .3 Knappe & Vogt

2.2 MATERIALS

- .1 Steel Wire: Basic cold drawn, Grade C-1006; average tensile strength over 100,000 psi (690 MPa); coated.
- .2 Wire Coating: Heavy-duty polyvinyl chloride (PVC) formula resin, plasticizers, stabilizers, pigments, and other additives.
 - .1 Thickness: 7 to 17 mil (0.178 to 0.432 mm).

2.3 MANUFACTURED UNITS

- .1 Coated Wire Shelving:
 - .1 Shelf & Rod: 1 inch (25 mm) spacing.
 - .1 Color: White Wire.
 - .2 Accessories:

- .1 Wall clips, side wall brackets, support brackets, adjustable wall brackets, and corner kits to suit installation.

Part 3 Execution

3.1 EXAMINATION

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

3.2 INSTALLATION

- .1 Install closet and utility shelving in accordance with the manufacturer's printed instructions.

3.3 CLEANING

- .1 Progress and Final Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.

3.4 SCHEDULE

- .1 Coated wire shelving, shelf & rod, full width of closet: all closets where indicated.

END OF SECTION

Part 1 General

1.1 DESCRIPTION OF WORK

- .1 Section Includes:
 - .1 Unit Type A Refrigerator
 - .2 Unit Type B Refrigerator
 - .3 Clothes Dryer
 - .4 Clothes Washer
 - .5 Hood Exhaust
 - .6 Unit Type B Range
 - .7 Unit Type A Cooktop
 - .8 Unit Type A Wall Oven
 - .9 Dishwasher
 - .10 Microwave

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
 - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials indoors and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect metal storage racks from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

Part 2 Products**2.1 APPLIANCES****2.2 GENERAL**

- .1 All appliances in suite kitchens to be from the same manufacturer.
- .2 Washers and dryers must be a set from the same manufacturer.
- .3 Products specified are standards of acceptance. Better or equal products from the following manufacturers will be accepted:
 - .1 Frigidaire
 - .2 General Electric
 - .3 LG
 - .4 Maytag
 - .5 Samsung
 - .6 Whirlpool
- .4 Finish in kitchens is to be stainless steel.
- .5 Appliances to be Energide rated with maximum electrical power consumptions of 800kwh per year.
- .6 **Unit Type A Refrigerator:** Bottom freezer with pull out drawers.
 - .1 Capacity: Minimum 0.32cu.m. (11.5 cu.ft.)
 - .2 Width: 610mm (24 inches).
 - .3 Door swing: As indicated (reversible hinges).
 - .4 Finish: Stainless Steel
 - .5 Interior Lighting: LED
 - .6 Energy Rating: Energy Star.
 - .7 Quantity: 1
- .7 **Exhaust:** Recirculation with work light
 - .1 Mount: Wall
 - .2 Shape: Pyramid
 - .3 CFM: Minimum 300CFM
 - .4 Duct Cover Kit: To suit ceiling height
 - .5 Fan Speeds: Minimum 2 options
 - .6 Control: Ability for light and fan to be wired to switches
 - .7 Filter: Odour Removing Charcoal
 - .8 Width: 760mm (30 inches)
 - .9 Quantity: 2
 - .10 Finish: Stainless Steel

- .8 **Unit B Refrigerator:** Bottom freezer, counter depth.
 - .1 Capacity: Minimum 0.59cu.m. (20.9 cu.ft.)
 - .2 Width: 756mm (30 inches).
 - .3 Door swing: As indicated (reversible hinges).
 - .4 Finish: Stainless Steel
 - .5 Interior Lighting: LED
 - .6 Energy Rating: Energy Star.
 - .7 Quantity: 1
- .9 **Microwave:** Countertop Microwave
 - .1 Size: 0.05 cu.m. (1.6 cu.ft.)
 - .2 Width: 559mm (22inches)
 - .3 Output power: Minimum 1200W
 - .4 Finish: Stainless Steel
 - .5 Quantity: 2
- .10 **Range:** Residential, electric, slide in, front controls.
 - .1 Style: Slide In
 - .2 Width: 760mm (30inches)
 - .3 Surface Type: Glass/Smooth Top
 - .4 Self Cleaning: Yes
 - .5 Oven Control Type: Knobs
 - .6 Energy Rating: Energy Star
 - .7 Quantity: 2
- .11 **Dishwasher:**
 - .1 Width: 610mm (24inches)
 - .2 Finish: Stainless Steel
 - .3 Interior: Stainless Steel
 - .4 Decibel Rating: 48 or below
 - .5 Controls: Top of door
 - .6 Energy Rating: Energy Star
 - .7 Quantity: 2
- .12 **Clothes Dryer:** Residential front or top-load electric heat pump dryer
 - .1 Capacity: Minimum 0.35 cu.m. (7.3 cu.ft.)
 - .2 Drum: Stainless Steel
 - .3 Energy Rating: Energy Star
 - .4 Quantity: 2
- .13 **Clothes Washer:** Residential electric front or top -loading washer.

- .1 Capacity: Minimum 0.14 cu.m. (4.8 cu.ft.)
- .2 Finish: White
- .3 Drum: Stainless Steel
- .4 Energy Rating: Energy Star
- .5 Quantity: 2

Part 3 Execution

3.1 DELIVERY

- .1 Supplier to deliver appliances to site.
- .2 Coordinate delivery with Owner and Contractor.

3.2 INSTALLATION

- .1 Installation of all appliances is to be by the General Contractor.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry
- .2 Section 08 54 13 – Fiberglass Doors and Windows .
- .3 Section 09 21 16 – Gypsum Board Assemblies.

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM D1784-11, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

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 window 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 anchorage details, hardware and accessories details.
- .4 Samples:
 - .1 Submit one representative working sample of each type of roller window shades.
 - .2 Submit duplicate samples of manufacturer's standard colours for selection by Departmental Representative.
 - .3 After approval samples will be returned for incorporation into Work.

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.

Part 2 Products**2.1 DESIGN CRITERIA**

- .1 Design roller window shades to following requirements:
 - .1 Allow wear susceptible parts to be replaceable by either user or manufacturer.

- .2 Include instructions for replacing or repairing worn parts, including inventory numbers for parts and procedures for ordering replacement parts.
- .3 Permit effective disassembly of components in for recycling of materials.

2.2 PRODUCT

- .1 Standard of Acceptance:
 - .1 Hunter Douglas Contract **RB 500 Manual Roller Shades**.
 - .2 Solarfective (legrand) Manual Roller Shade.
 - .3 SWF Contract Manual Solar Shades.

2.3 MATERIALS

- .1 Control Systems:
 - .1 Clutch Operated: Engineered heavy duty chain drive pulley operating system consisting of metal clutch housing and locking plug containing minimum 6 ribs and inserted at minimum of 57mm into roller tube. Lift torque enhancement provided by Counter Balance System with integrated spring support module. Utilization of adjustment-free continuous qualified T304 stainless steel ball chain with 49.9 kg (110 lbs) breaking strength for precise control, smooth operation and ensuring a uniform look. Chain tensioner to be compliant with WCMA safety standard A100.1-2010 and must prevent the clutch system from moving the roller shade through lowering and raising if not properly installed as specified in ANSI Standard Section 6.5.2. Components will be maintenance free from adjustments or lubrication for trouble-free operation.
 - .2 Dual roller shades: Universal mount steel brackets with 2 separate solar and room darkening blackout roller shades operating independently of each other. Install dual shades within a single cassette.
 - .3 Roller Tube: Circular-shaped aluminum tube extruded from alloy and temper 6063 T-6. 51mm outside diameter extruded tube to have a 2mm wall thickness. Heavily reinforced with minimum six internal ribs providing additional tensile strength and allows for secure placement of clutch & end plug.
 - .4 Heavy Duty Tube Bearing Plug: Die cast metal and reinforced idler assembly containing spring loaded end plug with positive locking wheel allows for up to 22mm adjustment and provides for a secure installation and removal of shade. Locking tube bearing plug contains minimum 6 ribs and inserted a minimum of 60mm into roller tube.
 - .5 Bottom Bar: Extruded aluminum weight in a Sealed Pocket Hem Bar, or RB Bottom Bar for fabrics that are not seamable. Bottom bar is for tracking adjustments and provides uniform look.
 - .6 Mounting Hardware: Manufacturer's standard heavy-duty bracket constructed of hardened 3mm thick steel to support full weight of shade with bracket & screw hole covers to provide uniform look. Integrated leveling device for enhanced level adjustment of overall shade. Locking mechanism on bracket adapter provides for a secure installation and removal of the shade.

- .7 Fascia: L shape removable aluminum extrusion valance that attaches to brackets and conceals roller shade.
- .8 Block-out System: Extruded aluminum side channel with concealed mounting brackets. Bottom bar with nylon wool pile to prevent light leakage.

2.4 FABRICATION

- .1 Shade measurements shall be accurate to within +/- 3mm or as recommended in writing by manufacturer.

2.5 FABRICS

- .1 Room Darkening Shades:
 - .1 Openess: 1% or 3% openess as selected by Departmental Representative.
 - .2 Product: GreenScreen HD2501
 - .1 100% polyester (PVC-free).
 - .3 Colour: as selected by Departmental Representative from manufacturer’s standard colour range.
- .2 Blackout Shades:
 - .1 Openess: 0%.
 - .2 Product: Sheerweave 7000
 - .1 100% polyester (PVC-free); polyurethane finish
 - .3 Colour: as selected by Departmental Representative from manufacturer’s standard colour range.

Part 3 Execution

3.1 EXAMINATION

- .1 Verification of Conditions: verify conditions of substrates and surfaces to receive roll down blinds previously installed under other Sections are acceptable for product installation in accordance with manufacturer's instructions prior to roller window shades installation.

3.2 INSTALLATION

- .1 Install shades at exterior windows as indicated.
- .2 Include centre brackets where necessary to prevent deflection of headrail.
- .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 window shades components for correct function and operation in accordance with manufacturer's written instructions.
- .2 Lubricate moving parts to operate smoothly and fit accurately.

3.4 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
 - .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 roll down blind installation.

3.6 SCHEDULE

- .1 Room darkening shades in all south exterior glazing.
- .2 Room Blackout shades:
 - .1 Room A108, A201, A203 and A204.
 - .2 Room B107, B109, B110 and B203.

END OF SECTION

Part 1 General**1.1 RELATED REQUIREMENTS**

- .1 Section 06 10 53 - Miscellaneous Rough Carpentry

1.2 REFERENCE STANDARDS

- .1 ASTM International (ASTM)
 - .1 ASTM A 123/A 123M, Standard Specification for Zinc (Hot-Dip galvanized) Coatings on Iron and Steel Products.
 - .2 ASTM A500/ A500M, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - .3 ASTM A307, Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
 - .4 ASTM F3125/ F3125M, Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
 - .5 ASTM A193/ A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting for High Temperature or High Pressure Service and Other Special Purpose Applications.
 - .6 ASTM A36/ A36M, Standard Specification for Carbon Structural Steel.
- .2 National Research Council Canada (NRC)
 - .1 National Building Code of Canada 2015 (NBC).

1.3 ADMINISTRATIVE REQUIREMENTS

- .1 Pre-Installation Meetings:
 - .1 Convene pre-installation meeting 1 week prior to beginning work of this Section, with Departmental Representative and Contractor's Representative in accordance with Section 01 31 19 - Project Meetings to:
 - .1 Verify project requirements.
 - .2 Review installation and substrate conditions.
 - .3 Co-ordination with other construction subtrades.
 - .4 Review manufacturer's written installation instructions and warranty requirements.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00- Submittal Procedures.
- .2 Product Data:

- .1 Submit product data for specific products.
 - .1 Triodetic Code Compliance: Provide code report for Triodetic foundation to demonstrate compliance with requirements for construction as per current National Building Code of Canada (NBCC).
- .3 Calculation: Provide structural calculation prepared by a design professional registered in the Northwest Territories and Nunavut (NAPEG) when required by Departmental Representative.
- .4 Shop Drawings:
 - .1 Submit signed and sealed engineered Triodetic shop drawings showing foundation framing layout, elevations, connection details, product components and accessories, foundation bearing timber pad and pad connections prepared by an Engineer registered in the Northwest Territories and Nunavut (NAPEG).

1.5 CLOSEOUT SUBMITTALS

- .1 Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2 Operation and Maintenance Data: submit operation and maintenance data for Triodetic foundation for incorporation into manual.
- .3 Warranty Documentation: submit warranty documents specified.

1.6 QUALITY ASSURANCE

- .1 Manufacturer's Qualifications:
 - .1 The foundation frame shall be manufactured by an experienced firm in the design, fabrication and construction of foundation frames for permafrost, discontinuous permafrost and other problem soil areas.
- .2 Installer Requirements:
 - .1 The foundation frame installer will be trained by the manufacturer or its representative.
- .3 Design Criteria:
 - .1 General:
 - .1 The foundation frame structure will be designed in accordance with all the provisions of the National Building Code and Codes having jurisdiction in the specific location of the foundation. The design is also to be in accordance with design criteria established by previous tests and field observations of the behaviour and performance of foundation frames.
 - .2 Design Loads:
 - .1 The foundation frame shall be designed for its self weight, the dead load of the building plus live loads and seismic loads dictated by the applicable building codes for the specific use and classification of the building as well as special loads as indicated on the contract documents.

- .3 Geometric Layout:
 - .1 The geometric layout of the foundation frame shall consist of a fully triangulated array of structural components. The modular components in the top layer are separated from the bottom layer by means of a network of diagonals which interconnects the top and bottom layers. This modular array shall be capable of distributing forces in a three dimensional pattern.
- .4 Torsional Rigidity:
 - .1 For square or rectangular patterned geometric layouts, a horizontal diagonal brace shall be placed in each module of both the top layer and bottom layer from corner to corner to resist distortion of these squares or rectangular modules.
- .5 Support System for one and two storey buildings:
 - .1 Unless otherwise noted on the drawings each lower node or hub where structural members interconnect in the lower layer shall have a bearing pad.
- .6 Jointing system:
 - .1 The jointing mechanism used to interconnect the structural components shall be capable of transmitting axial and bending stresses.
- .7 Bridging strength:
 - .1 The foundation frame shall have the structural capacity to span between a broad array of possible support conditions under total dead load plus live load.
 - .2 The foundation frame shall, under full dead load and live load, be capable of bridging or cantilevering over supports which have become ineffective.

1.7 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.

1.8 WARRANTY

- .1 Project Warranty: Refer to Conditions of the Contract for project warranty conditions and provisions.
- .2 Triodetic Foundation Warranty: Submit Triodetic manufacturer standard warranty document for execution by an authorized company official. Triodetic Manufacturer Limited Warranty is in addition to and not a limitation of other rights of the Owner may have under Contract Documents.

Part 2 Products**2.1 MANUFACTURERS**

- .1 Acceptable Product:
 - .1 Standard Acceptance: Triodetic Ltd. or approved alternative.

2.2 MATERIALS

- .1 Round tubes formed to suit connectors: Steel ASTM A500 Grade B or C.
- .2 Triodetic connectors and connector plugs: Aluminum Alloy AA 6351-T6.
- .3 Connector washers and all miscellaneous structural sections, brackets, weldments and connection plates: Steel ASTM A36
- .4 Threaded hardware: Steel ASTM 307, F3125/F3125M or A193 as required by design.

2.3 FABRICATION

- .1 Structural elements will be factory prefabricated round tubular sections with cold formed tooth ends to suit the mechanical connector. Tubular members will be accurately controlled in the forming operation to maintain precise length and angles in accordance with the required geometry.
- .2 Mechanical connector nodes will be cylindrical aluminum extrusions, factory milled to the required length to accommodate the full length of the formed tubular members.
- .3 All miscellaneous ancillary components as required by the contract documents will be accurately custom fabricated to ensure compatibility with other related elements of the work.

2.4 FINISH

- .1 All steel structural tube elements shall have a factory pre-galvanized finish.
- .2 All miscellaneous steel components shall be hot dipped galvanized or have a cold galvanizing factory applied paint finish.
- .3 All threaded hardware shall have a zinc plated finish.

Part 3 Execution**3.1 SITE EXAMINATION**

- .1 Before proceeding with the assembly work, the site shall be examined for evenness. Each base plate has a threaded rod to provide adjustability. It is of utmost importance that during assembly the frame is perfectly level, this will greatly enhance the assembly and will also benefit the ultimate structural performance of the foundation frame.
- .2 In order to enhance the bearing capacity of the soil it is recommended that timber pads or a geo-synthetic fabric topped by a layer of gravel be considered.

3.2 ERECTION

- .1 The installation work will be undertaken by an authorized erector who has been fully trained.
- .2 Assemble and erect the foundation frame in accordance with manufacturer's installation instructions and in accordance with shop and assembly drawings.
- .3 Apply a clear lubricant at the interface between the formed tooth ends of the structural tube components and the connector node in accordance with manufacturer's recommendations.
- .4 Use only special rawhide-faced hammers as provided by the manufacturer for assembly of the tube components. Metal hammers are not permitted.

3.3 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 00- Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Remove protective material from prefinished aluminum surfaces.
 - .3 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.
 - .4 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.
 - .5 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 00- Cleaning.

3.4 PROTECTION

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

END OF SECTION