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END OF SECTION

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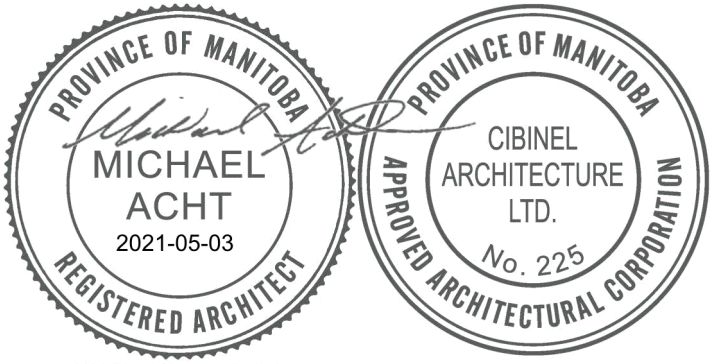

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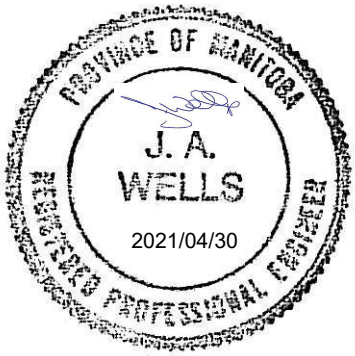

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Part 1 General

1.1 SECTION INCLUDES

.1 Contract method.

.2 Contractor use of the premises.

.3 Documents required.

1.2 RELATED REQUIREMENTS

.1 Bid Opportunity No. 111-2020; Part C – General Conditions for Construction; Part D – Supplemental Conditions

.2 All other Division 01 specification sections.

.3 This section describes requirements applicable to all Sections within Divisions 02 to 32.

1.3 DESCRIPTION OF THE WORK

.1 Refer to Part D - Supplemental Conditions.

1.4 CONTRACTOR USE OF PREMISES

.1 Contractor has unrestricted use of site until Substantial Performance of the Work.

1.5 DOCUMENTS REQUIRED

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

- .1 Contract Drawings.
- .2 Specifications.
- .3 Addenda.
- .4 Change Orders and other modifications to the Contract.
- .5 Reviewed Shop Drawings, product data, and samples.
- .6 List of outstanding Shop Drawings.
- .7 Field test records.
- .8 Inspection certificates.
- .9 Manufacturer's certificates.
- .10 Copy of approved Construction Schedule.
- .11 Health and safety plan and other safety related documents.
- .12 Other documents as specified.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Complementary documents.

.2 Specification grammar.

1.2 RELATED REQUIREMENTS

.1 City of Winnipeg Bid Opportunity No. 111-2020; Part C - General Conditions, and Part D – Supplemental Conditions

.2 Section 01 10 00 – Summary of Work.

.3 This section describes requirements applicable to all sections within Divisions 02 to 49.

1.3 COMPLEMENTARY DOCUMENTS

.1 Drawings, specifications, and schedules are complementary each to the other and what is called for by one to be binding as if called for by all. Should any discrepancy appear between documents which leave doubt as to the intent or meaning, abide by General Condition C2 Interpretation.

.2 Generally, drawings indicate graphically, the dimensions and location of components and equipment. Specifications indicate specific components, assemblies, and identify quality.

.3 All specification sections of the Project Manual and Drawings are affected by requirements of Division 01 sections.

.4 Examine all discipline drawings, specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Notify Contract Administrator of conflicts or additional work required beyond work described.

1.4 SPECIFICATION GRAMMAR

.1 Specifications are written in the imperative (command) mode, in an abbreviated form.

.2 Imperative language of the technical sections is always directed to the Contractor identified as a primary constructor, as sole executor of the Contract, unless specifically noted otherwise.

.1 This form of imperative (command) mode statement requires the primary constructor to perform such action or Work.

.2 Perform all requirements of the Contract Documents whether stated imperatively or otherwise. Division of the Work among Subcontractors, suppliers, or others is solely the prime constructor's responsibility. The Contract Administrator(s) and specification authors assume no responsibility to function or act as an arbiter to establish subcontract scope or limits between sections or divisions of Work.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Cash allowances.

.2 Inspection and testing allowances.

1.2 RELATED REQUIREMENTS

.1 Section 01 45 00 – Quality Control: Independent inspection and testing.

.2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 CASH ALLOWANCES

.1 The Contractor will carry the cash allowances stated herein.

.2 The Contract Price, not the cash allowances, include the Contractor's overhead and profit in connection with such cash allowances.

.3 Expenditures under cash allowances shall be authorized by the Contract Administrator.

.4 Where the actual cost of the Work under any cash allowance exceeds the amount of the allowance, the Contractor shall be compensated for the excess incurred and substantiated plus an amount for overhead and profit on the excess as set out in the Contract Documents. Where the actual cost of the Work under any cash allowance is less than the amount of the allowance, the City will be credited for the unexpended portion of the cash allowance, but not for the Contractor's overhead and profit on such amount. Multiple cash allowances shall not be combined for the purpose of calculating the foregoing.

.5 The Contract Price shall be adjusted by Change Order to provide for any difference between the amount of each cash allowance and the actual work under that cash allowance.

.6 The value of the work performed under a cash allowance is eligible to be included in progress payments.

.7 The Contractor and the Contract Administrator shall jointly prepare a schedule that shows when the Contract Administrator must authorize ordering of items called for under cash allowances to avoid delaying the progress of the Work.

.8 Obtain three quotations for each Cash Allowance, and for each type of inspection and testing service paid for by Cash Allowance, and submit to Contract Administrator for review. Contract Administrator reserve right to select quotation.

1.4 INSPECTING AND TESTING ALLOWANCES

.1 Costs Included in Inspecting and Testing Allowances: Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.

.2 Costs Not Included in the Inspecting and Testing Allowance But Included in the Contract Price:

- .1 Costs of incidental labour and facilities required to assist inspecting or testing agency.
- .2 Costs of testing services used by Contractor separate from Contract Document requirements.
- .3 Costs of retesting upon failure of previous tests as determined by Contract Administrator.

.3 Payment Procedures:

.1 Submit one copy of the inspecting or testing firm's invoice with next application for payment.

.2 Pay invoice on approval by Contract Administrator.

1.5 ALLOWANCES SCHEDULE

.1 Cash Allowance No. 1N – North Walkway Curtain Wall Site Testing, including AAMA501.1. (Refer to Section 08 08 00 Commissioning of Openings): Amount: $7,500.

.2 Cash Allowance No. 1S – North Walkway Curtain Wall Site Testing, including AAMA501.1. (Refer to Section 08 08 00 Commissioning of Openings): Amount: $7,500.

.3 Cash Allowance No. 2N – North Walkway Envelope Inspection and Testing: Amount: $10,000

.4 Cash Allowance No. 2S – South Walkway Envelope Inspection and Testing: Amount: $10,000

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Schedule and administer project meetings throughout the progress of the Work.

.2 Prepare agenda for meetings.

.3 Distribute written notice of each meeting four days in advance of meeting date to Contract Administrator.

.4 Provide physical space and make arrangements for meetings.

.5 Preside at meetings.

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

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

.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 START-UP MEETING

.1 After award of Contract, but before start of Work, a Start-Up Meeting will be held to discuss and resolve administrative procedures and responsibilities.

.2 Senior representatives of the Contractor, major Subcontractors, field inspectors and supervisors, and Contract Administrator will be in attendance.

.3 Contract Administrator will establish time and location of meeting and notify parties concerned minimum five Business Days before meeting.

.4 Contract Administrator will chair Start-Up Meeting, record minutes, and distribute minutes to all attending parties within four Business Days of meeting.

.5 Agenda to include:

- .1 Appointment of official representative of participants in Work.
- .2 Schedule of Work, progress scheduling.
- .3 Critical work sequencing and long-lead items.
- .4 Lines of communications.
- .5 Procedures for RFIs.
- .6 Submittal procedures.
- .7 Requirements for temporary facilities, site sign, offices, storage sheds, utilities.
- .8 Delivery schedule of specified equipment.
- .9 Safety.
- .10 Site security.
- .11 Proposed changes, change orders, procedures, approvals required, mark-up percentages permitted, time extensions, overtime, and administrative requirements.
- .12 City-supplied, Contractor-installed products.
- .13 Record drawings.
- .14 Maintenance manuals.
- .15 Take-over procedures, acceptance, and warranties.

.16 Monthly progress claims, administrative procedures, photographs, and holdbacks.

.17 Appointment of inspection and testing agencies or firms.

.18 Insurances and transcript of policies.

1.3 PROGRESS MEETINGS

.1 Administrative Requirements:

.1 During course of Work, schedule progress meetings at intervals and times agreed to by the Contractor and Contract Administrator. Progress meetings shall occur at least biweekly.

.2 Provide location for regular Progress Meetings.

.3 Prepare agenda for meetings.

.4 Notify parties concerned minimum 72 hours in advance of each meeting.

.5 Preside at meetings.

.6 Record minutes of meetings and circulate to attending parties and affected parties not in attendance within three Business Days after meeting. Include significant proceedings and decisions, and identify actions by parties in minutes.

.7 Bring one set of As-Built drawings, and project manual to progress meetings.

.2 Contractor, major Subcontractors involved in Work, and Contract Administrator are to be in attendance.

.3 Persons attending meetings shall be empowered to act on behalf of organizations whose representatives they are.

.4 Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

.1 Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

.1 Review schedule for next period.

.2 Review present and future needs of each entity present, including the following:

.1 Interface requirements.

.2 Sequence of operations.

.3 Status of submittals.

.4 Safety.

.5 Deliveries.

.6 Off-site fabrication.

.7 Access.

.8 Site utilization.

.9 Temporary facilities and controls.

.10 Progress cleaning.

.11 Quality and work standards.

.12 Status of correction of deficient items.

.13 Field observations.
.14 Status of RFIs.
.15 Status of proposal requests.
.16 Pending changes.
.17 Status of Change Orders.
.18 Documentation of information for payment requests.

.3 Problems which impede construction schedule.

.4 Other business.

1.4 PREINSTALLATION MEETINGS

.1 Conduct a preinstallation meeting at Project site before each construction activity that requires coordination with other construction.

.2 Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Notify Contract Administrator of scheduled meeting dates five Business Days before meeting.

.3 Agenda: Review progress of other construction activities and preparations for the particular activity under consideration

.4 Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

.5 Reporting: Distribute minutes of the meeting to Contract Administrator, each party present, and to other parties requiring information, within four Business Days of meeting.

.6 Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Schedules, form, content, submission.

.2 Critical path scheduling.

.3 Progress photographs.

.4 Submittals schedules.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 SCHEDULES

.1 Submit schedules as follows:

- .1 Construction Progress Schedule.
- .2 Schedule of trade costs and monthly cash flow of estimated progress payment claims.
- .3 Submittal Schedule for Shop Drawings and Product Data.
- .4 Submittal Schedule for Samples.
- .5 Submittal Schedule for timeliness of City-furnished Products.
- .6 Product Delivery Schedule.
- .7 Cash Allowance Schedule for acquiring Products and Installation.

.2 Schedule Format.

- .1 Prepare schedule in form of a horizontal Gantt bar chart.
- .2 Provide a separate bar for each major item of work.
- .3 Split horizontally for projected and actual performance.
- .4 Provide horizontal time scale identifying first Business Day of each week.
- .5 Format for listings: Chronological order of start and finish of each item of work.
- .6 Identification of listings: By systems description.

.3 Schedule Submission.

- .1 Submit initial format of each schedule within 10 Business Days of award of Contract.
- .2 Submit one copy of each schedule in electronic format.
- .3 Contract Administrator will review schedules and return review copy within 10 Business Days after receipt.
- .4 Resubmit finalized schedules within 10 Business Days after return of review copy.
- .5 Distribute copies of revised schedules to:
  - .1 Job site office.
  - .2 Subcontractors.
  - .3 Contract Administrator.
  - .4 Other concerned parties.
- .6 Instruct recipients to report to Contractor within ten days, any problems anticipated by timetable shown in schedules.

.4 Bring Construction Progress Schedule, and Submittal Schedule for Shop Drawings and Product Data to initial start-up meeting.

1.4 CONSTRUCTION PROGRESS SCHEDULING

.1 Submit revised schedules with each Application for Payment, identifying changes since previous version.

.2 Submit computer generated network analysis diagram using the critical path method (CPM).

.3 Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

.4 Indicate estimated percentage of completion for each item of Work at each submission.

.5 Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by the City and required by Allowances.

.6 Include dates for start and completion of each major element of construction as follows:

- .1 Permits.
- .2 Mobilization.
- .3 Site clearing.
- .4 Site utilities.
- .5 Structural framing.
- .6 Cladding and roofing.
- .7 Doors, windows and glazing.
- .8 Interior architecture and finishes (walls, floors and ceiling).
- .9 Interior Specialties.
- .10 Plumbing.
- .11 Lighting.
- .12 Power.
- .13 Environmental controls.
- .14 Heating, ventilating, and air conditioning.

.7 Indicate projected percentage of completion of each item as of first day of month.

.8 Indicate progress of each activity to date of submission schedule.

.9 Allow for preparation and review of mock-ups in schedule.

.10 Indicate changes occurring since previous submission of schedule:

- .1 Major changes in scope.
- .2 Activities modified since previous submission.
- .3 Revised projections of progress and completion.
- .4 Other identifiable changes.

.11 Provide a narrative report to define:

- .1 Problem areas, anticipated delays, and impact on schedule.
- .2 Corrective action recommended and its effect.

.12 Schedule Updating: Revise Construction Progress Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.5 PROGRESS PHOTOGRAPHS

.1 Digital Photography:

.1 Submit electronic copy of colour digital photography in *.jpg format, minimum 6 megapixel resolution.

.2 Identification: Name and number of project and date of exposure indicated.

.2 Number of Viewpoints: Sufficient views and proximity to clearly indicate stages of completion of all work and services before concealment, including exterior and interior, above ceiling, in-wall, in-floor, and underground conditions.

.3 Frequency:

.1 Pre-Construction photographs. Submit before demolition work begins.

.2 Continually. Submit monthly with progress application.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Shop Drawings and Product Data

.2 Samples

.3 Certificates and transcripts

.4 Requests for Interpretation (RFI)

1.2 RELATED REQUIREMENTS

.1 Section 01 32 00 - Construction Progress Documentation.

.2 Section 01 78 10 - Closeout Submittals.

.3 Other sections requesting submittals.

.4 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 DEFINITIONS

.1 Submittals for Review: Written and graphic information and physical samples that require Contract Administrator's responsive action. Unless specifically noted otherwise in individual sections, the following shall be considered Submittals for Review:

.1 Product Data.

.2 Shop Drawings.

.3 Samples.

.2 Submittals for Information: Written and graphic information and physical samples that do not require Contract Administrator's responsive action. Submittals may be rejected for not complying with requirements. Unless noted otherwise in individual sections, the following shall be considered Submittals for Information:

.1 Certificates.

.2 Maintenance Data.

.3 Test and Inspection Reports.

.4 Delegated Design Calculations.

.5 Closeout Submittals.

.6 Sample warranties.

.3 Request for Interpretation (RFI): Request from Contractor requesting interpretation or clarification of the Contract Documents, that is not easily inferable from the Contract Documents.

1.4 ADMINISTRATIVE

.1 Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of the construction schedule and no claim for extension by reason of such default will be allowed.

.2 Do not proceed with Work affected by submittal process 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 manufactured or produced in SI metric units, converted values within the metric measurement tolerances are acceptable.

.5 Review submittals prior to submission to Contract Administrator. 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.

.6 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

.7 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.8 Verify field measurements and affected adjacent Work are coordinated.

.9 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.

.10 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.

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

.12 Maintain and update an 'As-Built' mark-up set of drawings on site, for all disciplines, for review at site meetings. Refer to Section 01 78 00 – Closeout Procedures and Submittals for detail.

1.5 ELECTRONIC SUBMISSIONS

.1 Electronic Submittals:

.1 Provide in Portable Document Format (*.pdf) with selectable text and graphics that are readable. Merge documents into one bookmarked document up to 20 mb. Use hierarchical bookmarks to form a table of contents and provide hyperlinks to subject topic.

.2 Break down information into documents of related materials or systems.

.3 Where the Contract Administrator returns the submittal "Reviewed As Noted" and includes mark-ups or comments that change the originally submitted ratings, parameters, specifications, options, etc., correct the documents in the original electronic document before submitting final electronic documents.

.4 Highlight specific rating, parameter, specification, option, etc. when original document includes multiple alternatives.

.5 PDF drawing size: maximum 279 by 432 mm (11 by 17 inches).

1.6 SHOP DRAWINGS AND PRODUCT DATA

.1 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

.2 Shop drawings are to be reviewed by the Contractor for completeness, accuracy, compliance with Contract Documents, compliance with governing codes and standards, and coordination with other trade work prior to submission to Contract Administrators. Contractor to identify non-compliance issues and coordination conflicts with shop drawing submission, and make recommendations where issues or conflicts exist.

.3 Submit shop drawings to Contract Administrator, and directly to reviewing Engineering Consultant as applicable.

.4 Allow 15 Business Days for Contract Administrator's review of each submission. Allow for extra time where Shop Drawings are submitted in bulk or mass to allow proper review and coordination.

.5 It is the Contractor's responsibility to coordinate and track the shop drawing information flow and to manage the City and Contract Administrator's review process. Management responsibility includes regular phone and email communications with all parties, and daily maintenance of the Shop Drawing Tracking Schedule. Indicate all pertinent shop drawing information including:

.1 Shop drawing numbering system.

.2 Subcontractor business name, drawing number and applicable specification section.

.3 Subcontractor shop drawing submission date to Contractor.

.4 Contractor shop drawing submission dates to Contract Administrator, Engineering Consultants and City.

.5 Contract Administrator and/or Engineering Consultants review dates and review status.

.6 City representative review date and review status.

.7 Approval and resubmission dates as applicable.

.6 Adjustments made on Shop Drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.7 After Contract Administrator and City's review, distribute copies to all affected parties.

.8 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, an electronic copy noting approval will be returned, whereupon fabrication and installation of Work may proceed. If shop drawings are rejected, an electronic copy noting non-compliant or incomplete information will be returned. Make changes in shop drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of any revisions other than those requested. Resubmitted shop drawings must be approved before fabrication and installation of Work may proceed.

.9 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of any revisions other than those requested.

.10 Accompany submissions with transmittal letter, containing:

.1 Date.

.2 Project title and number.

.3 Name and address of

.1 Subcontractor

.2 Supplier

.3 Manufacturer

.4 Identification and quantity of each shop drawing, product data and sample and other pertinent data.

.5 Contractor's stamp, signed by Contractor's authorized representative certifying review and approval of submissions, verification of field measurements and compliance with Contract Documents.

.11 Submit electronic searchable pdf format of shop drawings with text at minimum 8 point font size when the drawing is printed on 279mm x 432mm sheet format, for each requirement requested in specification. Sections and as Contract Administrator may reasonably request. Include details of appropriate portion of Work as applicable:

.1 Date and revision dates.

.2 Project title and number.

.3 Name and address of:

.1 Subcontractor.

.2 Supplier.

.3 Manufacturer.

.4 Contractor's stamp, signed by Contractor's authorized representative certifying review and approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 Details of appropriate portions of Work as applicable:

.1 Fabrication details.

.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 other parts of the Work.

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

.12 Submit electronic searchable pdf format of product data sheets or brochures for requirements requested in specification Sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product.

.1 Mark submittal to show which products and options are applicable.

.13 Where the Contract Administrator is required to review Shop Drawings, method samples, mock-ups, premature requests for Substantial Performance or Completion reviews, and completed “corrections” more than once and/ or enter into extended discussions or preparation of additional details or calculations to facilitate the Contractor’s work or that of the Sub-Contractor’s, the additional consulting time shall be paid for by the Contractor. Similarly, if deficient workmanship or construction requires additional or unscheduled site visits by the Contract Administrator, or other inspectors or reviewers, the additional time and disbursements based on the Contract Administrator hourly rates, etc. shall be paid by the Contractor.

1.7 SAMPLES

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

.2 Deliver samples prepaid to Contract Administrator’s business address.

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

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

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

.6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.

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

1.8 CERTIFICATES AND TRANSCRIPTS

.1 Refer to Part D - Supplemental Conditions.

1.9 REQUESTS FOR INTERPRETATION (RFI)

.1 General: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit a RFI to the as Contract Administrator in the form specified.

.1 Contract Administrator will return RFIs submitted to Contract Administrator by entities other than the Contractor and controlled by Contractor with no response.

.2 Coordinate and submit RFIs in a prompt manner so as to avoid delays in Work.

.3 For RFIs submitted electronically, include project name and RFI number in subject line of email.

.2 Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

.1 Project name.

.2 Project number.

.3 Date.

.4 Name of Contractor.

.5 Name of Contract Administrator.

.6 RFI number, numbered sequentially.

.7 RFI subject.

.8 Specification Section number and title and related paragraphs, as appropriate.

.9 Drawing number and detail references, as appropriate.

.10 Field dimensions and conditions, as appropriate.

.11 Contractor's suggested resolution. If Contractor's suggested resolution impacts the construction schedule or the Contract Price, state impact in the RFI.

.12 Contractor's signature.

.13 Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

.1 Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

.3 RFI Forms: Contractor generated form including all content indicated in this Section.

.1 Form and attachments: electronic files in searchable pdf format.

.4 Contract Administrator's Action: Contract Administrator will review each RFI, determine action required, and respond. Allow ten Working Days for Contract Administrator's response for each RFI. RFIs received by Contract Administrator after 1:00 p.m. will be considered as received the following Working Day.

.1 The following Contractor-generated RFIs will be returned without action:

.1 Requests for approval of submittals.

.2 Requests for approval of substitutions.

.3 Requests for approval of Contractor's means and methods.

.4 Requests for approval of corrective actions for deficient work.

.5 Requests for coordination information already indicated in the Contract Documents.

.6 Requests for adjustments in the schedule or the Contract Price.

.7 Requests for interpretation of Contract Administrator's actions on submittals.

.8 Incomplete RFIs or inaccurately prepared RFIs.

.2 Contract Administrator's action may include a request for additional information, in which case Contract Administrator's time for response will date from time of receipt of additional information.

.3 If Contractor believes the RFI response warrants change in the construction schedule or the Contract Price, notify Contract Administrator in writing within ten Business Days of receipt of the RFI response.

.5 RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log with progress meeting minutes. Include the following:

.1 Project name.

.2 Name and address of Contractor.

.3 Name and address of Contract Administrator.

.4 RFI number including RFIs that were returned without action or withdrawn.

.5 RFI description.

.6 Date the RFI was submitted.

.7 Date Contract Administrator's response was received.

.6 On receipt of Contract Administrator action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Contract Administrator within 10 Business Days if Contractor disagrees with response.

1.10 PHOTOGRAPHIC DOCUMENTATION

.1 Refer to Section 01 32 00 – Construction Progress Documentation

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 References and codes

.2 Laws, notices, permits and fees

1.2 RELATED REQUIREMENTS

.1 Part C – General Conditions for Construction

.2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 REFERENCES AND CODES

.1 Do Work in accordance with:

.1 National Building Code of Canada (NBC 2010), and Manitoba amendments, The Buildings and Mobile Homes Act (C.C.S.M. C. B93)

.2 Province of Manitoba: The Workplace Safety and Health Act, C.C.S.M c. W210.

.3 City of Winnipeg Accessibility Design Standard 2015

.2 Meet or exceed requirements of:

.1 Contract Documents.

.2 Specified standards, codes and referenced documents.

1.4 LAWS, NOTICES, PERMITS AND FEES

.1 If the Contractor knowingly performs or allows work to be performed that is contrary to any laws, ordinances, rules, regulations or codes, the Contractor shall be responsible for and shall correct the violations thereof; and shall bear the costs, expenses and damages attributable to the failure to comply with the provisions of such laws, ordinances, rules, regulations or codes.

.2 Determine detailed requirements of authorities having jurisdiction.

1.5 SMOKING

.1 No smoking is permitted during execution of the Work within or outside the premises.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Definitions.

.2 Review by Contract Administrator.

.3 Independent Inspection Agencies.

.4 Access to work.

.5 Procedures.

.6 Rejected work.

.7 Reports, tests and mix designs.

.8 Mock-ups.

.9 Test and inspection logs.

.10 Mill tests.

.11 Equipment and systems.

1.2 RELATED REQUIREMENTS

.1 Section 01 21 00 - Allowances.

.2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 DEFINITIONS

.1 Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

.2 Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Contract enforcement activities performed by Contract Administrator.

.3 Mock-ups: Full-size physical assemblies that are constructed on-site. Mock-ups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mock-ups are not Samples. Unless otherwise indicated, approved mock-ups establish the standard by which the Work will be judged.

.1 Integrated Exterior Mock-ups: Mock-ups of the exterior envelope, consisting of multiple products, assemblies, and subassemblies.

.4 Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

.5 Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

.6 Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

.7 Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

.8 Independent Inspection and Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 REVIEW BY CONTRACT ADMINISTRATOR

.1 Contract Administrator may order any part of Work to be examined if Work is suspected to not be in accordance with Contract Documents. If, upon examination, such Work is found not in accordance with Contract Documents, correct such Work and pay full cost of correction and re-examination by Contract Administrator review.

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

1.5 INDEPENDENT INSPECTION AGENCIES

.1 Engage independent inspection and testing agencies for purpose of inspecting and testing portions of the Work.

.2 Costs:

.1 Quality Control Testing: borne by the Contractor.

.2 Quality Assurance Testing: Specific quality assurance testing and inspections specified in technical specification sections, unless explicitly assigned to the City, are paid for by cash allowance. Refer to Section 01 21 00 - Allowances.

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

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

.5 Give timely notice requesting inspection whenever portions of the Work are designated for special tests, inspections or approvals, either when described in the Contract Documents or when required by law in the Place of the Work.

.6 The Contractor is responsible to advise the City, Contract Administrator and testing agency a minimum of 5 Business Days prior to inspection or testing services date, and to arrange for testing agency attendance.

.7 If defects are revealed during inspection or testing, appointed agency will request additional inspection and testing to ascertain full degree of defect. Correct defect and irregularities as advised by Contract Administrator at no additional cost to the Work. Pay costs for retesting and re-inspection.

.8 Indicate all independent inspection and testing dates on the Construction Progress Schedule – Refer to Section 01 32 00. Coordinate all inspections and tests with the work progress and reschedule as required. Contractor is responsible to communicate with City, Contact Administrator and independent testing and inspection agencies in a timely manner regarding any schedule changes including retesting or re-inspection.

1.6 ACCESS TO WORK

.1 Provide equipment and reasonable facilities for such access as required for executing review, inspection and testing of the Work. Fully cooperate with appointed agencies and testing agencies and Contract Administrator during testing.

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

.3 Give timely notice requesting inspection if Work is designated for special tests, inspections or approvals by Contract Administrator instructions, or law of Place of Work.

1.7 PROCEDURES

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

.2 Submit samples and materials required for testing, as specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay 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.

.4 Provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.

.5 Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

.1 Submit a certified written report, in duplicate, of each quality-control service.

.6 Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

.7 Provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

.8 Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

1.8 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 Contract Administrator as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

.2 Correct defect and irregularities as advised by Contract Administrator or inspection/testing agencies at no cost to City. Pay costs for re-testing and re-inspection resulting from failure to meet Contract Document standard. Costs will include all testing and inspection agency costs including disbursements, and Contract Administrator coordination time, as applicable.

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

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

1.9 REPORTS, TESTS AND MIX DESIGNS

.1 Submit one (1) electronic copy in searchable pdf format of signed inspection and test reports to Contract Administrator.

.2 Provide electronic copy of signed inspection and test reports to manufacturer or fabricator of material being inspected or tested, and Subcontractor of work being inspected or tested.

.3 Furnish test results and mix designs as may be requested. Provide copies to Subcontractor of work being inspected or tested or to manufacturer or fabricator of material being inspected or tested.

.4 Submit mill test certificates as required of specification Sections.

.5 The cost of tests and mix designs beyond those called for in Contract Documents or beyond those required by law of Place of Work shall be appraised by Contract Administrator and may be authorized as recoverable.

.6 Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

.1 Date of issue.

.2 Project title and number.

.3 Name, address, and telephone number of testing agency.

.4 Dates and locations of samples and tests or inspections.

.5 Names of individuals making tests and inspections.

.6 Description of the Work and test and inspection method.

.7 Identification of product and Specification Section.

.8 Complete test or inspection data.

.9 Test and inspection results and an interpretation of test results.

.10 Record of temperature and weather conditions at time of sample taking and testing and inspecting.

.11 Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

.12 Name and signature of laboratory inspector.

.13 Recommendations on retesting and reinspecting.

.7 Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

.1 Name, address, and telephone number of technical representative making report.

.2 Statement on condition of substrates and their acceptability for installation of product.

.3 Statement that products at Project site comply with requirements.

.4 Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

.5 Results of operational and other tests and a statement of whether observed performance complies with requirements.

.6 Statement whether conditions, products, and installation will affect warranty.

.7 Other required items indicated in individual Specification Sections.

.8 Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

.1 Name, address, and telephone number of factory-authorized service representative making report.

.2 Statement that equipment complies with requirements.

.3 Results of operational and other tests and a statement of whether observed performance complies with requirements.

.4 Statement whether conditions, products, and installation will affect warranty.

.5 Other required items indicated in individual Specification Sections.

1.10 MOCK-UPS

.1 Mock-ups: Before installing portions of the Work requiring mock-ups, build mock-ups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

.1 Build mock-ups in location and of size indicated or, if not indicated, as directed by Contract Administrator.

.2 Prepare mock-ups for Contract Administrator's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

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

.4 Notify Contract Administrator five Business Days in advance of dates and times when mock-ups will be constructed.

.5 Employ supervisory personnel who will oversee mock-up construction. Employ workers that will be employed during the construction at Project.

.6 Demonstrate the proposed range of aesthetic effects and workmanship.

.7 Obtain Contract Administrator's approval of mock-ups before starting work, fabrication, or construction.

.1 Allow five Business Days for initial review and each re-review of each mock-up.

.8 Maintain mock-ups during construction in an undisturbed condition as a standard for judging the completed Work.

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

1.11 TEST AND INSPECTION LOG

.1 Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

.1 Date test or inspection was conducted.

.2 Description of the Work tested or inspected.

.3 Date test or inspection results were transmitted to Contract Administrator.

.4 Identification of testing agency or special inspector conducting test or inspection.

.2 Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Contract Administrator's reference during normal working hours.

1.12 MILL TESTS

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

1.13 EQUIPMENT AND SYSTEMS

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

.2 Refer to mechanical and electrical Divisions for definitive requirements.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Temporary utilities.

1.2 RELATED REQUIREMENTS

.1 Section 01 52 00 - Construction Facilities.

.2 Section 01 53 00 - Temporary Construction.

1.3 INSTALLATION AND REMOVAL

.1 Provide temporary utilities controls in order to execute work expeditiously.

.2 Remove from site all such work after use.

.3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.4 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 permitted as specified in Section 23 05 01 – Use of HVAC Systems During Construction.

.7 Ensure date of Substantial Performance of the Work and Warranties for heating system do not commence until entire system is in as near original condition as possible and is certified by Contract Administrator.

.8 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.

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

1.5 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 all costs for installation, maintenance and removal.

.3 Provide and pay for temporary power for electric cranes and other equipment requiring temporary power.

.4 Provide and maintain temporary lighting throughout project. Ensure level of illumination is not less than that required by legislation. Use high-efficiency lighting for the construction site if possible.

.5 Electrical power and lighting systems installed under this Contract may be used for construction requirements only with prior approval of Contract Administrator provided that guarantees are not affected. Make good damage to electrical system caused by use under this Contract. Replace lamps which have been used for more than three months.

1.6 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary high speed internet, telephone and data hook up, lines and equipment necessary for own use and use of Contract Administrator.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Construction aids.

.2 Office and sheds.

.3 Parking.

.4 Sanitary facilities.

.5 Construction signs.

1.2 RELATED REQUIREMENTS

.1 Section 01 51 00 - Temporary Utilities.

.2 Section 01 55 26 - Traffic Control and Procedures.

.3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 INSTALLATION AND REMOVAL

.1 Provide construction facilities in order to execute work expeditiously.

.2 Remove from site all such work after use.

.3 Coordinate staging area, for storing construction equipment and materials with the City.

1.4 SCAFFOLDING

.1 Provide and maintain stairs, ladders, ramps, platforms, and scaffolding.

1.5 HOISTING

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

.2 Hoists shall be operated by qualified operator.

1.6 SITE STORAGE/LOADING

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

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

1.7 CONSTRUCTION PARKING AND ROADWAYS

.1 Contractors must comply with the City and Highway Traffic Act regulations concerning parking, driving, etc. on the project site and adjacent streets.

.2 Any temporary closures required of existing roadways to be coordinated with and approved by the City.

.3 Parking permits are required for parking. The Contractor shall be responsible for the cost of all parking permits.

.4 The Contractor, its suppliers, servants and agents, when upon the City's property, shall use only such streets, roads and parking lots and follow such course going to and from the actual site of

the work, as the City will designate. The Contractor shall not permit any vehicle under its control to stand or be parked upon any property of the City without authorization of the City. Vehicles parked in unauthorized areas may be towed away at the vehicle owner's expense.

.5 Provide and maintain adequate access to project sites.

.6 If authorized to use existing roads for access to project site, maintain such roads for duration of Contract and make good damage resulting from Contractors' use of roads.

1.8 OFFICES

.1 Contractors and Subcontractors may provide their own offices as necessary. City will direct the location of these offices.

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

.2 Contractor shall be responsible for all storage of his own equipment. The City will not be responsible for lost or damaged Contractor owned equipment or tools.

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

.4 Coordinate location and method of storage with City prior to commencement of work.

1.10 SANITARY FACILITIES

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

.2 Post notices and take such precautions as required by local health authorities.

.3 Except where connected to municipal sewer system, periodically remove wastes from Site.

.4 Keep sanitary facilities clean and fully stocked with the necessary supplies at all times.

.5 Coordinate location for sanitary facilities with City prior to commencement of work.

1.11 CONSTRUCTION SIGNS

.1 Safety Signs:

.1 Format, location, and quantity of signs and notices to be approved by Contract Administrator.

.2 Signs and notices for safety or instruction to be in English language, or commonly understood graphic symbols.

.2 Maintain signs and notices for duration of project. Remove and dispose of signs off site when directed by Contract Administrator.

.3 Do not advertise or promote systems, construction or assembly methods, tools or equipment used or incorporated without written approval of Contract Administrator.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fire Safety Plan.

.2 Temporary fire separations and ramp in partially occupied buildings.

.3 Guardrails and barriers.

.4 Weather enclosures.

.5 Dust tight barriers.

.6 Protection for off-site and public property.

.7 Protection of applied finishes.

.8 Protection of surrounding Work.

1.2 RELATED REQUIREMENTS

.1 Section 01 51 00 - Temporary Utilities.

.2 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.4 FIRE SAFETY PLAN

.1 Prior to commencement of construction, create two (2) site specific fire safety plans, one for each walkway project.

.2 Contractor to coordinate exit closures with the City and the Office of the Fire Commissioner.

1.5 TEMPORARY FIRE SEPARATIONS AND RAMP IN PARTIALLY OCCUPIED BUILDING

.1 During the course of construction, all exits must remain operational. The walkways are to remain fully operational and shall provide a barrier free path of travel.

.2 The occupied part of the walkway shall be separated from the part being demolished by a weatherproof fire separation which has a fire resistance rating not less than 1 hour.

.3 Each corridor will be 2.438m (8’-0”) clear width, constructed with walls that have a 1-hour fire resistance rated assembly. These walls shall be constructed as one of the following assemblies:

.1 ULC Des W407: 92mm (3 5/8”) deep 0.5mm (25 gauge) steel stud at 600mm on centre, with 1 layer of 16mm (5/8”) type X exterior grade gypsum sheathing on both sides. Joints taped and treated. Mineral wool insulation will be used to fill any gaps between the corridor partition and the existing building components.

.2 ULC Des W301: 89mm (2x4) wood stud at 400mm on centre, with 1 layer of 16mm (5/8”) type X exterior grade gypsum sheathing on both sides. Joints taped and treated. Mineral wool insulation will be used to fill any gaps between the corridor partition and the existing building components.

.4 North Walkway:

.1 Provide a connecting corridor down the center of the walkway, providing access from the RBC Conventions Centre, to the existing walkway along the west side of the Delta Hotel, the west entrance of the Delta Hotel, and access to 185 Carlton. (Refer to drawing 1-A001).

.5 South Walkway:

.1 Provide a connecting corridor down the center of the walkway, providing access from the RBC Conventions Centre to 155 Carlton. (Refer to Drawing 1-A001).

.2 A temporary ramp is to be constructed alongside the existing ramp to provide a barrier free path of travel to 155 Carlton. Allow for temporary handrails for the ramp.

1.6 GUARD RAILS AND BARRIERS

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

.2 Provide as required by governing authorities.

1.7 WEATHER ENCLOSURES

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

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

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

1.8 DUST TIGHT BARRIERS

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

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

1.9 PROTECTION FOR OFF-SITE AND PUBLIC PROPERTY

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

.2 Be responsible for damage incurred.

1.10 PROTECTION OF APPLIED FINISHES

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

.2 Provide necessary screens, covers, and hoardings.

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

1.11 PROTECTION OF SURROUNDING WORK

.1 Provide protection for finished and partially finished Work from damage.

.2 Provide necessary cover and protection.

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Informational and warning devices.

.2 Protection and control of public traffic.

.3 Informational and warning devices.

.4 Fire routes.

1.2 RELATED REQUIREMENTS

.1 Section 01 52 00 – Construction Facilities.

.2 Section 01 53 00 - Temporary Construction.

.3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 REFERENCES

.1 Municipal guidelines and regulations enforceable in the Place of the Work.

1.4 ACCESS TO SITE

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

1.5 PUBLIC TRAFFIC FLOW

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

1.6 PROTECTION OF PUBLIC TRAFFIC

.1 Comply with requirements of City of Winnipeg traffic signage guidelines, regulations, and By-Laws in force for regulation of traffic or use of roadways upon or over which it is necessary to carry out Work or haul materials or equipment.

.2 When working on or near a travelled way:

.1 Place equipment in position to present minimum of interference and hazard to traveling public.

.2 Keep equipment units as close together as working conditions permit and preferably on same side of travelled way.

.3 Do not leave equipment on travelled way overnight.

.3 Do not close any lanes of road without approval of City. Before re-routing traffic erect suitable signs and devices in accordance authority having jurisdiction.

.4 Keep travelled way free of pot holes and of sufficient width for required number of lanes of traffic.

.5 Provide and maintain road access and egress to property fronting along Work under Contract and in other areas as indicated, unless other means of road access exist that meet approval of Contract Administrator.

1.7 INFORMATIONAL AND WARNING DEVICES

.1 Provide and maintain signs, flashing warning lights, and other devices required to indicate construction activities or other temporary and unusual conditions resulting from Project Work which requires road user response.

.2 Supply and erect signs, delineators, barricades and miscellaneous warning devices as specified in municipal guidelines.

.3 Place signs and other devices in locations recommended in municipal guidelines.

.4 Meet with Contract Administrator before start of Work to prepare list of signs and other devices required for project. If situation on site changes, revise list to approval of Contract Administrator.

.5 Continually maintain traffic control devices in use by:

.1 Checking signs daily for legibility, damage, suitability and location. Clean, repair or replace to ensure clarity and reflectance.

.2 Removing or covering signs which do not apply to conditions existing from day to day.

1.8 FIRE ROUTES

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Product quality, availability, storage, handling, protection, and transportation.

.2 Manufacturer's instructions.

.3 Quality of Work, and coordination.

.4 Concealment, and remedial work.

.5 Location of fixtures.

.6 Fastenings.

.7 Protection of work in progress.

1.2 RELATED REQUIREMENTS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 TERMINOLOGY

.1 New: Produced from new materials.

.2 Defective: A condition determined exclusively by the Contract Administrator.

1.4 PRODUCT QUALITY

.1 Products, materials, equipment, parts or assemblies (referred to as “Products” in the specifications, and “Materials” in the General Conditions) incorporated in Work: New, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

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

.3 Should any dispute arise as to quality or fitness of Products, decision rests strictly with Contract Administrator.

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

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

1.5 AVAILABILITY

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of Products are foreseeable, notify Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.3 In event of failure to notify Contract Administrator at start of Work and should it subsequently appear that Work may be delayed for such reason, Contract Administrator reserves right to

substitute more readily available Products of similar character, at no increase in Contract Price or affect to the construction schedule.

1.6 STORAGE AND PROTECTION

.1 Store and protect Products in accordance with manufacturers' written instructions.

.2 Store with seals and labels intact and legible.

.3 Obtain approval from and coordinate locations and related requirements for storage of Products and Material with City prior to construction.

.4 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.5 For exterior storage of fabricated Products, place on sloped supports above ground.

.6 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

.7 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.8 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

.9 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.7 TRANSPORTATION AND HANDLING

.1 Transport and handle Products in accordance with manufacturer's written instructions.

.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.8 MANUFACTURER'S WRITTEN INSTRUCTIONS

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

.2 Notify Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that Contract Administrator may establish course of action.

.3 Improper installation or erection of Products, due to failure in complying with these requirements, authorizes Contract Administrator to require removal and re-installation at no increase in Contract Price or affect to construction schedule.

1.9 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 Contract Administrator if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from site any workers deemed incompetent or careless.

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

1.10 COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

1.11 CONCEALMENT

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

.2 Before installation, inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

1.12 REMEDIAL WORK

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

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.13 LOCATION OF FIXTURES

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

.2 Inform Contract Administrator of conflicting installation. Install as directed.

1.14 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.

1.15 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 Type 304 or 316 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.

1.16 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of the Project.

.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of Contract Administrator.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Substitutions during construction.

1.2 DEFINITIONS

.1 Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

.1 Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.

.2 Substitutions for Convenience: Changes proposed by Contractor that are not required in order to meet other Project requirements but may offer advantage to Contractor.

1.3 SUBSTITUTIONS DURING BID PERIOD

.1 Substitutions During the Bid Period: Part B Bidding Procedures specify time restrictions for submitting requests for Substitutions during the bidding period.

1.4 SUBSTITUTIONS DURING CONSTRUCTION

.1 Contract Administrator may consider requests for Substitutions for Cause only within 15 days after date of Contract Award.

.2 Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.

.3 Substitutions for Convenience will not be considered.

.4 Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

.5 A request constitutes a representation that the Contractor:

.1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

.2 Will provide the same warranty for the Substitution as for the specified Product.

.3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to the Contract.

.4 Waives claims for additional costs or time extension which may subsequently become apparent.

.5 Will reimburse Contract Administrator for review or redesign services associated with re-approval by authorities.

.6 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

.7 Substitution Submittal Procedure:

.1 Limit each substitution request to one proposed Substitution.

.2 Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.

.3 Contract Administrator will notify Contractor in writing of decision to accept or reject request.

END OF SECTION

REQUEST FOR SUBSTITUTION

This form must be completely filled in with all relevant data by the Subcontractor and submitted to the Consultant for consideration before any request to change the Drawing or Specification requirements will be considered.

REFERENCE DATA

Project Name:		Date of Request:	
Location:		Consultant Project No.:	
Request by (company):			
Address:			
Contact:	Ph:	Fx:	E:
Subcontract Works:			Package No.:

SUBSTITUTION REQUEST DATA

Substitution is request for:	Reason for Request:
□ Named Product	
□ Product type, material, finish or formulation	
□ Fabrication or installation methods	

PRODUCT/ MATERIAL/ METHOD FOR WHIH SUBSTITUTION IS REQUESTED IS SHOWN ON THE FOLLOWING DOCUMENTS:

Specification:	Section No:	Page(s):	Clause No.(s):
Drawings (list of Drawings as affected):			

COST/ BENEFIT ANALYSIS

Describe in detail any alteration to any other part of the Work not required by use of the requested substitution.

Total net cost to any such other required alterations, incuding overhead and profit:	$
Cost of Contractor's Administration (to be filled in by Contractor):	$
Total cost of such other alterations (to be filled in by Contractor):	$
Total cost savings achieved (from page 2, to be filled in by Contractor):	$
Total cost/ benefit to Owner (to be filled in by Contractor):	$

Benefits to Owner other than financial:

ADDITIONAL INFORMATION REQUIRED

Complete the page 2 as applicable. Attach the following information:

1. Manufacturer's technical data sheets on proposed products.
2. Manufacturer's standard form of warranty.
3. Letter on manufacturer's letterhead stating that manufacturer will warrant products as specified in specification.

REQUEST FOR SUBSTITUTION

COMPARISON OF OPTIONS

Fill in the following blanks as are applicable to the product, material or method type. As a guide, if the item is mentioned in the Specification as a performance or materials replacement, then information about the proposed substitution is required by the Consultant to evaluate the proposed substitution. Requests lacking relevant information will be returned without action.

SPECIFED PRODUCT, MATERIAL OR METHOD	PRPOSED SUBSTITUTION
Description:	Description:
Product Name:	Product Name:
Type:	Type:
Model No.:	Model No.:
Fire Rating (hrs):	Fire Rating (hrs):
Thickness:	Thickness:
Country of manufacture:	Country of manufacture:
Substrate preparation required:	Substrate preparation required:
Length of warranty (yrs):	Length of warranty (yrs):
Sound transfer coefficient (STC):	Sound transfer coefficient (STC):
Exposure class:	Exposure class:
Resistance to chemicals (list):	Resistance to chemicals (list):
Other specified criteria (list):	Other specified criteria (list):

UNIT COST OF PRODUCT/ MATERIAL (must be completed):		UNIT COST OF PRODUCT/ MATERIAL (must be completed)	
$	What:	$	What:
Units required:	Total value: $	Units required:	Total value: $

CONTRACTOR'S REVIEW

I certify that I have review the above documentation for the proposed Request for Substitution and warrant it to be substantially complete and accurate.

Signed by:

Date:

CONSULTANT'S ACTION

☐ Request approved.	☐ Request approved subject to qualifcations per attached documentation.	Approved by:
☐ Request denied.	☐ Refer Variation Order No.:	Date:

Comments:

Part 1 General

1.1 SECTION INCLUDES

.1 Execution requirements for all Work.

1.2 RELATED REQUIREMENTS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 TOLERANCES

.1 Monitor fabrication and installation tolerance control of Products to produce acceptable Work.

.2 Do not permit tolerances to accumulate beyond effective or practical limits.

.3 Comply with manufacturers' tolerances. In case of conflict between manufacturers' tolerances and Contract Documents, request clarification from Contract Administrator before proceeding.

.4 Adjust Products to appropriate dimensions; position and confirm tolerance acceptability, before permanently securing Products in place.

1.4 EXECUTION

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

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

.3 Uncover Work to install ill-timed Work.

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

.5 Remove samples of installed Work for testing, if not designated in the respective Section as remaining as part of the Work.

.6 Provide openings in non-structural elements of Work for penetrations of electrical and mechanical Work. Limit opening dimensions to minimal sizes required, and performed in a neat and clean fashion.

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

.8 Employ original installer to perform cutting and patching for weather-exposed and moisture-resistant elements, and sight-exposed surfaces.

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

.10 Restore Work with new Products in accordance with requirements of Contract Documents.

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

.12 At penetration of fire rated wall, ceiling, or floor construction, completely seal voids with firestopping material, for full thickness of the constructed element.

.13 Re-finish surfaces to match adjacent finishes: For continuous surfaces re-finish to nearest intersection; for an assembly, re-finish entire unit.

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

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Requirements and limitations for cutting and patching of Work.

1.2 RELATED SECTIONS

.1 Individual Product Specification Sections:

.1 Cutting and patching incidental to work of the section.
.2 Advance notification to other sections of openings required in Work of those sections.
.3 Limitations on cutting structural members.

1.3 SUBMITTALS

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

.1 Structural integrity of any element of Project.
.2 Efficiency, maintenance, or safety of any operational element.
.3 Visual qualities of sight exposed elements.

.2 Include in request:

.1 Identification of Project.
.2 Location and description of affected Work.
.3 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 City or separate Contractor.
.7 Written permission of affected separate Contractor.
.8 Date and time work will be executed.

Part 2 Products

2.1 MATERIALS

.1 Primary Products: Those required for original installation.

.2 Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 62 00 – Product Exchange Procedures.

Part 3 Execution

3.1 EXAMINATION

.1 Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

.2 After uncovering existing Work, assess conditions affecting performance of work.

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

3.2 PREPARATION

.1 Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

.2 Provide protection from elements for areas which may be exposed by uncovering work.

3.3 CUTTING AND PATCHING

.1 Obtain Contract Administrator approval before cutting, boring or sleeving load-bearing members.

.2 Cut and patch as required to make work fit.

.3 Make cuts with clean, true, smooth edges.

.4 Where new work connects with existing and where existing work is altered, cut, patch and make good to match existing work.

3.4 CUTTING

.1 Execute cutting and fitting to complete the Work.

.2 Uncover work to install improperly sequenced work.

.3 Remove and replace defective or non-conforming work.

.4 Remove samples of installed work for testing when requested.

.5 Provide openings in the Work for penetration of mechanical and electrical work.

.6 Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

.7 Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

3.5 PATCHING

.1 Execute patching to complement adjacent Work.

.2 Fit Products together to integrate with other Work.

.3 Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.

.4 Employ original installer to perform patching for weather exposed and moisture resistant elements, and sight-exposed surfaces.

.5 Restore work with new Products in accordance with requirements of Contract Documents.

.6 Fit work air tight to conduit and other penetrations through surfaces.

.7 At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated or fire-resistant material to Section 07 84 00, to full thickness of the penetrated element.

.8 Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

3.6 ACCIDENTAL CUTTING OR DAMAGE

.1 Report any accidental cutting of reinforcing steel or damage to any structural elements to the Contract Administrator.

.2 Contract Administrator will provide instruction for remedial measures.

.3 Contractor is responsible for any and all remedial work and associated costs including engineering.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Progressive cleaning.

.2 Cleaning prior to acceptance.

.3 Final product cleaning.

1.2 RELATED REQUIREMENTS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 49.

Part 2 Products

2.1 CLEANING MATERIALS

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

Part 3 Execution

3.1 PROGRESSIVE CLEANING

.1 Maintain clear path of travel for public egress within temporary corridors as outlined in Section 01 53 00 - Temporary Construction.

.2 Maintain Work in tidy condition, free from accumulation of waste products and debris, including that caused by Contract Administrator or other Contractors.

.3 Remove waste materials from site at regularly scheduled times or dispose of as directed by Contract Administrator. Do not burn waste materials on site.

.4 Clear snow and ice from area of construction, remove from site.

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

.6 Containers:

.1 Provide on-site steel framed, hinged lid containers for collection of waste materials and debris.

.7 Remove waste material and debris from site and deposit in waste containers at end of each working day.

.8 Dispose of waste materials and debris off site.

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

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

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

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

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

3.2 CLEANING PRIOR TO ACCEPTANCE

.1 Prior to applying for Substantial Performance of the Work, remove surplus products, tools, construction machinery and equipment not required for performance of remaining Work.

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

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

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

.5 Do not burn waste materials on site.

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

.7 Clean and polish glass, hardware, tile, stainless steel, chrome 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, fitments, walls, floors and ceilings.

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

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

.11 Clean and polish surface finishes, as recommended by manufacturer.

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

.13 Remove dirt and other disfiguration from exterior surfaces.

.14 Clean and sweep roofs surfaces, and drainage components

.15 Clean equipment and fixtures to a sanitary condition; clean filters of mechanical equipment.

3.3 FINAL PRODUCT CLEANING

.1 Execute final cleaning prior to final project assessment.

.2 Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum surfaces.

.3 Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

.4 Clean filters of operating equipment.

.5 Remove waste and surplus materials, rubbish, and construction facilities from the site.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Inspections and declarations.

.2 Closeout submittals.

.3 Operation and maintenance manuals.

.4 As-built documents and record documents.

.5 Warranties and bonds.

.6 Maintenance materials, special tools and spare parts.

1.2 RELATED REQUIREMENTS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 45 00 - Quality Control.

.3 This section describes requirements applicable to all Sections within Divisions 02 to 49.

1.3 DEFINITIONS

.1 As-Built Documents: Project documents that are annotated by the Contractor during construction to record changes in the Work.

.2 Record Documents: As-built documents consisting of Drawings and Specifications produced, usually electronically, from information derived from the Contractor's as-built documents.

1.4 REFERENCES

.1 WCA/MAA Technical Bulletin #15 – Operations and Maintenance Manuals, dated December 24, 2001.

1.5 INSPECTIONS AND DECLARATIONS

.1 Substantial Performance:

.1 Contractor's Pre-Substantial Performance Inspection:

.1 Before requesting Substantial Performance review, the Contractor and Subcontractors shall conduct an inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.

.2 Notify Contract Administrator of Contractor's Pre-Substantial Performance inspection dates.

.3 After conducting pre-substantial performance inspection, notify Contract Administrator in writing of time allotted for completion of repairs and correction of deficiencies and defects. Indicate proposed date for Substantial Performance review.

.2 Substantial Performance Application: Once corrections have been made and Work is considered ready for Substantial Performance review, make formal application for Substantial Performance, confirming that the following has been completed:

.1 Work has been completed and inspected for compliance with the Contract Documents, and requirements of Substantial Performance as defined by Provincial lien legislation.

.2 Defects have been corrected and deficiencies have been completed.

.3 Equipment and systems have been tested, adjusted and balanced, and are fully operational and complete.

.4 Certificates required by authorities having jurisdiction have been submitted.

.5 Certificates required by utility companies have been submitted.

.6 Operation of systems have been demonstrated to Contract Administrator's personnel.

.7 Operations and maintenance manuals, as-built drawings have been submitted to Contract Administrator.

.8 Application for occupancy permit has been initiated.

.9 Detailed listing of seasonal work and schedule for completion has been provided.

.10 Final cleaning including cleaning of air handling systems and ductwork.

.3 Substantial Performance Review:

.1 Request Contract Administrator’s review.

.2 Have initial operating and maintenance manuals on site for Substantial Performance review.

.3 Accompany Contract Administrator on Substantial Performance review to identify obvious defects or deficiencies and items requiring completion or correction.

.4 Upon completion of review, Contract Administrator will verify whether Substantial Performance has been achieved and advise the Contractor accordingly.

.5 Comply with Contract Administrator’s instructions for correction of items of Work listed in closeout review report.

.6 Notify Contract Administrator of completion of items of Work determined in Contract Administrator’s Substantial Performance review, and request review by Contract Administrator.

.4 Declaration of Substantial Performance: When Contract Administrator considers defects and deficiencies have been corrected, and it appears requirements of Contract have been substantially performed, the Contract Administrator will determine the date of Substantial Performance of the Work, and issue a certificate of Substantial Performance.

.2 Commencement of Warranty Periods: The date for the commencement of the warranty period shall be as set out in the Supplemental Conditions.

.3 Commencement of Lien Periods: The date of publication of the certificate of Substantial Performance of the Work shall be the date for commencement of the lien period, unless required otherwise by the lien legislation applicable at the Place of the Work.

.4 Final Payment: When Contract Administrator considers final deficiencies and defects have been corrected and it appears requirements of Contract have been completed, make application for final payment.

.5 Payment of Hold-back: After issuance of certificate of Substantial Performance of the Work, submit an application for payment of hold-back amount, upon expiry of the lien period.

1.6 CLOSEOUT SUBMITTALS

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Copy will be returned after final inspection with Contract Administrator's comments.

.3 Revise content of documents as required prior to final submittal.

.4 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, one digital copy on a flash drive and four hard copies of the final operating and maintenance manuals in Canadian English.

.5 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.6 If requested, furnish evidence as to type, source and quality of products provided.

.7 Defective Products will be rejected, regardless of previous inspections. Replace Products at own expense.

.8 Pay costs of transportation.

1.7 OPERATION AND MAINTENANCE MANUALS

.1 Submission:

.1 Prepare operation and maintenance instructions and data using personnel experienced in maintenance and operation of described products.

.2 Two weeks before Substantial Performance of the Work, submit to the Contract Administrator, one initial digital copy of operating and maintenance manuals. All files to be searchable pdf file format and separated into appropriate sections as specified.

.3 Initial copy will be returned after Substantial Performance, with Contract Administrator's comments.

.4 Revise content of documents as required before final submittal.

.5 Should comments be extensive, the Contract Administrator may require the initial submission to be repeated before Substantial Performance.

.6 Two weeks prior to final inspection of the Work, submit to the Contract Administrator, one digital copy and four hard copies of final operating and maintenance manuals in English.

.2 Organize data in accordance with WCA/MAA Technical Bulletin #15, and as follows:

.1 Text:

.1 Hard copy: Manufacturer's printed data.

.2 Electronic copy: Provide electronic documents in accordance with requirements for electronic submissions in Section 01 33 00 – Submittal Procedures.

.2 Drawings:

.1 Hard copies: with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.2 Electronic: CAD and PDF copies of drawings in ledger size.

.3 Provide full size drawings in 1:1 scaled CAD files in dwg format on DVD or USB flash drive, when size is not practical for inclusion as paper drawings.

.3 Contents – Each Volume:

.1 Table of Contents: Include:

.1 Title of project.

.2 Date of submission.

.3 Names, addresses, and telephone numbers of Contract Administrator and Contractor with name of responsible parties.

.4 Schedule of products and systems, indexed to content of volume.

.5 For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

.2 Materials and Finishes:

.1 Building Products, Applied Materials, and Finishes: include product data, with catalogue number, size, composition, and colour and texture designations.

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

.3 Building Envelope: Include an outline of requirements for regular inspections and for regular maintenance to ensure that on-going performance of the building envelope will meet the initial building envelope criteria.

.3 Each Item of Equipment and Each System:

.1 Include description of unit or system, and component parts. Give function, normal operation characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

.2 Include installed colour coded wiring diagrams.

.3 Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

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

.5 Provide servicing schedule.

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

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

.8 Provide installed control diagrams by controls manufacturer.

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

.10 Additional requirements: As specified in individual specification sections.

.4 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

.5 Warranties and bonds.

.6 List of spare parts and maintenance materials.

.7 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.8 Certificate of Acceptance: Relevant certificates issued by authorities having jurisdiction, including pressure vessel acceptance, code compliance certificate, life safety systems performance certificate.

1.8 AS-BUILT DOCUMENTS AND RECORD DOCUMENTS

.1 As-Built Documents:

.1 In addition to requirements in General Conditions, maintain at the site for Contract Administrator and The City, one (1) record copy of:

.1 Contract Drawings.
.2 Specifications.
.3 Addenda.
.4 Change Orders and other modifications to the Contract.
.5 Reviewed shop drawings, product data, and samples.
.6 Field test records.
.7 Inspection certificates.
.8 Manufacturer's certificates.

.2 Contract drawings and shop drawings: legibly mark each item to record actual construction, including:
.1 Measured depths of various elements of foundation in relation to survey datum.
.2 Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Identify the exact location and invert elevation of underground valves and physical dimensions of all buried equipment.
.3 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.
.4 The required circuit layout for electrical, data transmission and fire alarms.
.5 The location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the structure.
.6 Field changes of dimension and detail.
.7 Changes made by Addenda or Change Orders.
.8 Details not on original Contract Drawings.
.9 References to related Shop Drawings and modifications.

.3 Specifications: legibly mark each item to record actual construction, including:
.1 Manufacturer, trade name, and catalogue number of each product actually installed, particularly optional items and substitute items.
.2 Changes made by Addenda and change orders.

.4 Store as-built documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage.

.5 Label as-built documents and file in accordance with section number listings in List of Contents of the Project Manual. Label each document "AS-BUILT DOCUMENTS" in neat, large, printed letters.

.6 Maintain as-built documents in clean, dry and legible condition. Do not use as-built documents for construction purposes.

.7 Keep as-built documents and samples available for inspection by Contract Administrator.

.8 Other Documents: Maintain [manufacturer's certifications], [inspection certifications], and [field test records] required by individual specifications sections.

.2 Record Documents:

.1 Prepare record documents in the form of a master set of Drawing and Specification files from the as-built documents maintained on site. Mark revised documents as "RECORD DOCUMENTS". Include all revisions.

.2 Employ a competent computer draftsperson to indicate changes on the electronic set of record drawings.

.3 Employ a competent specification writer to indicate changes to the electronic set of record specifications.

.4 Electronic CAD Drawings and Specification Files:

.1 May be available to the Contractor for a service fee per drawing sheet and/or specification section, for their use in developing record documents.

.2 Contractor requiring digital drawings or specifications shall make a request directly to the Contract Administrator, and will be responsible for such digital files.

.3 Contractor will be required to sign a waiver, accepting responsibility for the use of the drawings and specifications and will not be permitted to distribute the files or use the files for any other purpose.

.4 Contractor shall provide payment to the Contract Administrator prior to receiving such digital drawings or specifications.

.3 Submission:

.1 [Two weeks] before Substantial Performance of the Work, submit to the Contract Administrator, one initial electronic copy in searchable pdf format of Drawing and Specification files.

.2 Initial copy will be returned after Substantial Performance, with Contract Administrator's comments.

.3 Revise content of documents as required before final submittal.

.4 Should comments be extensive, the Contract Administrator may require the initial submission to be repeated before Substantial Performance.

.5 Final submission incorporating Contract Administrator's comments to include 1 hard copy and an electronic copy in the file formats noted below via electronic transfer to Contract Administrator prior to release of final payment.

.1 Drawings: AutoCAD Release [2017 or later] and searchable pdf format.

.2 Specifications: Microsoft Word and searchable pdf format.

1.9 WARRANTIES AND BONDS

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

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

.3 Obtain warranties and bonds, executed in duplicate by Subcontractors, suppliers, and manufacturers, within 10 Business Days after completion of the applicable item of work.

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

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

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittals.

1.10 MAINTENANCE MATERIALS, SPECIAL TOOLS AND SPARE PARTS

.1 Package spare parts, maintenance materials, and special tools in suitable containers, labelled for maintenance use. Clearly identify contents of each package. Include catalogue, serial or replacement number for each part.

.2 Maintenance Materials:

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

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

.3 Receive and catalogue all items. Submit inventory listing to Contract Administrator. Include approved listings in Operations and Maintenance Manual.

.4 Obtain receipt for delivered maintenance materials, and submit prior to final payment.

.3 Spare Parts:

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

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

.3 Receive and catalogue all items. Submit inventory listing to Contract Administrator. Include approved listings in Operations and Maintenance Manual.

.4 Obtain receipt for delivered spare parts, and submit prior to final payment.

.4 Tools:

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

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

.3 Receive and catalogue all items. Submit inventory listing to Contract Administrator. Include approved listings in Operations and Maintenance Manual.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Procedures for demonstration and instruction of Products, equipment and systems to facility personnel.

.2 Seminars and demonstrations.

1.2 RELATED REQUIREMENTS

.1 This section describes requirements applicable to all Sections within Divisions 02 to 28.

1.3 DESCRIPTION

.1 Demonstrate operation and maintenance of building systems and equipment to facility personnel two weeks prior to date of Substantial Performance.

.2 Contract Administrator will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

1.4 COMPONENT DEMONSTRATION

.1 Manufacturer to provide authorized representative to demonstrate operation of equipment and systems.

.2 Instruct facility personnel, and provide written report that demonstration and instructions have been completed.

1.5 SUBMITTALS

.1 Submit schedule of time and date for demonstration of each item of equipment and each system two weeks prior to designated dates, for Contract Administrator's approval.

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

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

1.6 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with:

.1 Section 21 01 10 – Common Work Mechanical
.2 Section 22 42 01 – Plumbing Specialties
.3 Section 23 73 13 – Air Conditioning Units – Packaged Terminal
.4 Section 26 05 00 – Common Work Results for Electrical
.5 Section 26 51 13 – Interior Luminaires
.6 Section 26 83 33 – Electric Space Heating Space
.7 Section 28 46 00 – Fire Alarm

.2 Testing, adjusting, and balancing have been performed, and equipment and systems are fully operational.

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 PREPARATION

.1 Verify that suitable conditions for demonstration and instructions are available.

.2 Verify that designated personnel are present.

.3 Prepare agendas and outlines.

.4 Establish seminar organization.

.5 Explain component design and operational philosophy and strategy.

.6 Develop equipment presentations.

.7 Present system demonstrations.

.8 Accept and respond to seminar and demonstration questions with appropriate answers.

3.2 PREPARATION OF AGENDAS AND OUTLINES

.1 Prepare agendas and outlines including the following:

.1 Equipment and systems to be included in seminar presentations.

.2 Name of companies and representatives presenting at seminars.

.3 Outline of each seminar's content.

.4 Time and date allocated to each system and item of equipment.

.5 Provide separate agenda for each system.

3.3 SEMINAR ORGANIZATION

.1 Coordinate content and presentations for seminars.

.2 Coordinate individual presentations and ensure representatives scheduled to present at seminars are in attendance.

.3 Arrange for presentation leaders familiar with the design, operation, maintenance and troubleshooting of the equipment and systems. Where a single person is not familiar with all aspects of the equipment or system, arrange for specialists familiar with each aspect.

.4 Coordinate proposed dates for seminars with Contract Administrator and select mutually agreeable dates.

3.4 DEMONSTRATION AND INSTRUCTIONS

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

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

.3 Instruct personnel on control and maintenance of sensory equipment and operational equipment associated with maintaining energy efficiency and longevity of service.

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

.5 Prepare and insert additional data in operations and maintenance manuals when the need for additional data becomes apparent during instructions.

3.5 TIME ALLOCATED FOR INSTRUCTION

.1 Ensure amount of time required for instruction of each item of equipment or system as follows:

.1 Section 21 01 10 – Common Work Mechanical: two hours of instruction
.2 Section 22 42 01 – Plumbing Specialties: two hour of instruction
.3 Section 23 73 13 – Air Conditioning Units – Packaged Terminal: two hour of instruction
.4 Section 26 05 00 – Common Work Results for Electrical: two hours of instruction
.5 Section 26 51 13 – Interior Luminaires: two hour of instruction
.6 Section 26 83 33 – Electric Space Heating Space: two hour of instruction
.7 Section 28 46 00 – Fire Alarm: two hour of instruction

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Section includes new architecturally exposed structural-steel finish to existing steel and new support components for the new curtain wall assembly.

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A780 / A780M-09(R2015) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

.2 Canadian Institute of Steel Construction (CISC)

.1 Guide for Specifying Architecturally Exposed Structural Steel

.3 CSA Group (CSA)

.1 CSA S16-09 - Design of Steel Structures

.2 CSA-W59-03 (R2008) - Welded Steel Construction (Metal Arc Welding)

.4 The Society for Protective Coatings (SSPC)

.1 Steel Structures Painting Manual

1.3 ADMINISTRATIVE REQUIREMENTS

.1 Coordinate selection of shop primers with topcoats. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

1.4 SUBMITTALS FOR ACTION

.1 Section 01 33 00: Submission procedures.

.2 Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS:

.1 Provide erection drawings indicating AESS members and their AESS Category per CISC Guide for Specifying Architecturally Exposed Structural Steel Category Matrix.

.2 Include details of cuts, connections, splices, camber, holes, and other pertinent data.

.3 Include embedment drawings.

.4 Indicate welds by standard CWB symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.

.5 Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pre-tensioned and slip-critical high-strength bolted connections. Indicate orientation of bolt heads.

.6 Indicate exposed surfaces and edges and surface preparation being used.

.7 Indicate special tolerances and erection requirements.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Qualification Data: For qualified fabricator, and erector.

1.6 QUALITY ASSURANCE

.1 Fabricator and Erector Qualifications as follows:

.1 Provide written verification of having completed comparable AESS work.

.2 Comply with applicable provisions of the following specifications and documents:

.1 CISC Guide for Specifying Architecturally Exposed Structural Steel, Appendix 1 - Code of Standard Practice.

.3 Mock-ups: Include the following:

.1 Section 01 45 00 – Quality Control.

.2 First off inspection: First element fabricated for use in finished structure subject to alterations for subsequent pieces.

.3 Provide scaled or full scale mock-ups as directed by Contract Administrator. Mock-ups shall be judged for aesthetic effects as well as qualities of materials and execution.

.4 Full scale mock-up to be completed at the location identified for glazed aluminum curtain wall mock-up for both the north and south walkways.

.5 Include surface preparation and finish paint system.

.6 Do not start fabrication of final units until mock-up is approved by Contract Administrator and the City.

.7 Scaled mock-ups will be retained until project is completed.

.8 Approved full-scale mock-ups may become part of the completed work.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

.1 Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Cleaning and Waste Processing.

1.9 PROJECT CONDITIONS

.1 Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

Part 2 Products

2.1 MATERIALS

.1 Refer to requirements of Section 08 44 13 – Glazed Aluminum Curtain Wall.

2.2 SPECIAL SURFACE PREPARATION

.1 Primers: As recommended for paint finish.

2.3 FABRICATION

.1 For special fabrication characteristics, refer to Table 1 – AESS Category Matrix.

.2 Shop-fabricate and assemble AESS to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Contract Administrator. Detail assemblies to minimize handling and to expedite erection.

.3 Fabricate AESS with surface quality consistent with the AESS Category and approved samples.

.4 Architecturally Exposed Structural Steel (AESS) - Category Matrix: Table 1:

.1 Refer to AESS for further requirements for each category.

.2 Category 4: Showcase Elements:

.1 Surface preparation to SSPC-SP6.

.2 Sharp edges ground smooth.

.3 Continuous weld appearance.

.4 Standard structural bolts.

.5 Weld spatters removed.

.6 Visual samples as specified.

.7 One-half standard fabrication tolerances.

.8 Fabrication marks not apparent.

.9 Welds uniform and smooth.

.10 Mill marks removed.

.11 Butt and plug welds ground smooth and filled.

.12 HSS weld seam oriented for reduced visibility.

.13 Cross sectional abutting surface aligned.

.14 Joint gap tolerances minimized.

.15 Welded connections unless otherwise specified. Review locations with Contract Administrator.

.16 HSS seam not apparent.

.17 Welds contoured and blended.

.18 Surfaces filled and sanded.

.19 Weld show-through minimized.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that field conditions are acceptable and are ready to receive work.

.2 Verify dimensions, tolerances, and method of attachment with other work.

.3 Verify AESS members upon delivery are free of twist, kinks, gouges and other imperfections that may result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 ERECTION

.1 Set AESS accurately in locations and to elevations indicated, and according to CSA S16.

.2 Erection techniques to meet the requirements of Section 08 44 13 - Glazed Aluminum Curtain Wall, and the specified AESS Category:

.1 Bolt Head Placement: Bolt heads to be placed as indicated on the structural Drawings. Where not indicated, place bolt heads in a given connection to one side.

.2 Removal of Field Connection Aids: Remove run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up and welding in the field from the structure. Remove welds at run-out tabs to match adjacent surfaces and grind smooth. Plug weld holes for erection bolts and grind smooth.

.3 Filling of Connection Access Holes: Fill connection access holes with proper procedures to match architectural profile.

.4 Field Welding: Weld profile, quality, and finish shall be consistent with Category and approved mock-ups and samples.

.3 Bolted Connections: In accordance Section 08 44 13 - Glazed Aluminum Curtain Wall,. Provide bolt type and finish as specified and place bolt heads as indicated on the approved Shop Drawings.

.4 Welded Connections: Comply with CSA W59 and Section 08 44 13 - Glazed Aluminum Curtain Wall. Appearance and quality of welds shall be consistent with the Category and approved samples. Assemble and weld built-up sections by methods that will maintain alignment of members to the specified tolerance.

.1 Assemble and weld built-up sections by methods that will maintain alignment of axes. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.

.5 Contract Administrator will review AESS steel in place and determine acceptability based on the specified Category, and approved samples and mock-ups.

3.3 ERECTION TOLERANCES

.1 Erection tolerances: in accordance with the requirements of standard frame tolerances for structural steel per CSA S16.

3.4 ADJUSTING AND CLEANING

.1 Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Touch-up work shall be done in accordance with manufacturer's instructions.

.2 Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

3.5 SCHEDULE OF ITEMS

.1 Existing structural steel exposed within the two walkways. The existing precast stabilization structural steel anchors, railing supports, and steel brackets will be demolished and the remaining visible structural steel is to be refinished to the AESS category specified and painted.

.2 New structural support members for the new curtain wall assembly is to be refinished to the AESS category specified and painted.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and application of Wind-Load and Guard-Load bearing steel stud systems.

1.2 REFERENCES

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

.1 ASTM A653/A653M-04a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian Standards Association (CSA International)

.1 CSA W47.1-03, Certification of Companies for Fusion Welding of Steel.

.2 CSA W55.3-1965(R2003), Resistance Welding Qualification Code for Fabricators of Structural Members Used in Buildings.

.3 CSA W59-03, Welded Steel Construction (Metal Arc Welding) (Metric Version).

.4 CAN/CSA S136-01, North American Specification for the Design of Cold-Formed Steel Structural Members.

.3 Canadian Sheet Steel Building Institute (CSSBI)

.1 CSSBI 50M-87, Lightweight Steel Framing Manual.

.2 CSSBI 52M-91, Lightweight Steel Framing Binder.

.3 CSSBI Fact Sheet #3 June 1994, Care and Maintenance of Prefinished Sheet Steel Building Products.

.4 CSSBI Technical Bulletin Vol. 7, No. 2 February 2004, Changing Standard Thicknesses for Canadian Lightweight Steel Framing Applications.

.5 CSSBI S5-04, Guide Specification for Wind Bearing Steel Studs.

1.3 SUBMITTALS

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

.2 Shop Drawings:

.1 Indicate design loads, member sizes, materials, design thickness exclusive of coatings, coating specifications, screw sizes and spacing, fasteners and anchors.

.2 Shop drawings shall be sealed by an Engineer registered in the Province of Manitoba.

.3 Samples:

.1 Upon request, submit samples of framing components and fasteners to Contract Administrator.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect steel studs during transportation, site storage and installation in accordance with CSSBI Sheet Steel Facts #3.

.2 Handle and protect galvanized materials from damage to zinc coating.

Part 2 Products

2.1 MATERIALS

.1 Steel: to CSA S136, fabricated from ASTM A653/A653M.

.1 Material that is 1.22mm and thinner shall be grade 230MPa steel.

.2 Material that is greater than 1.22mm shall be grade 345 MPa steel.

.2 Zinc coated steel sheet: quality to ASTM A653/A653M.

.1 Studs shall have a minimum Z180 designation coating.

.3 Welding materials: to CSAW59 and certified by Canadian Welding Bureau.

.4 Metal Angles (break metal):

.1 Steel: to CSA S136, fabricated from ASTM A653/A653M. Grade 230MPa steel.

.2 Zinc coated steel sheet: quality to ASTM A653/A653M. Minimum Z275 designation coating.

.3 Thickness: As shown on Drawings.

.4 Size: As shown on Drawings.

.5 Metal angel fasteners: As shown on Drawings

.5 Fasten studs to tracks as per reviewed shop drawings. Corrosion protected with minimum zinc coating thickness of 0.008mm.

.6 Fasten tracks to concrete with fasteners as indicated on reviewed shop drawings. Minimum fasteners edge distance is 75mm. Install as per manufacturer's requirements.

.7 Fasten tracks to steel with fasteners as indicated on reviewed shop drawings. Minimum fasteners edge distance is 25mm. Install fasteners as per manufacturer's requirements.

2.2 METAL FRAMING

.1 Steel studs: to CSA S136, fabricated from metallic coated steel, as shown on Drawings.

.2 Stud tracks: fabricated from same material and finish as steel studs, depth to suit.

.1 Bottom track: single piece.

.2 Top track: two piece telescoping.

.3 Bridging: fabricated from same material and finish as studs, 38 x 12 x 1.09 mm minimum thickness.

.4 Angle clips: fabricated from same material and finish as studs, 38 x 38 mm x depth of steel stud, 1.37 mm minimum thickness.

.5 Tension straps and accessories: as recommended by manufacturer.

2.3 SOURCE QUALITY CONTROL

.1 Ensure mill reports covering material properties are reviewed by Consultant.

Part 3 Execution

3.1 GENERAL

.1 Do welding in accordance with CSA W59.

.2 Certification of companies: CSA W47.1 for fusion welding CSA W55.3 for resistance welding.

.3 Do work to CSSBI S5.

3.2 ERECTION

.1 Erect components to requirements of reviewed engineered shop drawings.

.2 Anchor tracks securely to structure at spacing indicated on reviewed shop drawings.

.3 Erect studs plumb, aligned and securely attached with screws indicated on reviewed shop drawings.

.4 Seat studs into bottom tracks.

.5 Two piece telescoping top track.

.1 Install 60.0 mm minimum telescoping track at top of walls where required to accommodate vertical deflection. The inner track shall be 70mm.

.1 Nest top track into deflection channel 40.0 mm.

.2 Do not fasten tracks together.

.3 Stagger joints.

.6 Install studs at not more than 50.0 mm from abutting walls, openings, and each side of corners and terminations with dissimilar materials.

.7 Brace steel studs with horizontal internal bridging at 1500 mm maximum or as otherwise indicated on shop drawings.

.8 Fasten bridging to steel clips fastened to steel studs with screws or by welding.

.9 Frame openings in stud walls to adequately carry loads by use of additional framing members and bracing as indicated on structural drawings.

.10 Touch up welds with coat of zinc rich primer.

3.3 ERECTION TOLERANCES

.1 Plumb: not to exceed 1/500th of member length.

.2 Camber: not to exceed 1/1000th of member length.

.3 Spacing: not more than +/- 3.0 mm from design spacing.

.4 Gap between end of stud and track web: not more than 4.0 mm.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Interior decorative stainless steel railings for the existing stair and ramp within the South Walkway, the ramp within the North Walkway and the full length of both walkways along the exterior walls.

1.2 DEFINITIONS

.1 Delegated Design Professional: The specialist or supporting design professional contracted to the Contractor, fabricator or manufacturer to design and/or review specific building components or sub-components, and provide Shop Drawings and Delegated Design Submittals to meet the requirements of authorities having jurisdiction.

.2 Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.3 REFERENCES

.1 ASTM International (ASTM)

- .1 ASTM A554-16, Standard Specification for Welded Stainless Steel Mechanical Tubing
- .2 ASTM A 276 /A276M-17 Standard Specification for Stainless Steel Bars and Shapes
- .3 ASTM B221-14 Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
- .4 ASTM E 894-18, Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings
- .5 ASTM E 935-13e1, Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings
- .6 ASTM E 985-00e1, Standard Specification for Permanent Metal Railing Systems and Rails for Buildings

.2 Canadian Standards Association (CSA International)

- .1 CSA-W48-14 - Filler Metals and Allied Materials for Metal Arc Welding
- .2 CSA-W59-13 - Welded Steel Construction (Metal Arc Welding)

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

- .1 Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- .2 Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.
- .3 Coordinate bracket locations for handrails running the length of the walkways with the existing structure.

.4 Coordinate new post locations for ramp handrails with existing post locations along curb.

.5 Coordinate new post locations for stair handrail with existing post locations to minimize damage and disruption to existing floor finishes.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Manufacturer's product lines of railings assembled from standard components.

.3 Shop Drawings: Show fabrication and installation details for decorative metal railings.

.1 Include plans, elevations, sections, and details of each type of decorative metal railing, and each type and location of connection. Show anchorage and accessory items.

.2 Indicate construction details, sizes, and finishes of railing components.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Delegated Design Submittals: Submit documentation indicating compliance to design criteria, signed and sealed by the delegated design professional responsible for their preparation.

.1 Design Data: Include material data, calculations and details.

.3 Qualification data.

1.7 QUALITY ASSURANCE

.1 Fabricator Qualifications: Company specializing in performing work of this Section.

.2 Delegated Design Professional Qualifications: Professional Structural Engineer experienced in design and installation of work indicated, licensed in the Province of Manitoba.

.3 Fabrication of stainless steel items to take place in a shop exclusively used for stainless steel fabrication.

1.8 DELIVERY, STORAGE, AND HANDLING

.1 Protect metal surfaces during handling and storage to prevent staining, abrasion of finish coatings, bending, and denting.

.2 Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Construction/Demolition Waste Management and Disposal.

1.10 PROJECT CONDITIONS

.1 Field Measurements: Verify actual locations of construction contiguous with decorative metal railings by field measurements before fabrication and indicate measurements on Shop Drawings.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Delegated Design: Design railings and guards, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

.2 In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

.1 Stainless Steel: 60 percent of minimum yield strength.

.3 Design handrails, supports, and connections to withstand the following loads obtained from the non-concurrent application of:

.1 Concentrated load not less than 0.9 kN applied at any point and in any direction,

.2 and a uniform load of not less than 0.7 kN/m applied in any direction.

.4 Design guards, and connections to withstand effects of gravity loads and following loads and stresses within limits and under conditions indicated:

.1 Minimum horizontal load applied inward or outward at the minimum required height of a guard:

.1 3.0 kN/m for means of egress serving grandstands, stadiums, bleachers, arenas and open viewing areas.

.2 Concentrated load of 1.0 kN applied at any point for access ways to equipment platforms, contiguous stairs and similar areas where the gathering of many people is improbable, and

.3 0.75 kN/m or a concentrated load of 1.0 kN applied at any point, whichever governs for locations other than those specified in the two preceding subparagraphs.

.2 Minimum specified load applied vertically at the top of required guards: 1.5 kN/m, and not considered to act simultaneously with horizontal design load.

2.2 MATERIALS

.1 Stainless Steel:

.1 Tubing: to ASTM A554, Grade MT 304

.2 Bars and Shapes: to ASTM A 276, Type 304

.2 Welding Materials and Electrodes: Type required for materials being welded.

2.3 METALS, GENERAL

.1 Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, or blemishes where exposed to view in completed Work.

.2 Brackets, Flanges, and Anchors: Same metal and finish as supported rails.

2.4 FASTENERS

.1 General: Select fasteners for type, grade, and class required.

.1 Stainless-Steel Components: Type 304 stainless-steel fasteners.

.2 Dissimilar Metals: Type 304 stainless-steel fasteners.

.2 Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

2.5 FABRICATION

.1 Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

.2 Provide inserts and other anchorage devices for connecting railings to concrete, and steel components. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

.3 Assemble railings in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

.4 Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1 mm unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

.5 Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

.6 Form exposed work with accurate angles and surfaces.

.7 Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

.8 Connections: Fabricate railings with welded connections unless otherwise indicated.

.9 Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

.1 Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

.2 Obtain fusion without undercut or overlap.

.3 Remove flux immediately.

.4 At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

.10 Close exposed ends of hollow railing members.

.11 Flanges, Fittings, and Anchors: Provide flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

.12 Ramp, Stair and Continuous Railings along Walkways:

.1 Posts: Stainless steel tubing, diameter indicated.

.2 Handrail: Stainless steel tubing, diameter indicated.

.3 Handrail Brackets: Stainless steel, suitable for diameter of handrail indicated. Mechanically fastened to steel column or wall as indicated.

.4 Provide baseplate with welded sleeve at each floor mounted post.

.5 Finish: No. 4, satin stainless steel.

2.6 GENERAL FINISH REQUIREMENTS

.1 Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

.2 Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

.3 Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

2.7 STAINLESS-STEEL FINISHES

.1 Remove tool and die marks and stretch lines, or blend into finish.

.2 Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

.3 Directional Satin Finish: No. 4.

.4 When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that field conditions are acceptable and are ready to receive work.

.3 Verify dimensions, tolerances, and method of attachment with other work.

.4 Verify locations of concealed reinforcements in gypsum board assemblies have been clearly marked for installer. Locate reinforcements and mark locations if not already done.

3.2 INTERIOR RAILINGS

.1 Fit exposed connections together to form tight, hairline joints.

.2 Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

.1 Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

.2 Set posts plumb within a tolerance of 2 mm in 1 m.

.3 Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 6 mm in 3.6 m.

.3 Adjust railings before anchoring to ensure matching alignment at abutting joints.

.4 Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

.5 Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ATTACHING RAILINGS

.1 Wall-Mounted Railings: Attach wall mounted stainless steel handrails with 50-mm clearance from inside face of handrail and wall surface. Locate brackets as indicated. Space brackets as indicated or, if not indicated, at spacing required to support structural loads.

.1 For steel-framed partitions, use hanger or lag bolts set into steel or wood backing between studs concealed behind gypsum board. Coordinate with stud installation to locate backing members.

.2 Post-Mounted Railings: Weld stainless steel handrails to stainless steel mounting posts.

3.4 CLEANING

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

.2 Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

3.5 PROTECTION

.1 Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

.2 Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 07 27 00 – Air Barriers.

.2 Section 07 54 23 – Thermoplastic Olefin Roofing.

.3 Section 07 62 00 – Sheet Metal Flashing and Trim.

.4 Section 07 92 00 – Joint Sealant.

.5 Section 08 44 13 – Glazed Aluminum Curtain Wall.

1.2 REFERENCES

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

.1 ASTM A653/A653M-09a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealled) by the Hot-Dip Process.

.2 ASTM D1761-06, Standard Test Methods for Mechanical Fasteners in Wood.

.2 Canadian Standards Association (CSA International)

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

.2 CSA O80 Series-08 (R2012), Wood Preservatives

.3 CSA O121-08, Douglas Fir Plywood.

.4 CSA O141-05(2014), Softwood Lumber.

.5 CSA O151-09, Canadian Softwood Plywood.

.6 CAN/CSA-G164-M92(R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber.

1.3 MEASURMENT PROCEDURES

.1 No measurement will be made under this section. Contractor shall include in the appropriate fixed price component all labour, materials, supervision, and equipment as required to complete the work required under this Section and as shown on the Drawings.

1.4 QUALITY ASSURANCE

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

.2 Plywood in accordance with CSA standard.

1.5 DELIVERY, STORAGE, AND HANDLING

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

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 FRAMING AND STRUCTURAL MATERIALS

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

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.2 Framing and board lumber: in accordance with NBC, except as indicated or specified otherwise.

.3 Furring, blocking, nailing strips, grounds, rough bucks, cants, curbs, fascia backing and sleepers all to be pressure treated:

.1 S2S is acceptable for interior protect areas.

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

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

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

2.2 ACCESSORIES

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

.2 Sprayed polyurethane foam to meet the requirements of ULC S705.1.

.1 Acceptable product or approved equal in accordance with B6: Enerfoam by Dow Chemical Company.

.3 General purpose adhesive: to CSA O112 Series.

.4 Nails, spikes and staples: to CSA B111.

.5 Bolts: 12.5 mm (1/2”) diameter unless indicated otherwise, complete with nuts and washers.

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

.7 Nailing discs: flat caps, minimum 25 mm diameter, minimum 0.4 mm thick, sheet metal, formed to prevent dishing. Bell or cup shapes not acceptable.

2.3 FASTENER FINISHES

.1 Stainless steel, unless otherwise indicated on drawings.

.1 300 series stainless steel.

.2 400 series stainless steel.

.3 Corrosion resistant finish:

.1 Multi-layered application.

2.4 WOOD PRESERVATIVE

.1 Wood Preservative: CCA or other water-born salt, free of petroleum solvents and oils, applied by pressure treatment in accordance with CSA O80.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate.

.2 Inform Contract Administrator of unacceptable conditions immediately upon discovery.

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

3.2 SCHEDULES

.1 Use pressure-treated wood and treat material when used in the following application:

.1 Wood, fascia backing, blocking, curbs, nailers, sleepers on roof deck.

.2 Wood in direct contact with concrete.

.3 Wood furring on outside surface of exterior masonry and concrete walls.

.4 Wood sleepers supporting wood subflooring over concrete slabs in contact with ground or fill.

3.3 INSTALLATION

.1 Comply with requirements of NBC 2010 supplemented by following paragraphs.

.2 Install members true to line, levels and elevations, square and plumb.

.3 Construct continuous members from pieces of longest practical length.

.4 Install spanning members with "crown-edge" up.

.5 Install furring and blocking as required to space-out and support wall and ceiling finishes, facings, fascia, soffit, siding, and other work as required.

.6 Install furring to support siding applied vertically where there is no blocking and where sheathing is not suitable for direct nailing.

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

.8 Install fascia backing, nailers, curbs and other wood supports as required and secure using galvanized fasteners.

.9 Install sleepers as indicated on drawings.

.10 Use dust collectors and high quality respirator masks when cutting or sanding wood panels.

.11 Patch, finish, re-finish interior finishes removed, cut, broken or damaged resulting from the Work.

3.4 ERECTION

.1 Frame, anchor, fasten, tie and brace members to provide necessary strength and rigidity.

.2 Countersink bolts where necessary to provide clearance for other work.

.3 Use nailing disks for soft sheathing as recommended by sheathing manufacturer.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.

3.6 PROTECTION

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

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Fibreglass-mat faced and Type X weather-resistant, moisture and mould resistant gypsum board sheathing.

1.2 RELATED SECTIONS

.1 Section 07 27 00 – Air Barriers.

.2 Section 07 43 13 – Metal Wall Panels.

.3 Section 08 44 13 – Glazed Aluminum Curtain Wall.

.4 Section 07 62 00 – Sheet Metal Flashing and Trim.

.5 Section 07 92 00 – Joint Sealant.

1.3 REFERENCES

.1 ASTM International (ASTM):

.1 ASTM C1002-14, Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

.2 ASTM C1177-13 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

.3 ASTM C1280-13a, Standard Specification for Application of Exterior Gypsum Panel Products used as Sheathing.

.4 ASTM E96-16, Standard Test Methods for Water Vapor Transmission of Materials.

.5 ASTM E119 – 19, Standard Test Methods for Fire Tests of Building Construction and Materials.

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S102.1-10, Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.

.2 CAN/ULC-S101-14, Methods of Fire Endurance Tests of Building Construction and Materials.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 – Project Closeout.

.2 Provide copies of operation and maintenance data and information.

.3 Submit final executed warranty.

1.5 QUALITY ASSURANCE

.1 Perform Work in accordance with manufacturer’s written instructions and this specification.

.2 Maintain one copy of manufacturer’s written instructions on site.

.3 Components used shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, flashings and adhesives.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Refer to current Product MSDS for proper storage and handling.

.2 Deliver all materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.3 Store all roll materials on end in original packaging. Protect rolls from direct sunlight and weather until ready for use.

.4 Store all air barrier membranes, adhesives and primers at temperatures of 5 degrees C (40 degrees F) and rising.

.5 Keep solvent away from open flame or excessive heat.

.6 Waste Management and Disposal

.7 Contractor to verify compliance for Volatile Organic Compounds (VOC) limitations of products to comply with all federal, provincial, and local regulations controlling use of volatile organic compounds (VOC).

1.7 WARRANTY

.1 Provide manufacturer's standard 5-year warranty.

Part 2 Products

2.1 MATERIALS

.1 Fibre Reinforced Gypsum Board Sheathing (Soffit):

.1 Fibreglass-mat faced gypsum sheathing to ASTM C1177.
.2 Thickness: minimum 13mm (½") or as otherwise indicated on drawings.
.3 Surfacing: Fibreglass mat on face, back and long edges.
.4 Permeance: Not less than 23 perms to ASTM E96.
.5 Acceptable Products:
.1 DensGlass Sheathing, manufactured by Georgia-Pacific Gypsum LLC.
.2 Securock Brand Glass-Mat Sheathing, manufactured by CGC.
.3 Glasroc Brand Sheathing, manufactured by CertainTeed.

.2 Gypsum Sheathing Board (temporary rated corridors):

.1 Type X rated water-resistant exterior gypsum sheathing, 1200mm wide x maximum practical length.
.2 Thickness: minimum 16mm (5/8").
.3 Acceptable Products:
.1 GlasRoc Sheathing Type X, manufactured by CertainTeed

.3 Metal furring runners, hangers, tie wires, inserts, anchors: galvanized.

2.2 ACCESSORIES

.1 Screws: to ASTM C1002, corrosion resistant treated.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section. Notify Contract Administrator in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

3.2 INSTALLATION

.1 Install in accordance with:

.1 Gypsum Association GA-253.

.2 ASTM C1280.

.3 Manufacturer's instructions.

3.3 Protection

.1 Protect gypsum board installations from damage and deterioration.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 The supply and installation of rigid, high-density non-combustible, stone wool insulation board.

1.2 REFERENCES

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

.1 ASTM C612-10, Standard Specification for Mineral Fibre Block and Board Thermal Insulation.

.2 ASTM C518-17, Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

.3 ASTM E96/E96M-16, Standard Test Methods for Water Vapour Transmission of Materials.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-09, Standard for Thermal Insulation, Mineral Fibre, for Buildings.

1.3 SUBMITTALS

.1 Product Data:

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

.2 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

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

.3 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site for recycling.

Part 2 Products

.1 Rigid Mineral Fibre Board: to CAN/ULC-S702.

.1 Type: 1.

.2 Density: 11 lbs/ft^2 (176 kg/m^3) to ASTM C303.

.3 Compressive strength: 1566 psf (75 kPa) @ 25% compression (ASTM C165).

.4 Thermal resistance: RSI value / 25.4 mm @ 24ºC - 0.70 m^{2}K/W (ASTM C518).

.5 Permeability: 2160 ng/Pa.s.m^2 (35 perm) to ASTM E96.

.6 Thickness: as indicated on drawings

.7 Size: largest available sheet sizes

.8 Acceptable Product:

.1 COMFORTBOARD 110 by Rockwool.

2.2 ACCESSORIES

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

.2 Adhesive for insulation hangers: one-part, medium modulus polymer modified sealing compound. Compound to be compatible with the air barrier membrane.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 EXAMINATION

.1 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.

3.3 WORKMANSHIP

.1 Install insulation after building substrate materials are dry.

.2 Install insulation to maintain continuity of thermal protection to building elements and spaces.

.3 Fit insulation tight around electrical boxes, plumbing and heating pipes and ducts, around exterior doors and windows and other protrusions.

.4 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 reviewed by Consultant.

3.4 INSULATION BOARD INSTALLATION

.1 Install insulation with insulation clips embedded in adhesive, 2 per 600mm x 1200mm minimum, additional hangars as required to suit site conditions, fit boards tight.

3.5 CLEANING

.1 Remove all leftover materials and debris from site and dispose of same in proper manner. Cleanup of materials to be performed on a daily basis

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S702-14, Standard for Thermal Insulation Mineral Fibre for Buildings.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling.

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

Part 2 Products

2.1 INSULATION

.1 Batt stone wool insulation: Type 1 to CAN/ULC S702.

.1 Mineral fibre thermal insulation.

.2 Density: >2 lbs/ft^2.

.3 Thickness: to be friction-fit into all wall cavities and other areas indicated on the drawings.

.4 Acceptable Product:

.1 Comfortbatt by Rockwool.

2.2 ACCESSORIES

.1 Tape: as recommended by manufacturer.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSULATION INSTALLATION

.1 Install insulation to maintain continuity of thermal protection to building elements and spaces in accordance with Manufacturer instructions.

.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 Do not enclose insulation until it has been reviewed by Consultant.

3.3 CLEANING

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

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Supply labour, materials and equipment to install field membrane, bridge and seal terminations in flashing and weather barriers as shown on Drawings and as specified herein.

1.2 RELATED SECTIONS

.1 Section 06 10 00 – Rough Carpentry.

.2 Section 07 62 00 – Sheet Metal Flashing and Trim.

.3 Section 07 92 00 – Joint Sealant.

.4 Section 08 44 13 – Glazed Aluminum Curtain Wall.

1.3 PRE-INSTALLATION MEETING

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations. Agenda for meeting to include:

.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.

.2 Co-ordinate pre-installation meeting with trades of the following sections:

.1 Section 06 10 00 – Rough Carpentry.

.2 Section 07 62 00 – Sheet Metal Flashing and Trim.

.3 Section 07 92 00 – Joint Sealant.

.4 Section 08 44 13 – Glazed Aluminum Curtain Wall.

1.4 SEQUENCING

.1 Sequence air barrier installation with work of other trades to ensure expedient installation of systems.

.2 Sequence to ensure new construction is installed over air barriers within maximum 150 days of air barrier installation.

1.5 CLOSEOUT SUBMITTALS

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

.2 Submit final executed warranty.

1.6 QUALITY ASSURANCE

.1 Applicator of the primary air barrier membranes to be authorized by the manufacturer as suitable for the execution of the Work.

.2 Applicators to have minimum of three years' experience specialized in the installation of self-adhesive air barriers.

.3 Perform Work in accordance with manufacturer's written instructions and this specification.

.4 Maintain one copy of manufacturer's written instructions on site.

.5 Allow access to Work site by the air barrier membrane manufacturer's representatives.

.6 Components used shall be sourced from one manufacturer, including sheet membrane, air barrier sealants, primers, mastics, flashings and adhesives.

.7 Single-Source Responsibility:

.1 Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.

.2 Provide products which comply with all federal, provincial, and local regulations with regards to controlling the use of volatile organic compounds (VOC's).

.8 Mock-up

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

.2 Construct mock-up of each type of flashing termination and intersection shown on Drawings.

.3 Co-ordinate construction of mock-up with:

.1 Section 07 62 00 – Sheet Metal Flashing and Trim.

.2 Section 08 44 13 – Glazed Aluminum Curtain Wall.

.4 Allow 24 hours for inspection of the mock-up by Contract Administrator prior to proceeding with air barrier work. Mock-up may remain as part of the Work.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Refer to current Product MSDS for proper storage and handling.

.2 Deliver all materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

.3 Store all roll materials on end in original packaging. Protect rolls from direct sunlight and weather until ready for use.

.4 Store all air barrier membranes, adhesives and primers at temperatures of 5 degrees C (40 degrees F) and rising.

.5 Keep solvent away from open flame or excessive heat.

.6 Waste Management and Disposal

.7 Contractor to verify compliance for Volatile Organic Compounds (VOC) limitations of products to comply with all federal, provincial, and local regulations controlling use of volatile organic compounds (VOC).

1.8 WARRANTY

.1 Provide manufacturer's standard 1-year warranty.

Part 2 Products

2.1 MATERIALS

.1 Self Adhesive Air Vapour Barrier Membrane (Soffits):

.1 Self-adhesive, cold-applied, water and vapour resistive sheet air barrier membrane consisting of engineered film and adhesive technology with split-back poly-release film.

.2 For application over gypsum exterior sheathing as primary air/vapour barrier, including as transition membrane and detail sheet at openings and through wall flashing.

.3 Acceptable Products:

.1 Blueskin SA® manufactured by Henry Company Canada.

.2 Sopraseal Stick 1100 T by Soprema.

.2 Primer: As recommended by manufacturer.

.3 Termination sealant: As recommended by Manufacturer.

.4 Air barrier membrane components and accessories must be obtained as a single-source from the membrane manufacturer to ensure total system compatibility and integrity.

2.2 ACCESSORY PRODUCTS AND MATERIALS COMPATIBILITY

.1 Accessory products including caulks and sealants, primers, etc. which are in direct contact with, or form part of the air barrier systems must be chemically and physically compatible with the materials to which they are being applied and must be approved for that use by their manufacturer and the manufacturers of the air barrier materials they contact.

.2 Contractor to confirm material, primer and substrate compatibility with air barrier manufacturer.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that surfaces and conditions are ready to accept the Work of this section. Notify Contract Administrator in writing of any discrepancies. Commencement of the Work or any parts thereof shall mean acceptance of the prepared substrates.

.2 All surfaces must be sound, dry, clean and free of oil, grease, dirt, excess mortar or other contaminants detrimental to the adhesion of the membranes. Fill voids, gaps and spalled areas in substrate to provide an even plane. Strike masonry joints full-flush.

.3 Curing compounds or release agents used in concrete construction must be resin based without oil, wax or pigments.

3.2 SURFACE PREPARATION

.1 All surfaces must be sound, clean and free of oil, grease, dirt, excess mortar or other contaminants. Fill spalled areas in substrate to provide an even plane.

.2 New concrete should be cured for a minimum of 14 days and must be dry before primer for air barrier membranes are applied.

.3 Ensure all preparatory Work is complete prior to applying primary air barrier membrane.

.4 Mechanical fasteners used to secure sheathing boards or penetrate sheathing boards shall be set flush with sheathing and fastened into solid backing.

.5 Pre-cast and concrete block substrates are required to be adhesive primed prior to application of self-adhering water resistive air barrier membrane.

3.3 APPLICATION OF SUBSTRATE ADHESIVE PRIMER

.1 Adhesive Primer for Self-Adhered Membranes.

.1 Condition substrate with applicable adhesive primer prior to installation of self-adhesive air vapour and vapour permeable air and water barrier membranes in accordance with manufacturers directions.

.2 Apply adhesive primer at rate recommended by manufacturer to all areas to receive self-adhering sheet membrane as indicated on drawings by roller or spray and allow to fully dry.

.3 Re-condition adhesive primed surfaces not covered by self-adhering membrane during the same working day.

3.4 INSTALLATION OF AIR BARRIER SYSTEM

.1 Inside and Outside Corners:

.1 Seal inside and outside corners of sheathing boards with a strip of self-adhering air vapour barrier membrane extending a minimum of 75mm (3inches) on either side of the corner detail.

.2 For inside corners, pre-treat the corner with a continuous 13mm (½ inch) bead of bituthene mastic.

.3 Adhesive prime surfaces in an intermittent pattern, at a rate of 200 – 250 sq ft/gal where appropriate due to surface conditions, to achieve surface adhesion as per manufacturers' instructions and allow drying.

.4 Align and position self-adhering air vapour sheet membrane, remove protective film and press firmly into place. Ensure minimum 51mm (2 inches) overlap at all side laps and 75mm (3 inches) overlap at all end laps of membrane.

.5 Roll all laps and membrane with a counter top roller to ensure seal.

.2 Transition Areas:

.1 Tie-in to structural beams, columns, floor slabs and intermittent floors, parapet curbs, foundation walls, roofing systems and at the interface of dissimilar materials as indicated in drawings with self-adhered air barrier transition membrane.

.2 Prime surfaces in an intermittent pattern, at a rate of 200 – 250 sq ft/gal where appropriate due to surface conditions, to achieve surface adhesion as per manufacturers' instructions and allow to dry.

.3 Align and position self-adhering transition membrane, remove protective film and press firmly into place. Provide minimum 75mm (3 inch) lap to all substrates.

.4 Ensure minimum 51mm (2 inches) overlap at all side laps and 75mm (3 inches) overlap at all end laps of membrane.

.5 Roll all laps and membrane with a counter top roller to ensure seal.

.3 Through Wall Flashing Membrane:

.1 Apply through-wall flashing membrane as shown on Drawings.

.2 Adhesive prime surfaces and allow to dry, press membrane firmly into place, over lap minimum 51mm (2 inches) at all side and end laps. Promptly roll all laps and membrane to ensure the seal.

.3 Applications shall form a continuous flashing membrane and shall extend up a minimum of 100mm (4 inches) up the back-up wall unless otherwise shown on Drawings.

.4 Seal the top edge of the membrane where it meets the substrate using termination sealant. Trowel-apply a feathered edge to seal termination to shed water.

.5 Install through-wall flashing membrane and extend 13mm (½ inch) from outside edge of veneer.

.4 Primary Air/Vapour Barrier Membrane:

.1 Apply self-adhesive air/vapour barrier membrane:

.1 Complete and continuous to substrate.

.2 Overlap joints in shingle fashion and in accordance with manufacturer's recommendations and written instructions.

.3 Stagger vertical joints.

.2 Prime surfaces in accordance with manufacturers' instructions.

.3 Align and position self-adhering membrane to substrate, remove top panel of protective release film and press firmly into place.

.4 Ensure alignment, hold membrane in place to avoid wrinkles and sequentially remove remaining panels of protective film and press firmly into place.

.5 Overlaps:

.1 Minimum 75mm (3 inch) at ends.

.2 Minimum 75mm (3 inch) at sides of subsequent membrane applications.

.6 Apply pressure to membrane surfaces, laps and flashings using an appropriate roller to provide best possible surface adhesion.

.7 At the end of each day's work seal the top edge of the membrane where it meets the substrate with termination sealant. Trowel to a feathered edge to seal termination and shed water.

3.5 APPLICATION OF TERMINATION SEALANT

.1 Seal membrane terminations, heads of mechanical fasteners, masonry tie fasteners, around penetrations, duct work, electrical and other apparatus extending through the primary water resistive air barrier membrane and around the perimeter edge of membrane terminations at window and door frames with termination sealant.

3.6 FIELD QUALITY CONTROL

.1 Make notifications when sections of Work are complete to allow review prior to covering air barrier system.

3.7 PROTECTION

.1 Damp substrates must not be inhibited from drying out. Do not expose the backside of the substrate to moisture or rain.

.2 Cap and protect exposed back-up walls against wet weather conditions during and after application of membrane, including wall openings and construction activity above completed air barrier installations.

.3 Cover installed membranes within 150 days.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Work in this section consists of furnishing all labour and materials to supply the linear soffit and wall metal panel system as shown on drawings, including the supply and installation of all metal framing components and connections to secure the soffit panel system to the structural back-up.

.2 Work furnished and included:

.1 Supporting sub-girts.
.2 Cladding profile.
.3 Fasteners.
.4 Structural framing members including steel stud/channel framing, purlins, eave and ridge elements, and other elements required to support the cladding system.
.5 Accessories including associated flashings, closures, sealants.

1.2 RELATED SECTIONS

.1 Section 07 21 13 – Board Insulation

.2 Section 07 21 16 – Blanket Insulation

.3 Section 07 27 00 – Air Barriers

.4 Section 07 62 00 – Sheet Metal Flashing and Trim.

.5 Section 07 92 00 – Joint Sealant

.6 Section 08 44 13 – Glazed Aluminum Curtain Wall

1.3 REFERENCES

.1 ASTM International:

.1 ASTM A653M-90: Standard 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 93.5-92: Installation of Metal Residential Siding, Soffits and Fascia.

.3 Canadian Sheet Steel Building Institute (CSSBI):

.1 CSSBI 20M-08: Standard for Sheet Steel Cladding for Architectural, Industrial and Commercial Building Applications.

1.4 MEASUREMENT PROCEDURES

.1 No measurement will be made under this section. Contractor shall include in the appropriate fixed price component all labour, materials, supervision, and equipment as required to complete the work required under this Section and as shown on the Drawings.

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation meeting:

.1 Coordinate and conduct a pre-installation meeting at the job site attended by the Contractor Administrator, Contractor and Soffit Panel Installer including Contractors of related trades. Coordinate structural support requirements in relation to Soffit Panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 01 33 23 – Shop Drawings, Product Data and Samples.

.2 Product Data:

.1 Submit manufacturer's printed product literature for panel systems materials, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Samples:

.1 Submit duplicate 12” x 12” (300 x 300mm) samples of soffit and wall panel, in profile specified and colour selected by Contractor Administrator.

.2 Submit full colour range available of soffit and wall panels for colour selections by Contractor Administrator.

.4 Shop Drawings: submit detailed drawings and soffit and wall panel analysis showing:

.1 Profile and Gauge

.2 Location, layout and dimensions of panels

.3 Location and type of fasteners

.4 Shape and method of attachment of all trim

.5 Locations and type of sealants

.6 Coordination Drawings: Provide drawings which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to sub-girts and structural support.

.7 Other details as may be required for a weathertight installation

.8 Shop drawings shall be sealed by an engineer registered in the Province of Manitoba. Seal to apply to:

.1 Attesting to the ability of the soffit and wall panel assembly to withstand the specified loads. Including supporting sub-girts, steel stud framing/channels, accessorises, anchorage of soffit and wall assembly and support framing to existing structure.

.5 Closeout Submittals:

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

.2 Submit operation and maintenance data for incorporation into manual, including manufacturer’s recommended cleaning instructions for metal components.

.3 Submit manufacturer’s and contractor’s warranty documentation.

1.7 QUALITY ASSURANCE

.1 Qualifications:

.1 Manufacturer and installers are to be specialized in the manufacturing and installation respectively of soffit panels with a minimum of five (5) years of documented experience each, on similar type and size projects.

.2 Mock-up:

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

.2 Install a mock-up of a complete ES-1 soffit assembly at one location identified by Contractor Administrator along both the north and south walkway.

.3 Co-ordinate site review of mock-up with Contractor Administrator and The City.

.4 Obtain Contractor Administrator approval prior to fabrication of any further metal flashings.

.5 Co-ordinate with Contractor Administrator to review mock-up installation at the following times:

.1 Removal of existing metal panel system and installation.

.2 Completion of installation of self-adhesive air vapour barrier and flashing.

.6 Mock-up may remain as part of the Work.

1.8 DELIVERY, STORAGE AND HANDLING

.1 Store cladding products and all components of the wall system in accordance with manufacturer's recommendations and protected from the elements.

.2 Protect pre-finished steel during fabrication, transportation, site storage and erection, in accordance with CSSBI Standards.

.3 Prevent contact of flashing materials with corrosive substances.

.4 Damaged materials shall be replaced with new materials.

.5 Handle and store metal materials so that marring and scratching of the coatings do not occur.

1.9 WARRANTIES

.1 Soffit and Wall Panels:

.1 Manufacturer Warranty: furnish panel manufacturer's written warranty covering failure of factory-applied exterior finish within the warranty period. Warranty period for 40 years after the date of Substantial Completion. The values below are based on normal environments and exclude any aggressive atmospheric conditions.

.1 WeatherX™ (Siliconized Polyester - SMP) will not crack, chip, or peel (lose adhesion) for forty (40) years from date of installation. This does not include minute fracturing that may occur during the normal fabrication process. WeatherX™ (Siliconized Polyester - SMP) will not chalk in excess of a number six (6) rating, in accordance with ASTM D-4214-98 method D659 at any time for thirty (30) years from date of installation ; will not change colour more than eight (8.0) Hunter ΔE units as determined by ASTM method D-2244-02.

.2 For work in this section, warranty by installer against defects or deficiencies in materials or workmanship shall be for a period of one (1) year from date of substantial completion.

Part 2 Materials

2.1 DESIGN CONSIDERATIONS

.1 Design soffit and wall panel system to resist wind loads, positive and negative, expected for Winnipeg, Manitoba region NBCC climatic data, 50 year probability 20psf (0.96kPA).

.2 Cladding to be designed to accommodate thermal movement over an ambient temperature range of -40˚C to +50˚C.

.3 Design expansion joints to accommodate movement in cladding and between cladding and structure to prevent permanent distortion or damage to the cladding.

.4 Design soffit and wall system to maintain the following erection tolerances:

.1 Maximum variation from plane or location shown on shop drawings: 20 mm/10 m (3/4 inch/30 feet).

.2 Maximum offset from true alignment between two adjacent members abutting end to end in line: 1 mm (0.04 inches).

2.2 MATERIALS

.1 Metal Soffit and Wall Panels (MP-1):

.1 Fabricated from ASTM A653M structural quality Grade 230 galvanized steel, with Z275 zinc coating, as designated by ASTM A653M-90 panel. Fabricate all components of the system in the factory, ready for field installation.

.1 Size: 300mm wide x 40 deep; hidden fastening.

.2 Thickness: 22 gauge (0.036”) unless otherwise indicated on drawings.

.3 Pre-painted with SMP.

.4 Provide metal panels in longest practicable length to minimize field lapping of joints.

.5 Fasteners: exposed fasteners colour matched to metal panel finish colour.

.6 Soffit panel orientation: install as indicated on drawings.

.7 Wall panels orientation: vertically or as otherwise indicated on drawings.

.8 Acceptable Products:

.1 AD300R by Vicwest Building Products.

.1 WeatherX finish.

.2 Colour: as selected and confirmed by Contractor Administrator.

.1 For soffit panels: finish colour to match exiting soffit of adjacent Delta Hotel Walkway or as otherwise selected by Contractor Administrator.

.2 For wall panels finish colour to match refer to drawing section and details.

2.3 SUPPORTING SYSTEM:

.1 Z-Bars/Hat-Channels/Steel Studs: from galvanized steel, ASTM A653M Grade 230 with Z275 zinc coating.

.1 Thickness: minimum 18 gauge (1.22mm) or as otherwise indicated on approved shop drawings.

.2 Size: as required to support soffit/wall panel assembly and be suspended from the existing structure. Connected to create level support surface to receive soffit panels. Shims as required to accommodate undulations in soffit profile to be provided.

.3 Anchors: stainless steel and as recommended by manufacturer.

2.4 ACCESSORIES

.1 Flashing: to Section 07 62 00 – Sheet Metal Flashing and Trim.

.1 Custom fabricated to suit drawings details, as required. Use preformed corner pieces only. Double back exposed edges.

.2 Sealants: to Section 07 92 00 – Joint Sealant.

.3 Exposed aluminum extrusion to be finished to match panels, unless otherwise indicated on drawings.

.4 Fasteners: concealed/exposed, non-corrosive as recommended by the panel manufacture.

Part 3 Execution

3.1 FABRICATION

.1 All components including flashings shall be fabricated wall components to comply with dimensions, profiles, thicknesses and details as shown on the drawings.

.2 Fabricate all components of the system in the factory, ready for field installation.

.3 Provide cladding and accessories in longest practicable length to minimize field lapping of joints.

3.2 EXAMINATION

.1 Examine work of other Sections upon which work of this Section depends.

.2 Report all discrepancies to Contractor Administrator before beginning work on the soffit panel system.

.3 Provide field measurements to manufacturer as required to achieve proper fit of the preformed soffit panels. Measurements shall be provided in a timely manner so that there is no impact to construction schedule.

.4 Verify that bearing support has been provided behind vertical joints and horizontal soffit and wall panel joints. Width of support shall be as recommended by manufacturer.

3.3 INSTALLATION

.1 Install soffits and wall panels in accordance with CGSB 93.5-92, and manufacturer's written instructions. Examine work of other trades over which cladding will be applied for conformity to drawings. Report all discrepancies to Contractor Administrator prior to proceeding.

.2 Install metal furring strips and support girts in accordance with approved shop drawings and system design. Provide additional metal framing as may be required to conform to performance requirements.

.3 Install girts attached to structural support or wall framing, using fasteners in accordance with approved shop drawings.

.4 Ensure girt installation provides a true surface.

.5 Install continuous starter strips, inside and outside corners, edgings, drip, cap, sill and window opening flashings as indicated.

.6 Install outside corners, fillers and closure strips with carefully formed and profiled work.

.7 Install soffits and wall panel in accordance with manufacturer's standard installation procedures, providing proper laps and detailing to ensure a weather tight face.

.8 Anchor panels securely in place in accordance with approved shop drawings and system design. Use exposed/concealed approved fasteners.

.9 Attach components in a manner that will not restrict thermal expansion and contraction. Oversize fastener holes by 1/8" for metal panel pieces longer than 12'.

.10 Separate dissimilar metals and use gasketed fasteners where needed to eliminate the possibility of corrosive or electrolytic action between metals.

.11 Paint anchor heads to match metal panel colour.

.12 Caulk all junctions to adjoining work with sealant.

3.4 TOUCH-UP AND CLEANING

.1 Touch up minor paint abrasions with manufacturer approved touch-up paint.

.2 Clean cladding by dry wiping.

.3 Field paint all cut or exposed edges not treated with manufacturer approved coating.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 07 62 00 – Sheet Metal Flashing and Trim

1.2 REFERENCES

.1 ASTM International Inc.

.2 Canadian Roofing Contractors Association (CRCA)

.3 Canadian Standards Association (CSA International)

.4 Molded Polystyrene, ASTM C578.

.5 Polyisocyanurate insulation boards, ASTM C1289, Type II, Class 2, UL Classified.

1.3 MEASUREMENT PROCEDURES

.1 No measurement will be made under this section. Contractor shall include in the appropriate fixed price component all labour, materials, supervision, and equipment as required to complete the work required under this Section and as shown on the Drawings.

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Convene pre-installation meeting one week prior to beginning Work, with roofing contractor's representative, the Contractor Administrator and The City to:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building sub trades.

.4 Review manufacturer's installation instructions and warranty requirements.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide two (2) copies of most recent technical roofing components data sheets describing materials' physical properties and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Manufacturer's Certificate: certify that products and system design meet or exceed specified requirements of CSA A 123.21-14, Standard Test Method for Dynamic Wind Uplift Resistance of Membrane-Roofing Systems. Provide Certification from the manufacturer that the adhesive and/or mechanical anchors utilized in the design and installation exceed the following design live wind loads:

.1 -1.5 kPa for the field of the roof.

.2 -2.3 kPa for the edge of the roof.

.3 -3.5 kPa for the corners of the roof.

.4 Provide shop drawings:

.1 Indicate flashing, tapered insulation, pre-manufactured fittings, expansion joint membrane, roof drains, and details.

.2 Provide layout for tapered insulation. Insulation to provide the minimum slopes indicated on the drawings. At no point less than 1% to drains or scuppers. Shop drawing to show the location and identification of all sloped insulation blocks.

.5 Closeout Submittals:

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

.2 Submit operation and maintenance data for incorporation into manual, including manufacturer's recommended cleaning instructions for metal components.

.3 Submit manufacturer's and contractor's warranty documentation.

1.6 QUALITY ASSURANCE

.1 Roofing contractors and sub-contractors must, when tendering or performing work, possess a roofing contractor operating license.

.2 Roofing contractors and sub-contractors must also be currently registered with and approved by the product manufacturer.

.3 Only qualified, certified installers employed by a company with the appropriate equipment may execute the roofing work.

.4 Contractor may switch roofing foreman through project only upon written permission of Contractor Administrator and only after suitable overlap to facilitate transfer of knowledge.

1.7 FIRE PROTECTION

.1 Prior to the start of work, conduct a site inspection to establish safe working practices and make sure that all procedures and proposed changes are approved to minimize the risk of fires.

.2 Respect safety measures described in the Product Manufactures' Specifications Manual as well as local association recommendations, and The City requirements.

.3 At the end of each workday, use a heat detector gun to spot any smouldering or concealed fire. Job planning must be organized to ensure workers are still on location at least two hour after roof application.

.4 Throughout roofing installation, maintain a clean site and have at least one ULC-approved ABC fire extinguisher, charged and in perfect operating condition, on-site near roofing work area. Respect all safety measures described in technical data sheets.

1.8 DELIVERY, STORAGE, AND HANDLING

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

.2 The materials are to remain in their original packaging, displaying the manufacturer's name, product name, weight, and reference standards, as well as all other indications or references considered standard.

.3 Storage and Handling Requirements:

.1 Safety: comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of felt and membrane in upright position. Store membrane rolls with salvage edge up.

.4 Avoid material overloads which may affect the structural integrity of specific roof areas.

.5 Remove only in quantities required for same day use.

.6 Place plywood runways over completed Work to enable movement of material and other traffic.

.7 Store sealants at +5 degrees C minimum.

.8 Store insulation protected from daylight, weather and deleterious materials.

1.9 FIELD CONDITIONS

.1 Ambient Conditions

.1 Do not install roofing when temperature remains below the manufacturer's minimum recommended temperature.

.2 Minimum temperature for solvent-based adhesive is -5 degrees C.

.2 Install roofing on dry deck, free of snow and ice, use only dry materials and apply only during weather that will not introduce moisture into roofing system.

1.10 WARRANTY

.1 The product manufacturer will issue a written and signed document in The City's name, certifying that the roofing membranes are free of manufacturing defects for a period of ten (10) years, starting from the date of acceptance. This warranty will cover the removal and replacement of defective roof membrane products, including labour. The warranty must remain a full warranty for the duration of the period specified. No letter amending the manufacturer's standard warranty will be accepted and the warranty certificate must reflect these requirements.

.2 The contractor will provide a written and signed document to The City certifying that the work executed will remain in place and free of leakage or other waterproofing defect for a period of five (5) years from the date of acceptance.

Part 2 Products

2.1 PERFORMANCE CRITERIA

.1 Compatibility between components of roofing system is essential. All waterproofing materials are to be provided by the same manufacturer. Provide written declaration to Contractor Administrator stating that materials and components, as assembled in system, meet this requirement.

.2 Roofing System: to CSA A123.21 for wind uplift resistance, exceeding the above noted design wind loads and to meet manufacturer's warranty general conditions.

.3 Acceptable manufacturer:

.1 Firestone Building Products.

.4 Alternate manufactures will be reviewed for conformance. If the product meets the specification requirements, written approval will be provided in the form of an addendum. Request for alternates to be submitted to Contractor Administrator for review minimum 5 business days prior to bid closing and in accordance with B6.

2.2 BONDING ADHESIVE

.1 Primary Adhesive:

.1 Bonding adhesive is a solvent based contact adhesive designed specifically for bonding TPO membranes to approved insulations in addition to wood, metal, masonry and other acceptable substrates.

.1 Acceptable product: ULTRAPLY BONDING ADHESIVE by FIRESTONE.

2.3 ROOF BOARD (AIR VAPOUR BARRIER SUPPORT PANEL)

.1 Glass reinforced sheathing: gypsum cover board combining reinforcing glass mat fully embedded into a specially formulated fire and moisture resistive, non-combustible core.

.1 Thickness: as indicated on drawings.

2.4 AIR VAPOUR BARRIER MEMBRANE

.1 Self-adhered air/vapour barrier membrane (roof system):

.1 Description: Self-adhered membrane with SBS modified bitumen and a tri-laminated woven polyethylene facer. The underside is covered with a release liner.

.1 Acceptable product: V-Force Vapor Barrier Membrane by FIRESTONE.

2.5 FLASHING / TRANSITION MEMBRANE

.1 Self-adhered continuity flashing/transition membrane: SBS modified bitumen and a tri-laminated woven polyethylene facer. The underside is covered with a release liner.

.1 Acceptable product: V-Force Vapor Barrier Membrane by FIRESTONE.

.2 Pressure sensitive tape of type recommended by manufacturer for sealing joints and transitions.

2.6 INSULATION

.1 Tapered Insulation:

.1 Polyisocyanurate Insulation confirming to ASTM C1289, Type II, Class 2. Tapered panels sloped as required to achieve general profile indicated on drawings. Minimum slope of 1% to roof drains or scuppers, as well as around perimeter and penetrations. Below primary polyisocyanurate faced roof insulation boards.

.1 Acceptable product: RESISTA Insulation by FIRESTONE.

.2 Polyisocyanurate Insulation:

.1 Confirming to ASTM C1289, Type II, Class 2. Flat roof insulation consists of closed-cell polyiso foam core laminated to a specially coated, inorganic, fiberglass facer. Standard size 4’ x 4’ (1200 x 1200) boards insulation, thickness and layers as indicated on project drawings. Insulation must be installed in accordance with the fastening rate and pattern as required by manufacturer.

.1 Acceptable product: RESISTA Insulation by FIRESTONE.

2.7 MEMBRANE ROOFING SYSTEM

.1 Thermoplastic Polyolefin (TPO) Membrane for Field Surface:

.1 Description: roofing membrane that is produced with polyester weft-inserted reinforcement, S/A with secure bond, heat weldable, flexible TPO membrane with a factory applied pressure sensitive adhesive. Thickness to be 60 mil (1.524mm). All seams and splices to be hot welded.

.1 Acceptable product: UltraPly TPO SA Membrane by FIRESTONE.

.2 Thermoplastic Polyolefin (TPO) Membrane for Flashings and Upstands:

.1 Description: roofing membrane that is produced with polyester weft-inserted reinforcement. This heat weldable TPO membrane thickness to be 60 mil, (1.52mm). All seams and splices to be hot welded.

.1 Acceptable product: ULTRAPLY TPO MEMBRANE by FIRESTONE

2.8 EXPANSION JOINT MEMBRANE

.1 Factory fabricated elastomeric expansion waterproofing joint, to prevent the penetration of water at control, expansion or building. Extruded elastomer with polyester fleece embedded on both sides (top and bottom surfaces).

.1 Acceptable product: RedLINE expansion joint waterproofing system by SITURA INC

.2 Adhesive: self-curing structural adhesive/fluid-applied waterproofing membrane as approved by TPO membrane manufacturer.

2.9 ADHESIVES

.1 Insulation adhesive:

.1 Description: two-component, low-rise polyurethane insulation adhesive applied in beads designed for adhesive attachment of roof insulation to acceptable substrates

.1 Acceptable product: I.S.O.Stick INSULATION ADHESIVE by FIRESTONE.

2.10 FASTENERS

.1 Insulation Fastener:

.1 #12 Phillips pre-assembled hot-dipped galvanized mechanical fasteners made case-hardened carbon steel that comply with FMR approval standards, complete with 2” (51mm) diameter barbed stress plates that comply with the CSA B35.3.

.1 Acceptable product: Dekfast low slope roof fasteners.

.2 Fasteners for Seam Plates, Termination Bars, Batten Strips, and other accessories to substrates:

.1 Factory coated steel fastener c/w metal plates as required, complying with corrosion resistance provisions in FM Global.

.1 Acceptable product: FASTENERS/PLATES by FIRESTONE

2.11 MISCELLANEOUS ACCESSSORIES:

.1 Sealants: as recommended by manufacturer and compatible with roof membranes.

.2 Provide metal termination bars with fasteners and sealants, as approved by TPO membrane manufacturer, at membrane terminations along roof/wall interfaces.

.3 Provide pourable sealers, pre-formed cone and vent flashings, pre-formed inside outside corners sheet flashings, T-joints, lap sealant, termination reglets and other accessories.

Part 3 Execution

3.1 QUALITY OF WORK

.1 Do examination, preparation and roofing Work in accordance with Roofing Manufacturer's Specification Manual and CRCA Roofing Specification Manual, particularly for fire safety precautions.

.2 Do not install roofing materials during rain or snowfall.

3.2 SURFACE EXAMINATION

.1 Examine substrate surface in accordance with manufacturer’s written instructions.

.2 Confirm existing substrate surfaces are acceptable to manufacturer’s written instructions to accept Work of this section.

.3 Contractor to profile level all existing surfaces receiving new roofing systems to ensure positive drainage will be achieved.

.4 Notify Contractor Administrator in writing of discrepancies. Commencement of the Work or any parts thereof constitute acceptance of substrate conditions.

3.3 PREPARATION

.1 Protection:

.1 Protect adjacent surfaces from damage resulting from Work of this section.

.2 Protect finished Work from water penetration at end of each day and on completion of each section of Work.

.3 Protect installation from moisture for minimum 48 hours after completion of each portion of Work.

.4 Ensure site protection below deck is provided at all times. Any contamination from construction processes and/or precipitation must not be permitted to penetrate the areas below the roof deck.

.2 Surface preparation:

.1 Ensure environmental and site conditions are suitable as directed by manufacturer for installation of system.

.2 Remove all existing roofing materials, included membrane residual on existing roof deck. All loose and/or protruding materials to be removed down to existing roof deck with methods suitable to the contractor. As necessary the contractor is to provide the applicable site protection measures.

.3 Prepare surfaces in accordance with manufacturer's written instructions.

3.4 METHOD OF INSTALLATION

.1 Pre-conditioning of membranes:

.1 All types of membranes must be fully unrolled 30 minutes prior to installation, no mater of the temperature. Installation of membranes in cold weather refer to manufactures written specifications and recommendations.

3.5 INSTALLATION OF AIR VAPOUR BARRIER SUPPORT PANEL ON STEEL DECK

.1 Adhere support panel using specified adhesive applied in continuous strips spaced 300mm (12”) on the field surface 150mm (6”) on the perimeter, and 100mm (4”) on corners.

.2 Cut boards so edges rest on centre of upper ribs. Cut straight lines with adequate tools.

.3 Where slopes change, boards will be cleanly cut (avoid breaking boards) to acquire deck shape. Place boards perpendicular to deck ribs for continuous support at extremities.

.4 Board joints will be staggered, at half-length, and perfectly butted.

3.6 APPLICATION OF PRIMER

.1 Apply primer to wood, metal, concrete, masonry, gypsum board and cementitious board roofing substrates at a rate recommended by manufacturer. All surfaces to be primed must be free of rust, dust or any residue that may hinder adherence. Cover primed surfaces with roofing membrane as recommend by manufacturer.

3.7 INSTALLATION OF SELF-ADHERED AIR VAPOUR BARRIER MEMBRANE

.1 Primer must be dry prior installation of the air/vapour barrier membrane.

.2 Beginning at the bottom of the slope, without adhering the membrane, unroll onto the substrate for alignment. Do not immediately remove the silicone release sheet.

.3 Align the roll parallel to the corrugations of the steel deck. Make sure the membrane overlaps are supported along their entire length.

.4 Peel back one end of the silicone release sheet and adhere this part of the membrane to the substrate. Peel back the remaining release sheet at a 45º angle to avoid wrinkles in the membrane.

.5 Overlap adjacent membranes by 75 mm (3 in). Overlap end laps by 150 mm (6 in). Stagger end laps by at least 300 mm (12 in).

.6 When the vapour barrier is installed directly on the steel deck, place a thin sheet of metal under the end lap of the air/vapour barrier.

3.8 INSTALLATION OF INSULATION

.1 Tapered Insulation:

.1 Adhere insulation to air/vapour barrier panel/membrane or to adjoining board using specified adhesive.

.2 Apply adhesive in 19mm (3/4”) continuous parallel ribbons at 300mm (12”) on center in the field, 150mm (6”) at the edges and 100mm (4”) at corners (each layer). Refer manufacturer’s instructions for spacing at perimeters and corners.

.3 Install tapered insulation as first insulation layer, in accordance with shop drawings. Stagger joints between layers 150mm (6”) minimum.

.4 Follow the other installation instructions as listed below.

.2 Insulation:

.1 Adhere insulation to tapered insulation, air vapour barrier panel/membrane and to adjoining board using specified adhesive.

.2 Apply adhesive in 19mm (3/4”) continuous parallel ribbons at 300mm (12”) on center in the field, 150mm (6”) at the edges and 100mm (4”) at corners (each layer). Refer manufacturer’s instructions for spacing at perimeters and corners.

.3 Use largest insulation sheets as possible, place boards in parallel rows with ends staggered, and in firm contact with one another.

.4 All vertical joints between level boards and sloped modules for the two rows of insulation board to be staggered. Minimum 150mm (6”).

.5 Use a weighted roller to ensure continuous contact between insulation, adhesive and air/vapour barrier panel.

.6 Under no circumstance should the membrane be left unsupported over a space greater than ¼”.

.7 At gaps in the insulation, cut and adhere segments of rigid insulation as required to ensure full continuity in thermal barrier.

.8 If localized mechanical anchors are required to secure insulation due to surface irregularities, they shall be included in the fixed price of the roof installation and the fasteners shall be hot-dipped galvanized No. 12 screws. Dip screws in liquid membrane prior to insertion to provide air seal.

.9 Install only as much insulation as can be covered in the same day.

3.9 INSTALLATION OF MEMBRANE ROOFING

.1 Thermoplastic Olefin (TPO) SA TECHNOLOGY for Field Surface:

.1 Place membrane loose laid on suitable substrate as close to its final position.

.2 Allow membrane to relax a minimum of thirty (30) minutes before attachment.

.3 Adjoining sheets are overlapped at least 75 mm (3 in).

.4 Layout the membrane in fashion so that the field and flashing seams are installed to shed water.

.5 Orient the membrane so that any exposed cut edges of the sheet are used as the bottom sheet in splices whenever possible.

.6 Membrane sheet are to be fully adhered with TPO SA Technology on a compatible substrate.

.7 Methods and installation strictly in accordance with the manufacturer.

.8 All TPO strips are heat welded to form a continuous, watertight membrane.

.2 Thermoplastic Olefin (TPO) with BONDING ADHESIVE for Flashings and Upstands:

.1 Place membrane loose laid on suitable substrate as close to its final position.

.2 Allow membrane to relax a minimum of thirty (30) minutes before attachment.

.3 Adjoining sheets are overlapped at least 75 mm (3 in).

.4 Layout the membrane in fashion so that the field and flashing seams are installed to shed water.

.5 Orient the membrane so that any exposed cut edges of the sheet are used as the bottom sheet in splices whenever possible.

.6 Overlap membrane onto the field surface from the upstands and parapets in accordance with the manufacturer.

.7 Membrane sheet are to be fully adhered with TPO bonding adhesive on a compatible substrate.

.8 The adhesive must be roller applied in a thin even coat on both mating surfaces.

.9 Allow sufficient time for the adhesive to flash off before matting the surfaces.

.10 Methods and installation strictly in accordance with the manufacturer.

.11 All TPO strips are heat welded to form a continuous, water tight membrane.

.3 Seaming:

.1 All splice need to be hot air welded.

.2 Welding equipment is the responsibility of the installer.

.3 Ansy visible edges with scrim exposed shall be covered with cut edge sealant.

.4 Vertical facings are to be flashed with coated metal or a separate strip of membrane fully adhered.

.5 Do not flash over existing through-wall flashings, weep holes and overflow.

.6 All corners should be finished using pre-molded flashing in accordance with the manufacturer.

.4 Pipe Penetrations:

.1 All pipes must be anchored to the deck.

.2 Metal edges used at pipe penetrations must have rounded corners.

.3 All TPO components should be protected from direct contact with steam or heat sources when in service temperature of the penetration is in excess of 60 degrees Celsius. In such cases the flashing can be installed directly to an intermediate insulated cool sleeve.

.4 All penetrations must allow flashing terminations of a minimum height determined by local regulations.

.5 Install pre-molded pipe flashings when possible.

.6 Pre-molded flashings, heat weld the boot to the surrounding TPO membrane around the base of the penetration and secure on top using a stainless steel clamping ring.

.7 Sealant must be used at all edges and entire circumference of the pipe.

.5 Curb Flashing:

.1 Curb corners come in various sizes, refer to the manufacturers recommendations and drawing to select and fit curb corners.

.2 Bonding adhesive is required between the curb and membrane.

.3 Cut edge sealant shall be applied to any edges where scrim reinforcement is exposed.

.4 Vertical T joint covers required at all vertical transitions and non-factory welds.

3.10 WATERPROOFING FOR VARIOUS DETAILS

.1 Install waterproofing membranes in conformance with various roofing details and as per manufacturer's written technical documentation.

3.11 FIELD QUALITY CONTROL

.1 Field reviews:

.1 Field reviews of roofing application will be carried out by Contractor Administrator and/or by independent inspection agency designated by Contractor Administrator.

3.12 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 RELATED SECTIONS

.1 Section 06 10 00 – Rough Carpentry

.2 Section 07 27 00 – Air Barriers.

.3 Section 07 54 23 – Thermoplastic Olefin Roofing.

.4 Section 07 43 13 – Metal Wall Panels.

.5 Section 08 44 13 – Glazed Aluminum Curtain Wall

1.2 REFERENCES

.1 The Aluminum Association Inc. (AAI)

.1 AAI-Aluminum Sheet Metal Work in Building Construction.

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

.1 ASTM A653/A653M-18, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM D523-14, Standard Test Method for Specular Gloss.

.3 ASTM D822/D822M - 13, Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings.

.4 ASTM D2244-16 Standard Practice for Calculation of Colour Tolerances and Colour Differences from Instrumentally Measured Colour Coordinates.

.5 ASTM D2247-15 Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

.6 ASTM D2414-18 Standard Test Method for Carbon Black-Oil Absorption Number (OAN).

.3 Canadian Roofing Contractors Association (CRCA)

.1 Roofing Specifications Manual.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-93.1-M85, Sheet Aluminum Alloy, Prefinished, Residential.

1.3 MEASUREMENT PROCEDURES

.1 No measurement will be made under this section. Contractor shall include in the appropriate fixed price component all labour, materials, supervision, and equipment as required to complete the work required under this Section and as shown on the Drawings.

1.4 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.

.3 Samples:

.1 Submit duplicate 100 x 100mm (4”x4”) samples of each type of sheet metal material, finishes and colours.

.2 Submit duplicate 100 x 100mm (4”x4”) samples of each type of Aluminum Sheet material, finishes and colours.

.4 Quality assurance submittals:

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedures.

.5 Closeout Submittals:

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

.2 Submit operation and maintenance data for incorporation into manual, including manufacturer’s recommended cleaning instructions for metal components.

.3 Submit manufacturer’s and contractor’s warranty documentation.

1.5 PRE-INSTALLATION MEETING

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installation, with contractor's representative, Contract Administrator and The City 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.

1.6 MOCK-UP

.1 Build mock-ups for type of flashing, trim and counter flashing complete with all fasteners as per drawings and specifications. Obtain The City and Contract Administrator approval prior to fabrication of any further metal flashings.

.2 Mock-ups may remain as part of Work.

1.7 DELIVERY, STORAGE AND HANDLING

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

.2 Stack flashings to prevent twisting or bending out of shape.

.3 Prevent contact of flashing materials with corrosive substances.

.4 Damaged materials shall be replaced with new materials.

.5 Handle and store metal flashings so that marring and scratching of the coatings do not occur.

1.8 WARRANTY

.1 Warranty for flashing assembly free of the following defects: splitting seams, lifting, loosening and undue expansion for two (2) years from date of Substantial Performance.

Part 2 Products

2.1 SHEET METAL MATERIALS

.1 Zinc coated steel sheet: thickness as shown on drawings, commercial quality to ASTM A653/A653M, with Z275 designation zinc coating.

2.2 PREFINISHED STEEL SHEET

.1 Prefinished steel with factory applied silicone modified polyester.

.1 Thickness: minimum 0.61mm (24 gauge) or as otherwise indicated on drawings and details.

.2 Colour: selected by Contractor Administrator from manufacturer's standard range.

.3 Specular gloss: 30 units +/- 5 in accordance with ASTM D523.

.4 Coating thickness: not less than 25 micrometres.

.5 Resistance to accelerated weathering for chalk rating of 8 in accordance with ASTM D822/D822M.

.6 Resistance to colour fade 5 units or less in accordance with ASTM D2244.

.7 Resistance to humidity after 1000 hours of exposure in accordance with ASTM D2247.

.2 Acceptable product: Perspectra Series by ArcelorMittal Dofasco Inc. or approved equal in accordance with B6.

2.3 PREFINISHED ALUMINUM SHEET

.1 Aluminum-zinc alloy coated steel sheet:

.1 To ASTM A792/A792M.

.2 Commercial quality.

.3 Grade 33.

.4 Thickness: as indicated on drawings and details

.5 Class F1S.

.6 Colour: as indicated on drawings or selected by Contractor Administrator from manufacturer's standard range.

.2 Finish exposed surfaces of aluminum components in accordance with AA DAF45.

.1 Anodic finish: designation AA-A41. Colour as selected by Contract Administrator from manufacturer's standard range.

.3 Appearance and properties of anodized finishes designated by Aluminum Association as Architectural Class 1, Architectural Class 2, and Protective and Decorative: to AAMA/WDMA/CSA 101/I.S.2/A440, for coating Classes 1, 2 and 3 respectively.

2.4 ACCESSORIES

.1 Isolation coating: alkali resistant bituminous paint.

.2 Sealants: In accordance with Section 07 92 00 – Joint Sealants.

.3 Cleats: of the same materials as the metal designed to secure. Size shall be to suit components to be secured (min 100mm wide). Gauge shall be sufficient to retain the flashings in place.

.4 Fasteners: stainless steel, size and type as shown on Drawings.

.5 Washers: as indicated on drawings.

.6 Touch-up paint: as recommended by prefinished material manufacturer.

2.5 FABRICATION

.1 Fabricate metal flashings and other sheet metal work in accordance with applicable CRCA 'FL' series details and as indicated on drawings.

.2 Fabricate aluminum flashings and other sheet aluminum work in accordance with AAI-Aluminum Sheet Metal Work in Building Construction.

.3 Form pieces in 8’ (2400mm) maximum lengths.

.1 Make allowance for expansion at joints.

.4 Hem exposed edges on underside ½” (12mm).

.1 Mitre and seal corners with sealant.

.5 Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

.6 Apply isolation coating to metal surfaces to be embedded in concrete or mortar.

2.6 METAL FLASHINGS

.1 Form flashings, trims, copings and fascias, etc. to profiles and thicknesses indicated on drawings.

.2 Butt end joints and provide 150mm (6”) backup plates or provide tight fit S-lock.

.3 Each cap flashing to incorporate a 45°, ½” (12mm) hemmed drip edge, unless otherwise noted on drawings.

2.7 SCUPPERS

.1 Form scuppers, including hopper box, from prefinished steel to profiles and thicknesses indicated on drawings.

.2 Provide necessary fastenings and sealant.

2.8 REGLETS

.1 Form recessed and surface mounted reglets to profiles and thicknesses indicated on drawings, to be built-in concrete or masonry work in accordance with CRCA FL series details and as indicated on drawings.

.1 Provide slotted fixing holes and steel/plastic washer fasteners.

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 CRCA FL series details and as indicated on drawings.

.2 Use concealed fastenings, unless otherwise indicated on drawings and where approved before installation.

.3 Counterflash bituminous flashings at intersections of roof with vertical surfaces and curbs.

.4 Flash joints using butt end joints and backup plates or S-lock forming tight fit over hook strips.

.5 Lock end joints and caulk with sealant.

.6 Provide end dams to window sill flashing and counter flash with self-adhesive air vapour barrier membrane.

.7 Install surface mounted reglets true and level, and caulk top of reglet with sealant.

.8 Turn top edge of flashing into recessed reglet or mortar joint minimum of 25mm (1”). Lead wedge flashing securely into joint and caulk top with sealant.

.9 Any through wall flashing shall be installed on 10-degree slope unless noted otherwise.

.10 Install pans, where shown around items projecting through roof membrane.

3.3 FLASHING

.1 Install starter flashing, drip and other flashing, corners, edgings as required and shown on the drawings.

3.4 SCUPPERS

.1 Install scuppers as indicated and at locations shown on drawings.

3.5 CLEANING

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

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Leave work areas clean, free from grease, finger marks and stains.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Tested and listed firestopping systems.

1.2 RELATED REQUIREMENTS

.1 Mechanical Specifications for Mechanical work requiring firestopping

.2 Electrical Specifications for Electrical work requiring firestopping.

1.3 DEFINITIONS

.1 Fire Stop: a system consisting of a material, component, and means of support used to fill gaps between fire separations or between fire separations and other assemblies, or used around items that wholly or partially penetrate a fire separation.

.2 Fire Separation: a construction assembly that acts as a barrier against the spread of fire.

.3 Single Component Fire Stop System: fire stop material that has Listed Systems Design, and is used individually without use of high temperature insulation or other materials to create fire stop system.

.4 Multiple Component Fire Stop System: exact group of fire stop materials that are identified within Listed Systems Designs to create on site fire stop system.

.5 Non-Rated Fire Separation: A separation that prevents passage of fire and smoke for a time period that allows fire suppression system to be activated and contain the fire.

.1 Non-rated fire separations indicated on Drawings are assigned minimum 45-minute fire resistance rating. Firestop on both sides of separation.

.6 Tightly Fitted: penetrating items that are cast in place in building of non-combustible construction or have zero annular space in buildings of combustible construction.

1.4 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM E814-13a - Standard Test Method for Fire Tests of Penetration Firestop Systems

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S115-11 - Standard Method of Fire Tests of Firestop System

.3 Firestop Contractors International Association (FCIA)

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: for each type of product specified. Indicate:

.1 Technical data on out-gassing, off-gassing and age testing.

.2 Curing time.

.3 Chemical compatibility to other construction materials.

.3 Submit system design listings including illustrations from a qualified nationally recognized testing and inspection agency applicable to each firestop configuration. Indicate proposed

materials, reinforcement, anchorage, fastenings, and method of installation reflecting actual project conditions.

.1 Unlisted Firestopping Systems: Obtain an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) from firestop manufacturer where no specific third party tested, listed and classified firestop system is available for a particular firestop configuration.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Installation Data: Manufacturer's written special preparation and installation requirements and tested and listed firestop systems designs.

.3 Installer Qualifications: when requested by Contract Administrator.

.4 Statement of Compatibility. Stating firestopping materials and substrates are compatible.

.5 Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

.6 Manufacturer's Field Reports: Written reports within 3 days of review, verifying compliance of Work, as described in Part 3, Article “Field Quality Control”.

1.7 CLOSEOUT SUBMITTALS

.1 Incorporate the following into Operation and Maintenance Manual:

.1 MSDS.

.2 Product literature for each product used.

.3 For each fire stop system indicate: Room number/name, location within room, rating, EJ, product description, maintenance requirements, and life expectancy of each product installed.

.4 List date of installation for each product and month/year of expected expiration of each product.

1.8 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years experience and FCIA Manufacturer Member in good standing.

.2 Installer Qualifications: Company specializing in performing the work of this section and is an FCIA member in good standing.

.3 Single Source Responsibility: Obtain firestop systems for each type of penetration and construction situation from a single primary firestop systems manufacturer. Obtain firestop systems for complete project, from a single primary firestop systems manufacturer, to the greatest extent possible.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Deliver firestopping products in original, unopened containers with labels intact and legible, identifying product and manufacturer.

.3 Store and handle firestopping materials to manufacturer's instructions.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 – Cleaning and Waste Processing.

1.11 SITE CONDITIONS

.1 Ambient Conditions:

.1 Do not apply materials when temperature of substrate material and ambient air is below manufacturer's recommended application temperature.

.2 Maintain this minimum temperature before, during, and for three days after installation of materials.

.3 Provide ventilation to manufacturer's instructions in areas to receive solvent cured materials.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Manufacturers:

.1 A/D Fire Protection Systems

.2 3M Fire Protection Products.

.3 Hilti, Inc.

.4 Specified Technologies, Inc.

.5 Tremco.

2.2 SYSTEM DESCRIPTION

.1 Tested and listed firestopping systems consisting of a material or materials, the wall or floor assembly, and penetrating items or gaps, assembled or placed in spaces, gaps, joints and building perimeters, to restore the fire resistance rating and or smoke resistant properties of a fire resistance rated assembly or smoke resistant assembly.

2.3 REGULATORY REQUIREMENTS

.1 Conform to applicable code for fire resistance ratings and surface burning characteristics.

.2 Provide certificate of compliance from authority having jurisdiction indicating approval of materials, tested and listed systems or engineering judgments used.

2.4 PERFORMANCE REQUIREMENTS

.1 Penetrations: Firestopping systems produced to resist spread of fire and passage of smoke and gases according to specified requirements, including but not limited to:

.1 Firestop penetrations passing through fire resistance rated wall and floor assemblies, and other locations indicated.

.2 Complete penetration firestopping systems tested and approved by third party testing.

.2 Obtain an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) submittal from firestop manufacturer where no specific third party tested, listed and classified firestop system is available for a particular firestop configuration.

2.5 MATERIALS

.1 Fire stopping and smoke seal systems: in accordance with CAN-ULC-S115.

.1 Asbestos-free materials and systems capable of maintaining an effective barrier against passage of flame, smoke, water and toxic gases in compliance with requirements of CAN/ULC-S115 or ASTM E814, and not to exceed opening sizes for which they are

intended, in accordance with ULC or cUL Design Numbers or other design system listing acceptable to authority having jurisdiction.

.2 Firestopping materials and systems: Flexible to allow for movement of building structure and penetrating items without affecting adhesion or integrity of system.

.2 Firestop products may include, but not be limited to:

.1 Sealants, sprays, mortars, fire straps and breaks.

.2 Fire barrier mouldable putties, with or without backing.

.3 Fire barrier self-locking pillows containing intumescent composition.

.4 Fire barrier composite sheets used to cover large or blank openings.

.5 Firestop devices: factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

.3 Firestopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.4 Firestopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: firestop collars or wrap devices; elastomeric seal.

.5 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.6 Sealants for vertical joints: non-sagging.

.7 Fire-rated acoustical sealant: rated for use in fire-resistance rated partitions requiring sound transmission control.

2.6 ACCESSORIES

.1 Primer: Type recommended by firestopping manufacturer for specific substrate surfaces.

.2 Forming/Packing Material: Permanent type, suitable for application.

.3 Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

.4 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

Part 3 Execution

3.1 EXAMINATION

.1 Verify opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping are ready to receive the work of this section.

.2 Verify tested and listed systems selected are applicable to the conditions encountered.

.3 Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

.1 Clean substrate surfaces as recommended in manufacturer's written instructions, of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material and performance of firestop system for fire or smoke resistant situations.

.2 Remove incompatible materials which may affect bond.

.3 Install damming or backing materials to arrest liquid material leakage.

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.3 APPLICATION

.1 Install firestopping at walls or partition openings that contain penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping to tested and listed system or engineering judgment.

.2 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.3 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.4 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.5 Tool or trowel exposed surfaces to neat finish.

.6 Remove excess compound promptly as work progresses and upon completion.

3.4 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 Clean adjacent surfaces of firestopping materials.

3.5 PROTECTION OF FINISHED WORK

.1 Protect adjacent surfaces from damage by material installation.

3.6 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in Article “Submittals for Information”.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in Article “Quality Assurance”.

3.7 SCHEDULES

.1 Firestop and smoke seal at, but not limited to, the following locations:

.1 New penetrations through fire-resistance-rated wall or floor assemblies including both empty openings and openings that contain penetrations.

.2 Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the barrier.

.3 Top of fire-resistance rated gypsum board partitions.

.4 Joints in fire-resistance-rated assemblies to allow independent movement.

.5 Perimeter of horizontal fire resistance rated assembly and exterior wall between a rated floor/roof and an exterior wall assembly.

.6 Around mechanical and electrical assemblies penetrating fire separations.

.7 Joints, through penetrations and membrane penetrations in assemblies such as smoke barriers, smoke partitions and those assemblies required to limit, restrict or retard the passage of smoke.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Materials, preparation and application for caulking and sealants, including expansion joint strips.

1.2 RELATED SECTIONS

.1 Section 06 10 00 – Rough Carpentry.

.2 Section 07 27 00 – Air Barriers.

.3 Section 07 62 00 – Sheet Metal Flashing and Trim.

.4 Section 08 44 13 – Glazed Aluminum Curtain Wall.

1.3 REFERENCES

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

.1 ASTM C719-14(2019), Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

.2 ASTM C920-18, Standard Specification for Elastomeric Joint Sealants.

.3 ASTM C1193-16 Standard Guide for Use of Joint Sealants.

.4 ASTM C1330-08 Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.

1.4 MEASUREMENT PROCEDURES

.1 No measurement will be made under this section. Contractor shall include in the appropriate fixed price component all labour, materials, supervision, and equipment as required to complete the work required under this Section and as shown on the Drawings.

1.5 SUBMITTALS

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

.2 Manufacturer's product Data to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.4 Expansion joint.

.5 Manufactures installation instructions.

.3 Samples:

.1 Submit Manufacturer’s colour palette of standard colours of each type of sealant and expansion joint.

.2 As requested by Contractor Administrator submit cured samples of exposed sealants and expansion joint for each color where required to match adjacent material.

1.6 CLOSEOUT SUBMITTALS

.1 Submit closeout submittals in accordance with Section 01 78 00 – Closeout Submittals.

.1 Executed warranties.
.2 Operations and Maintenance Manual.

1.7 PRE-INSTALLATION CONFERENCE

.1 Convene pre-installation conference one week prior to beginning work of this Section and on-site installations. Agenda for meeting to include:

.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.

.2 Co-ordinate pre-installation conference with trades of the following sections:

.1 Section 06 10 00 – Rough Carpentry.
.2 Section 07 27 00 – Air Barriers.
.3 Section 07 62 00 – Sheet Metal Flashing and Trim.
.4 Section 08 44 13 – Glazed Aluminum Curtain Wall.

1.8 QUALITY ASSURANCE

.1 Contractor Qualifications: minimum of 3 years experience in application of specified products on projects of similar size and scope.

.2 Mock-up:

.1 Construct mock-up in accordance with Section 01 45 00 - Quality Control.
.2 Construct mock-ups in co-ordination with mock-up as specified under following sections:
.1 Section 07 27 00 – Air Barriers.
.2 Section 07 62 00 – Sheet Metal Flashing and Trim.
.3 Section 08 44 13 – Glazed Aluminum Curtain Wall.
.3 Mock-up to show location, size, shape and depth of joints complete with back-up material, primer, caulking and sealant.
.4 Mock-up will be used:
.1 To judge workmanship, substrate preparation, operation of equipment and material application.
.5 Allow 24 hours for inspection of mock-up by Contract Administrator before proceeding with sealant work.

.3 Field Adhesion Testing:

.1 Contract Administrator or assigned testing agency will conduct field adhesion testing in the presence of and with the assistance of the Contractor in accordance with ASTM C719.
.2 Testing to be completed throughout the course of the work.

.4 Repair of Sealant at Field Adhesion Test Locations:

.1 Repair the sealant pulled from the test area by applying new sealant to the test area.
.1 At locations where acceptable adhesion was obtained:

.1 Use the same application procedure to repair the area as was used originally for the joint.

.2 Ensure that the original sealant surface area is clean and that the new sealant is in contact with the original sealant.

.2 At locations where unacceptable adhesion was obtained:

.1 Consult with manufacturer to ensure acceptable adhesion occurs.

.2 Clean entire surface if joint in accordance with manufacturer's directions.

.3 Modify preparation and application procedures in accordance with specific manufacturer directions to obtain acceptable adhesion.

.4 Co-ordinate with Contract Administrator for retesting off sealant adhesion.

.2 Contractor shall carry costs associated with sealant testing and repair in their bid.

1.9 DELIVERY STORAGE AND HANDLING

.1 Comply with Section 01 60 00.

.2 Deliver products in original factory packaging bearing identification of product, manufacturer, and batch number. Provide Material Safety Data Sheets for each product.

.3 Store products in a location protected from freezing, damage, construction activity, precipitation, and direct sunlight per manufacturer's recommendations.

.4 Handle products with appropriate precautions and care as stated on Material Safety Data Sheet.

1.10 SITE CONDITIONS

.1 Environmental Limitations:

.1 Do not proceed with installation of joint sealants under following conditions:

.1 When ambient and substrate temperature and humidity conditions are outside limits permitted by joint sealant manufacturer.

.2 When joint substrates are wet.

.2 Joint-Width Conditions:

.1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.11 ENVIRONMENTAL REQUIREMENTS

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

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

1.12 WARRANTY

.1 Installer Warranty:

.1 Provide written performance warranty covering labour and materials stating that the installed sealant will be free of defects related to workmanship for a minimum of five (5) years from the date of Substantial Performance. The following problems shall be specifically covered under the warranty in writing:

.1 Cohesive or adhesive failure of the seal.

.2 Abrasion or tear failure of the seal resulting from normal weathering.

.3 Moisture leakage through a sealed joint or crack.

.4 Chalking, cracking, sliding, debonding, shrinkage in the sealant.

.2 Manufacturer Warranty:

.1 Provide written manufacturer warranty covering labour and materials stating that the installed sealant will be free of defects related to material deficiency for a minimum of five (5) years from the date of Substantial Performance. The following problems shall be specifically covered under the warranty in writing:

.1 Cohesive or adhesive failure of the seal.

.2 Abrasion or tear failure of the seal resulting from normal weathering.

.3 Chalking, cracking, sliding, debonding, shrinkage in the sealant.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Silicone Sealant:

.1 Single component, neutral cure, silicone sealant to ASTM C920, Type S, Grade NS, Class 50/50, Use NT, M, A, G, and O.

.2 Acceptable product(s):

.1 DowSil 795 by Dow Corning.

.2 Paintable Sealant:

.1 Single component, moisture cure, polyurethane sealant to ASTM C920, Type S, Grade NS, Class 35, Use NT, M, A, T, O and I.

.2 Acceptable product(s):

.1 MasterSeal NP1 by BASF.

.3 Expansion Joint Strip:

.1 Preformed, pre-compressed, self-expanding, silicone pre-coated joint system. Expanding foam to be cellular foam impregnated with a water-based, non-drying, 100% acrylic dispersion. Seal shall combine factory-applied, low-modulus silicone and a backing of acrylic-impregnated expanding foam into a unified hybrid sealant system.

.1 Acceptable product: Seismic Colorseal by Emseal Joint Systems, LTD.

.2 Size: all expansion joint strips/seals are to be site confirmed, expansion joint strips vary from +/-13 to +/- 100mm

.3 Colour: to be selected by the Contract Administrator. Submit finished colour sample to Contract Administrator for selection and approval prior to installation.

.4 Colour: to be selected by Contract Administrator from manufacturer's standard range of colours.

.5 Single source responsibility for sealants: in order to ensure consistent quality of performance, provide all sealants from a single manufacturer.

2.2 ACCESSORIES

.1 Primer: Use only manufacturer's approved primer.

.2 Closed-cell foam backing rod:

.1 To ASTM C1330.

.2 Compatible with sealant.

.3 Bond breaker tape:

.1 Self-adhesive, pressure sensitive tape made from TFE-flourocarbon (Teflon) or polyethylene which sealant will not adhere to.

.2 Compatible with sealant.

.3 Use of aggregate bond breakers is prohibited.

Part 3 Execution

3.1 PROTECTION

.1 Protect adjacent surfaces against any damage that could result from sealant installation.

3.2 PREPARATION

.1 Back-Up Material:

.1 Install appropriate size backer rod, larger than joint where necessary according to manufacturer's recommendations.

.1 Backer rod diameter to be 25% greater than the joint width.

.2 Pack joints continuously with closed cell baker rod joint backing material allowing a recess to receive sealant.

.3 Backer rod to be installed under adequate compression to hold it in-place in the joint opening and to resist the pressure applied when tooling a non-sag sealant into place.

.4 Install backer rod without stretching.

.5 Do not double up or braided together backer rods to fit the opening.

.6 Do not install backer rod with a sharp tool.

.7 Ensure surface skin of the backer rod is not punctured or cut during installation.

.8 Where joint configuration and size does not permit the use of a backer rod, install bond breaker tape continuously with no skips or voids in the tape application.

.2 Prime substrates as recommended by the sealant manufacturer.

.1 Install primer prior to installation of the sealant backing.

.2 Allow primer to dry until all the solvent evaporates in accordance with manufacturer directions.

.3 Prime only those surfaces that will be sealed with sealant the same day. If a previously primed surface that was performed the day before is encountered it must be re-primed.

3.3 SEALANT INSTALLATION

.1 Prepare sealants that require mixing; follow manufacturer's recommended procedures, mixing thoroughly.

.2 Mix only as much material as can be applied within manufacturer's recommended application time period.

.3 Apply materials only within manufacturer's specified application life period. Discard sealant after application life is expired or if prescribed application period has elapsed.

.4 Application of sealants shall be by skilled applicators installed in accordance with manufacturer's printed directions and supervision. The sealants shall be carefully applied to meet the design requirements.

.5 Sealant shall not be installed on wet or damp substrates. Wet or damp substrates should be allowed to dry before application of primer and/or sealant.

.6 Do not install sealants under conditions of precipitation or temperatures below 4°C. Use appropriate measures for protection and supplementary heating to ensure proper curing conditions in accordance with manufacturer's recommendations if application during inclement weather occurs.

.7 All sealants have a temperature range for optimum handling which can vary considerably, and should be stored at a temperature within this range for at least 16 hours before use.

.8 Do not use sealant that has started to set in its container, exceeded shelf life or installation times as stated by the manufacturer.

.9 The sealant shall be carefully handled and stored to prevent inclusion of foreign materials, or exposure to excessive temperatures as specified by the manufacturer.

.10 Sealant to be installed in a manner that will completely fill the cavity formed in the joint opening by the substrates and sealant backing or bond breaker.

.11 Apply sealant by any of the common types of hand operated guns. Nozzles shall be sized and shaped to fit the intended joint opening width, which will confine the sealant to the joint and aid in building pressure to force the sealant into the cavity. Ensure that mixing and placing procedures do not entrain air within the sealant.

.12 Immediately after applying the sealant, tool the bead. Tooling forces material into cavities and into more intimate contact with the substrate. Wet tooling will not be permitted.

.13 Tool joint to provide a concave-shaped surface. Do not re-use any material forced outside of the joint by the tooling procedure.

.14 Sealant installation shall be a full bead free from air pockets and embedded impurities and free from ridges, wrinkles and sags.

.15 Use anti-tack solutions only with the approval and directions of the sealant manufacturer.

3.4 CLEANING

.1 Do not clean inadvertent spills or splatters of sealant on concrete or masonry with solvent because of possible permanent staining of the substrate. Scrape, wipe or scrub such spills with dry tools or rags.

.2 Clean bulk caulking guns, barrel and nozzle completely after every day's use.

.3 The special precautions recommended by the manufacturer shall be rigidly followed where hazardous materials are involved.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section includes labour and materials required to complete conformance testing and reporting of the curtain wall system.

1.2 RELATED SECTIONS

.1 Section 01 21 00 –Allowances.

.2 Section 08 44 13 – Glazed Aluminum Curtain Walls.

1.3 ALLOWANCES

.1 Air tightness and water resistance testing conducted for mock-ups testing shall be arranged by the Contractor on behalf of the Contract Administrator and The City.

.2 Costs for this testing will be paid out of the Cash Allowance in accordance with Section 01 21 00 – Allowances.

1.4 MEASUREMENT AND PAYMENT

.1 Mock-up installation field testing (CW-1 at the north and south walkway):

.1 Allocate costs for testing of the mock-up installation to the Cash Allowance.

.2 Costs incurred for additional testing for items not meeting the specifications including costs for transportation and for required modifications to be the responsibility of the Contractor.

1.5 REFERENCES

.1 American Architectural Manufacturers Association (AAMA):

.1 AAMA 501.1-05 Standard Test Method for Water Penetration Of Windows, Curtain Walls And Doors Using Dynamic Pressure.

.2 ASTM International:

.1 ASTM E783-02 (2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

.2 ASTM E1186-17 Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems.

.3 Canadian Standards Association (CSA International)

.1 AAMA/WDMA/CSA 101/I.S.2/A440-11 (R2016), NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

.2 CSA A440SI-09 - Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-11 (R2016), NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

1.6 SUBMITTALS

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

.2 Submit test results from testing agency for each specified test maximum one week following completion of testing.

1.7 TESTING AGENCY

.1 Notify Testing Agency in writing of the construction and testing schedule prior to the start of work.

.2 Acceptable field testing agencies:

.1 Intertek
356 Saulteaux Crescent
Winnipeg, Manitoba R3J 3T2
Contact: Bryan Boyle
Phone: (204) 885-9300

Part 2 Products

2.1 NOT USED.

.1 Not Used.

Part 3 Execution

3.1 ON-SITE AIRTIGHTNESS TESTING

.1 Qualitative Testing:

.1 Conduct qualitative air tightness in accordance with:
.1 ASTM-E1186.
.2 AAMA/WDMA/CSA 101/I.S.2/A440.
.3 CSA A440S1.

.2 Conduct smoke testing and visual examination at interior and exterior surfaces of exterior walls, corners and curtain wall locations.

.3 Test pressure in accordance with:
.1 Section 08 44 13 – Glazed Aluminum Curtain Walls.

.4 Test to include rough opening.

.5 Frequency of Testing:
.1 Once during CW-1 mock-up at both the north and south walkway.

3.2 ON-SITE WATER PENETRATION TESTING

.1 Conduct water penetration testing in accordance with AAMA 501.1:

.1 Dynamic pressure.

.2 Water penetration testing to include the rough opening.

.3 Test pressure in accordance with:
.1 Section 08 44 13 – Glazed Aluminum Curtain Walls.

.4 Pass criteria as defined by AAMA 501.1.

.5 Frequency of Testing:
.1 Once during CW-1 mock-up at both the north and south walkway.

3.3 ANALYSIS AND CORRECTIVE PROCEDURES

.1 Correct leakages identified during testing including repairs to:

.1 Rough opening.

.2 Frame connections.

.2 Following leakage corrections, re-test.

.3 Do not cover any membrane until reviewed by Contract Administrator.

.4 Repairs to leakages identified by testing and re-testing are the responsibility of the contractor. No additional costs to be submitted to The City for repairs or testing.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This section covers removal and replacement of the existing glazing system with new curtain wall and metal spandrel panels, new stick framing and anchorage, glazing units in the manner, direction and performance shown on the drawings and specified in this section.

1.2 RELATED SECTIONS

.1 Section 07 27 00 – Air Barriers.

.2 Section 07 62 00 – Sheet Metal Flashing and Trim.

.3 Section 07 92 00 – Joint Sealants.

.4 Section 08 08 00 – Commissioning of Openings.

1.3 MEASUREMENT AND PAYMENT

.1 No measurement will be made under this section. Contractor shall include in the appropriate fixed price component all labour, materials, supervision, and equipment to complete the work required under this Section and as shown on the Drawings.

1.4 REFERENCES

.1 Aluminum Association (AA):

.1 Designation System for Aluminum Finishes (2003).

.2 Architectural Aluminum Manufacturers Association (AAMA)

.1 AAMA 501.1-17 Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.

.2 AAMA 501.2-(Latest) Field Check for Metal Curtain Walls for Water Leakage.

.3 AAMA 800-(Latest), Voluntary Specifications and Test Methods for Sealants.

.4 AAMA 1503-09, Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

.3 American Society for Testing and materials (ASTM):

.1 ASTM A653/A653M-05a, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 ASTM C864-05(2011), Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacer.

.3 ASTM C1048-12e1, Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

.4 ASTM B209/B209M-04, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

.5 ASTM C612-14, Mineral Fiber Block and Board Thermal Insulation.

.6 ASTM E783-02(2018), Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

.7 ASTM E 1105-Latest, Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference

.8 ASTM E2188-latest, Standard Test Method for Insulating Glass Unit Performance.

.9 ASTM E2189-10e1, Standard Test Method for Testing Resistance to Fogging in Insulating Glass Units.

.10 ASTM E2190-latestet, Standard Specification for Insulating Glass Unit Performance and Evaluation.

.11 ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

.4 Canadian Standards Association (CSA International)

.1 AAMA/WDMA/CSA 101/I.S.2/A440-11 (R2016), NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

.2 CSA A440SI-09 - Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440-11 (R2016), NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights.

.3 CAN/CSA-A440.2-14/A440.3-14 - Fenestration energy performance / User guide to CSA A440.2-14, Fenestration energy performance.

.4 CAN/CSA-A440.4-19 Window, Door, and Skylight Installation.

.5 CAN/CSA S136-12, North American Specification for the Design of Cold-Formed Steel Structural Members.

.6 CAN/CSA 136.1-12, Commentary on North American Specification for the Design of Cold-Formed Steel Structural Members.

.5 Canadian General Standards Board

.1 CAN/CGSB 12.8-(Latest), Insulating Glass Units.

.6 Insulating Glass Manufacturers Association

.1 IGMA TM-3000-(Latest) - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.

1.5 PRE-INSTALLATION MEETING

.1 Convene pre-installation meeting one week prior to beginning work of this Section and on-site installations. Agenda for meeting to include:

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Review installation details.

.4 Co-ordinate with other subtrades.

.5 Review manufacturer's installation instructions and warranty requirements.

.6 Review testing requirements.

1.6 CO-ORDINATION AND SCHEDULING

.1 Co-ordinate window installation with cladding, roofing and sheet metal flashing and trim installation.

1.7 ACTION/INFORMATION SUBMITTALS

.1 Submit in accordance with Section 01 33 00 – Submittals.

.2 Product Data:

.1 Submit manufacturers product data verifying conformance to performance requirements for each type of curtain wall system.

.3 Samples:

.1 Submit sample of the final finish/colour of the specified prefinished aluminum curtain wall system.

.2 Submit sample of the final finish/colour of the specified aluminum plate (at curtain wall backpan) and closures.

.3 Submit 300 x 300mm (12”x12”) samples of each specified type of glazing, vision glazing Type 1 (GL-1) and spandrel glass Type 2 (GL-2).

.4 Submit min. 300mm (12”) long samples of the specified solid stainless steel closure (floor grills), showing finish.

.5 Submit 300 x 300mm (12”x12”) sample of the PTAC Unit exterior louver showing finish, colour, frame and blades.

.4 Shop Drawings:

.1 Clearly show large scale details for:

.1 Head, jamb and sill, profiles of components.

.2 Anchorage details.

.3 Interior and exterior trim.

.4 Junction between combination units.

.5 Elevations of units.

.6 Rough opening.

.7 Relation to construction of adjacent work.

.1 Continuity of air and vapour seal.

.8 Anchorage details:

.1 Shim and anchor method.

.2 Quantity, spacing and embedment.

.2 Show on shop drawings:

.1 Materials, including:

.1 Specifications.

.2 Material name.

.2 Internal drainage details.

.3 Location of isolation coating.

.4 Description of related components.

.5 Exposed finishes and fasteners.

.6 Glass sizes.

.7 Glass:

.1 Thickness.

.2 Number of panes.

.3 Coating material and location.

.4 Space and fill material.

.5 Spacer material.

.3 Seal Shop Drawings by an Engineer registered in the Province of Manitoba. Seal to apply to:

.1 Curtain wall anchor to structure method, shims and materials.

.2 Loads on curtain walls and glazing.

.3 Frame reinforcement.

1.8 CLOSEOUT SUBMITTALS:

.1 Submit two (2) copies of operation and maintenance data and information, including cleaning instructions, for curtain wall framing, glass, frames and hardware.

.2 Submit final executed warranty.

1.9 QUALITY ASSURANCE

.1 Qualifications

.1 Manufacturer to be specialized in the manufacturing of glazed aluminum curtain wall systems with a minimum of ten (10) years of documented experience.

.2 Installers are to be specialized in the installation of glazed aluminum curtain wall systems with a minimum of five (5) years of documented experience.

.2 Mock-Up

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

.2 Install a mock-up of a complete CW-1 glazed aluminium curtain wall system assembly into exterior wall system at one location identified by Contract Administrator along both the north and south walkway.

.1 At one CW-1 mock-up location incorporate the solid closure (floor grill) and PTAC unit installation, including the exterior louver around the PTAC unit.

.3 Erect mock-up and test installation on-site in accordance with Section 08 08 00 – Commissioning of Openings.

.4 Co-ordinate site review and testing of mock-up with Contract Administrator and testing agency minimum of one week prior to installation of mock-up.

.5 Co-ordinate with Contract Administrator to review mock-up installation at the following times:

.1 Removal of existing curtain wall system and installation.

.2 Completion of installation of self-adhesive air vapour barrier and flashing.

.3 Completion of installation of curtain wall, expanding foam air seal and sealant, but prior to installation of trims and finishes.

.6 Allow 24 hours following Contract Administrator mock-up review and submission of testing reports before proceeding with installation of remaining curtain walls.

.7 Mock-up may remain as part of the Work.

.8 Pay for air leakage testing and wind-driven rain resistance testing of the mock-up under the Cash Allowance. Bear costs incurred for additional testing for items not meeting the specifications including costs for transportation and for required modifications to meet specifications.

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.

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

.3 Storage and Handling Requirements:

.1 Store materials in accordance with manufacturer's recommendations.

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

.3 Replace defective or damaged materials with new.

1.11 EXISTING CONDITIONSS

.1 Verify site conditions and measurements prior to manufacturing of curtain wall system.

.2 Site measure each rough opening as dimensions may vary.

1.12 WARRANTIES

.1 Construction Warranty: Provide two (2) year warranty against leakage, defects and defective material, and workmanship from the date of substantial completion.

.1 Include glazing cracks which form within one year from the date of substantial completion.

.2 Manufacturer Warranty:

.1 Provide ten (10) year warranty against defects and malfunction under normal usage from the date of substantial completion.

Part 2 Products

2.1 MANUFACTURERS

.1 Acceptable Products:

.1 Glazed Aluminum Curtain Wall (CW-1): prefinished aluminum curtainwall complete with Structural Silicone Glazed (SSG) and captured along the top and bottom of the system, and captured vertical mullion at connections to existing structures.

.1 1600 Wall System 2 by Kawneer Company Inc.

.2 Frame: 2-1/2" (63.5mm) sightline.

.3 Tested to AAMA 501.1

.4 Final finish/colour: clear anodized finish or as otherwise indicated on drawings.

.2 Alternate manufactures and products will be reviewed for conformance. If the product meets the specification requirements, written approval will be provided. Submit request for alternates to Contract Administrator for review.

2.2 DESIGN REQUIREMENTS

.1 Curtain wall supplier to use wind load of 17.1psf (0.82kPA) for curtain wall mullion anchorage to structure design.

.2 Curtain wall weight to be supported at the walkway floor level only (soffit), connection to structure at the roof level are for lateral/wind load only.

.3 Deflection of L/175 up to 13’-6” height and L/240 plus ¼” above 13’-6”.

2.3 DESIGN CRITERIA

.1 Assembled system includes installation of structural mullion sections, insulting glass units, spandrel box and glass infill.

.2 Design the entire skin based on the Rain Screen principle to provide:

.1 Gaskets, baffles, overlaps and seals to provide a "Rain Screen" barrier to effectively drain to the exterior by a weep drainage network:

.1 Water entering joints,

.2 Condensation occurring in glazing channels,

.3 Migrating moisture occurring within system.

.2 Air seals to minimize air passage from the system cavities into the building and vice versa, to assure adequate pressure equalization of the system cavities with the outside.

.3 Air and vapour seals to minimize air borne vapour exfiltration from the building into the system cavities.

.4 Continuous silicone heal bead to seal inside face of glazing to aluminum frame. Heal bead not to block system drainage system.

.5 Openings between these cavities and the outside of sufficient cross-section to provide pressure equalization. Baffle openings or otherwise guard to minimize direct water entry.

.6 No vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.

.7 Venting of the space behind the spandrel panel along the soffits; provide openings at the interior face of vertical curtainwall mullion along the soffits and roof level as shown on drawing details. Do not cut the backpan.

.3 Design system to accommodate, without damage to components or deterioration of seals:

.1 Expansion and contraction within system caused by cycling temperature range of 95 degrees C over a 12 hour period without causing detrimental effect to system components including buckling, failure of joint seals, or undue stress on fasteners.

.2 Movement between system and perimeter framing components.

.3 Dynamic loading and release of loads.

.4 Deflection of structural support framing.

.4 Design and size components to meet or exceed the requirements for loads on walls acting as guards in accordance with 2010 National Building Code of Canada.

.5 Maintain continuous air/vapour barrier throughout assembly, primarily in line with inside pane of glass and heel bead of glazing compound.

2.4 PERFORMANCE REQUIREMENTS

.1 Design and size components to withstand dead and live loads caused by pressure and suction of wind, acting normal to plane of system as calculated in accordance with 2010 NBC.

.2 Design and size components to withstand seismic loads and sway displacement as calculated in accordance with 2010 NBC.

.3 Limit mullion deflection to a maximum as per paragraph 2.2.3, not to exceed 19mm over glass panel length; with full recovery of glazing materials.

.4 Size glass units and glass dimensions to limits established in CAN/CGSB-12.20-M89.

.5 Thermal transmittance U-Value:

.1 Maximum 2.4 W/($m^2 \cdot °C$) in accordance with:

.1 AAMA 1503-09.

.2 CAN/CSA-A440.2

.6 Temperature Index:

.1 Greater than 50 in accordance with CSA-A440.2.

.7 Design Pressure:

.1 1,920 Pa in accordance with CAN/CSA-A440.

.8 Air tightness:

.1 0.2 L/(s m^2) at 300 Pa as measured in accordance with;

.1 ASTM E783 for site testing.

.9 Water Penetration Resistance Test Pressure:

.1 390 Pa as measured in accordance with AAMA 501.1

.10 Structural test pressure: 2,880 Pa.

.11 Resistance to Forced Entry:

.1 To ASTM F588 – Grade 10 minimum.

.12 Sound attenuation through wall system (exterior to interior): greater than STC 31, measured in accordance with ASTM E90 and ASTM E1425.

2.5 MATERIALS

.1 Extruded aluminum: Aluminum Association A 6063-T6 alloy and temper in accordance with ASTM B221 and CAN/CSA-S157.

.2 Glazed Curtain Wall Mullion Profile: vertical and horizontal members, interior tubular extruded aluminum section, four-sided structural silicone glazed on the exterior with adequate bite on mullions, caps, infill panels, drainage holes, deflector plates and internal flashings to accommodate internal weep drainage system, internal mullion seals to eliminate "stack effect" air movement within internal spaces of framing.

.3 Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.

.4 Exposed sheet to receive anodic finish which shall be anodizing quality.

.5 Sheet which is not exposed shall be utility grade.

.6 Member Wall thickness: Each framing member shall have a wall thickness sufficient to meet the specified structural requirements.

2.6 GLASS AND GLAZING MATERIALS

.1 Glazing utilized to fit within the confines of the Kawneer 1600 Wall System.

.1 Acceptable Manufacturer:

.1 PPG Glass North America

.2 AGC Flat Glass North America

.2 Glaze windows in accordance with CAN/CSA-A440 and CAN/CGSB 12.8. Insulating glass units must carry IGMAC Certification and be identified with:

.1 IGMAC.

.2 Name of manufacturer.

.3 Location where the units were made.

.4 Year of manufacture.

.3 Vision Glass Product Configuration Type 1 (GL-1)

.1 Double Glazed:

.2 Lite 1 Configuration – Exterior

.1 Thickness: 1/4" (6 mm)

.2 Substrate: Clear.

.1 Heat-Strengthened Glass.

.3 Low Emissivity Coating:

.1 Solarban 60.
.2 Coating Position: Surface 2
.4 Airspace: 1/2" (12.7 mm) c/w 95% argon / 5% air fill.
.3 Lite 2 Configuration – Interior
.1 Thickness: 1/4" (6 mm)
.2 Substrate: Clear
.1 Tempered Glass
.3 No Coating

.4 Performance Data
.1 Visible Light
.1 Transmittance: 70%
.2 Reflectance - Indoors: 11%
.2 U-Values
.1 Winter – (Argon): 1.37 watt/meter²/°C (0.24 Btu/hour/foot²/°F)
.3 Other Values
.1 Solar Heat Gain Coefficient: 0.39

.5 Spandrel Glass Type 2 (GL-2):
.1 Double Glazed:
.2 Lite 1 Configuration – Exterior
.1 Thickness: 1/4" (6 mm)
.2 Substrate: Clear.
.1 Heat-Strengthened Glass.
.3 Low Emissivity Coating:
.1 Solarban 60.
.2 Coating Position: Surface 2
.4 Airspace: 1/2" (12.7 mm) c/w 95% argon / 5% air fill.
.3 Lite 2 Configuration – Interior
.1 Thickness: 1/4" (6 mm)
.2 Substrate: Clear
.1 Heat-Strengthened Glass
.3 Silicone coated
.1 Opaci-coating on Surface 4.
.1 Colour as selected by Contract Administrator.
.2 Coating to be of sufficient thickness for fallout protection.
.4 Provide the following alternative price in lieu of base bid Spandrel Glass Type 2 (GL-2):
.1 Thickness: 1/4" (6 mm) clear.
.1 Heat-Strengthened Glass
.2 Silicone coated.
.1 Opaci-coating on Surface 2
.1 Colour: Opaci-coat 200 #2-2349 Greenish Grey
.2 Colour to be confirmed and approved by Contact Administrator.
.2 Coating to be of sufficient thickness for fallout protection.

.6 Setting Blocks:

.1 To ASTM C 864.

.2 Material: Neoprene.

.3 Shore A Durometer Hardness: 80 to 90.

.4 Length: 4 inches (100 mm).

.5 Width of glazing rabbet space: less 1/16 inch (1.5 mm).

.6 Height required for glazing method, pane weight, and pane area.

.7 Side Blocks:

.1 To ASTM C 864.

.2 Material: Neoprene.

.3 Shore A Durometer Hardness: 50 to 60.

.4 Length: 3 inches (75 mm).

.5 One half height of glazing stop, thickness required for application, one face self-adhesive.

.8 Glazing Tape: Tremco SGT Tape, 100% solid, highly adhesive and elastic, cross linked butyl performed tape with a continuous integral EPDM shim.

.9 Glazing Gaskets: ASTM C 864, extruded of a silicone compatible EPDM rubber that provides for silicon adhesion, shape to fit glazing channel retaining slot; black color.

.10 Tempered Glass:

.1 Cut float glass materials to indicated sizes and provide cut-outs and holes, if indicated, before heat strengthening.

.2 Fully temper float glass materials in accordance with ASTM C 1048, Kind FT.

.11 Sealed Insulating Glass Units:

.1 Fabricate units in accordance with ASTM E 2188, 2189, 2190 Standard Specification for Insulating Glass Unit Performance.

.2 Provide unit edge seals meeting requirements of ASTM C 1249 with sealant for glass-to-spacer seals.

2.7 CURTAIN WALL BACKPAN

.1 3 ¼" (82.5mm) Backpans.

.2 22-gauge galvanized steel with sealed corners.

.3 All spandrel boxes shall be fully vented and drained.

.4 2.053 (0.081") aluminum sheets on all interior faces of the backpans. Aluminum sheets to be adhered to backpan or by other methods recommended by supplier/contractor and as confirmed with the Contract Administrator. Finish to match curtain wall mullions and face of aluminum sheets to be flush with curtain wall mullions. No penetrations are allowed in the backpan.

.5 As required and indicated on drawings provide aluminum trim and closures on the interior face of backpan.

.6 Insulation:

.1 CURTAINROCK stone wool insulation by Rockwool.

.2 Thickness: to fill backpan.

.3 Fasten to backpan with stickpins at 12" (300mm) on centre.

2.8 ACCESSORIES

.1 Fasteners: 300 series stainless steel or 400 series stainless steel cadmium plated and shall be of a size, type, quantity and length to meet the load requirements of the aluminum curtain wall framing in accordance with building code and all applicable local regulations, and to maintain a weather-resistant installation. Size and quantity to perform their intended function.

.2 Floor grills: 20ga. solid stainless steel closure, with continuous angle support and stainless steel tamper proof screws. Dissimilar metals to be separated by foam tape or gasket.

.3 PTAC Unit Louver: prefinished metal louver with fixed blades.

.1 EH Price 'NSE1' Louver with approximately 65% free area, 38mm depth, clear anodized finish to match curtainwall mullions.

.4 Thermal break: thermal separator shall be extruded of a silicone compatible elastomer that provides for silicon adhesion.

.5 Pre-engineered transition assembly: silicone materials to transition assembly between curtain wall openings and the adjacent wall system/membranes:

.1 Acceptable Product: Proglaze ETA by Tremco Commercial Sealants & Waterproofing.

.6 Spray-foam Insulation:

.1 Closed cell polyurethane.

.1 Acceptable Product: Dow Enerfoam.

.2 Foam must not be used as a structural load bearing connection meant to resist lateral wind loads.

.7 Primer, sealer and cleaners: to glass manufacturer's standard.

.8 Sealant to be neutral cure silicone in accordance to Section 07 92 00 – Joint Sealants.

.9 Expansion joint strip: in accordance to Section 07 92 00 – Joint Sealants.

.10 Self Adhesive Air Vapour Barrier Membrane:

.1 In accordance with Section 07 27 00 – Air Barriers.

.2 Primer: Manufacturer approved.

.3 Termination mastic: Manufacturer approved.

.11 Sheet Metal Flashing: in accordance with Section 07 62 00 – Sheet Metal Flashing and Trim.

2.9 STRUCTURAL STEEL

.1 Design details and connections in accordance with requirements of CAN/CSA-S16 and CAN/CSA-S136 with CSA-S136.1 to resist forces, moments, shears and allow for movements indicated.

.2 Shear connections:

.1 Select framed beam shear connections from an industry accepted publication such as "Handbook of the Canadian Institute of Steel Construction" when connection for shear only (standard connection) is required.

.2 Select or design connections to support reaction from maximum uniformly distributed load that can be safely supported by beam in bending, provided no point loads act on beam, when shears are not indicated.

.3 For composite construction select or design minimum end connection to resist reaction resulting from factored movement resistance as tabulated in the "Handbook of the

Canadian Institute of Steel Construction" assuming 100% shear connection with depth of steel deck and/or slab shown on drawings.

.4 Structural steel:

.1 Rolled or steel structural sections: G40.21-350W.

.2 Hollow structural sections: G40.21-350W class C.

.3 Angles, channels and plates: G40.21-300W.

.5 Anchor bolts: to CSA-G40.20/G40.21, Grade 300W.

.6 Bolts, nuts and washers: to ASTM A307, ASTM A325M, and ASTM A490/A490M as required.

.7 Welding materials: to CSA W59 and certified by Canadian Welding Bureau.

.8 Hot dip galvanizing: galvanize steel, where indicated, to ASTM A123, minimum zinc coating of 600 g/m^2.

.9 Shear studs: to CSA W59, Appendix H.

.10 Fabricate structural steel in accordance with CAN/CSA-S16, CAN/CSA-S136, and in accordance with reviewed shop drawings.

.11 Dissimilar metals to be separated by a foam tape or gasket.

.12 Install shear studs in accordance with CSA W59.

.13 Continuously seal members by continuous welds where indicated. Grind smooth.

.14 Clean, prepare surfaces and shop prime structural steel as follows:

.1 Steel not receiving finish painting: One coat of CISC / CPMA 1-73a quick drying shop primer. Steel to be cleaned in conformance with SSPC-SP2.

.2 Steel receiving finish painting: One coat of CISC / CPMA 2-75 quick drying shop primer. Steel to be cleaned in conformance with SSPC-SP7.

.3 Exterior structural steel: All exterior structural steel shall be hot-dipped galvanized unless noted.

.15 Clean members, remove loose mill scale, rust, oil, dirt and foreign matter.

.16 Apply paint under cover, on dry surfaces when surface and air temperatures are above 5 degrees C.

.17 Maintain dry condition and 5 degrees C minimum temperature until paint is thoroughly dry.

.18 Strip paint from bolts, nuts, sharp edges and corners before prime coat is dry.

2.10 FABRICATION

.1 Fabricate aluminum curtain wall framing from extrusions of size and shape shown on reviewed shop drawings in accordance with CAN/CSA-A440.

.2 Provide internal steel reinforcing to meet requirements of 2010 National Building Code of Canada, Climatic Information for Building Design in the Place of the Work.

.3 Dry shrinkage of the thermal break not exceed 0.10% of the framing member length.

.4 Vertical and horizontal members shall be tubular extrusions designed for shear block corner construction.

.5 Accurately machine, assembled and seal joints to provide neat, flush, hairline, and weather tight joints.

.6 Provide shielded drainage and pressure equalization vents.

.7 Seal horizontal members to vertical members to provide individual compartments within the system in accordance with the rain screen principle.

.8 Vent, pressure equalize and drain glazing pockets to the exterior.

.9 Factory pre-drill slotted weep holes at 610 mm o/c. along bottom edge of horizontal exterior caps at sill locations.

.10 Visible manufacturer's identification labels not permitted.

.11 Brace frames to maintain square and rigidity during shipment and installation.

.12 Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

.13 Break form aluminum flashings to details indicated and of same finish as curtain wall framing.

2.11 FINISHES

.1 Submit manufacturer finish samples based on Aluminum Association designation system for Aluminum Finishes to Contract Administrator.

.2 Colour:

.1 Final finish to be selected and approved by Contract Administrator.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrate surface in accordance with manufacturer’s direction and written instruction.

.2 Confirm existing substrate surfaces are acceptable to manufacturer’s directions and written instructions to accept Work of this section.

.3 Measure sizes of new material on jobsite at each specific location. Rough opening sizes can be expected to vary for each window.

.4 Notify Contract Administrator in writing of discrepancies. Commencement of the Work or any parts thereof constitute acceptance of substrate conditions.

.5 Verify dimensions, tolerances, and method of attachment with other work.

.6 Verify wall openings and adjoining air barrier and vapour retarder materials are ready to receive work of this section.

3.2 PREPARATION

.1 Protection

.1 Protect adjacent surfaces from damage resulting from Work of this section.

.2 Protect finished Work from water penetration at end of each day and on completion of each section of Work.

.3 Protect installation from moisture for minimum 48 hours after completion of each portion of Work.

.2 Demolition:

.1 Remove existing glazing and frames as indicated and discard.

.3 Surface preparation

.1 Ensure environmental and site conditions are suitable as directed by manufacturer for installation of system.

.2 Prepare surfaces in accordance with manufacturer's written instructions.

3.3 INSTALLATION

.1 Complete in accordance with CAN/CSA-A440.4, manufacturer’s instructions and shop drawings.

.2 Install, glaze and adjust windows in accordance with manufacturer’s instructions and approved shop drawings.

.3 Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities and perimeter air seal.

.4 Provide alignment attachments and shims to permanently fasten system to building structure. Clean weld surfaces; apply protective primer to field welds and adjacent surfaces.

.5 Erect structural steel, as indicated and in accordance with CAN/CSA-S16, CAN/CSA-S136, and in accordance with reviewed shop drawings.

.6 Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.

.7 Provide thermal isolation where components penetrate or disrupt building insulation.

.8 Co-ordinate attachment and seal of perimeter air barrier and vapour retarder materials.

.9 Drain water entering joints, condensation occurring in glazing channels and migrating moisture occurring within the system to the exterior by a weep drainage network.

.10 Apply expanding foam insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

.11 Install perimeter sealant to method required to achieve performance criteria, backing materials, and installation criteria.

.12 Replace at no extra cost to The City, glass that is:

.1 Cracked.

.2 Broken.

.3 Broken due to improper setting and installation.

.4 Otherwise damaged during installation.

3.4 FIELD QUALITY CONTROL

.1 Independent testing of aluminum curtain wall will be carried out by independent testing agency in accordance with Section 08 08 00 – Commissioning of Openings:

.1 On-site Airtightness Testing

.1 Quantitative Test:

.1 In accordance with Section 08 08 00 – Commissioning of Openings.

.2 Qualitative Testing:

.1 In accordance with Section 08 08 00 – Commissioning of Openings.

.2 On-site Water Penetration Testing:

.1 In accordance with Section 08 08 00 – Commissioning of Openings.

.2 Analysis and Corrective Procedures

.1 Air tightness and water penetration testing will identify locations of air leakage and will be reported in writing to the Contractor for correction. Contractor shall re-seal and otherwise correct all leakage sites as identified and as may be required.

.2 Following air leakage corrections, the test area will be re-tested if deemed necessary.

.3 Do not cover any membrane until reviewed by Contract Administrator.

.4 Should the contractor fail to meet the on-site specification requirements, all re-testing required due to deficient work and/or testing procedures will be carried out at the Contractor's sole cost. The contractor shall implement the necessary repairs to the rough opening in order to meet the specification requirements for rough opening air leakage at no cost to The City. Re-testing shall be completed to verify that the specification requirements have been met or surpassed.

3.5 CLEANING AND PROTECTION

.1 Remove protective material from prefinished aluminum surfaces.

.2 Remove visible manufacture labels.

.3 Clean curtain wall and glazing in accordance with manufacturers directions:

.1 Wash down interior and exterior surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Remove dirt from corners. Wipe surfaces clean.

.2 Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to manufacturer.

.4 Protect installed windows from damage during construction. Do not apply masking tape, adhesives or other chemicals directly to window components. Consult with window manufacturer for product compatibility.

.5 Clean all window components including interior and exterior faces of glazing at the completion of the project.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Gypsum board.

.2 Acoustic insulation.

1.2 RELATED SECTIONS

.1 Section 05 41 00 - Structural Metal Stud Framing.

.2 Section 06 16 43 – Gypsum Sheathing.

.3 Section 07 84 00 - Firestopping.

.4 Section 09 22 16 - Non-structural Metal Stud Framing.

1.3 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM C475/C475M-15 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board

.2 ASTM C665-12 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

.3 ASTM C840-13 - Standard Specification for Application and Finishing of Gypsum Board

.4 ASTM C954-15 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.5 ASTM C1002-14 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

.6 ASTM C1047-14a - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base

.7 ASTM C1396/C1396M-14a - Standard Specification for Gypsum Board

.8 ASTM D3273-16 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction

.3 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S101-07, Fire Endurance Tests of Building Construction and Materials

.2 CAN/ULC-S102-10 - Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.3 CAN/ULC-S702-14 - Standard for Mineral Fibre Thermal Insulation for Buildings

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data:

.1 Provide data on each type of gypsum board and cementitious backer board.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Cleaning and Waste Processing.

Part 2 Products

2.1 REGULATORY REQUIREMENTS

.1 Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to CAN/ULC-S101 by an independent testing agency. Refer to Drawings for design assemblies.

2.2 GYPSUM BOARD MATERIALS

.1 Interior Standard Gypsum Board: ASTM C1396/C1396M, paper-faced; 1220 mm wide, maximum available length in place; tapered edges, ends square cut.

.1 Regular core, 13 mm thick.

.2 Regular and fire rated core, 16 mm thick.

2.3 ACCESSORIES

.1 Acoustic Insulation: CAN/ULC-S702 or ASTM C665 Type I; preformed mineral fibre, in batt form; friction fit type, unfaced, minimum 40 kg/m^3 density, thickness indicated. Flame/Smoke Properties: 0/0 to CAN/ULC-S102, non-combustible to CAN/ULC S114.

.1 Manufacturer/Model:

.1 Roxul; AFB.

.2 Thermafiber; SAFB.

.2 Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.

.3 Steel Drill Screws:

.1 For metal framing less than 0.91 mm thick: to ASTM C 1002.

.2 For metal framing 0.91 mm and thicker: to ASTM C 954.

.4 Casing Beads, Corner Beads, Control Joints and Edge Trim: to ASTM C 1047, zinc-coated by hot-dip process, 0.46 mm base thickness, laminated to paper tape, one piece length per location.

.5 Joint Materials: ASTM C475.

.1 Reinforcing tape, adhesive, and water.

.2 Joint compound: Asbestos-free.

Part 3 Execution

3.1 EXAMINATION

.1 Verify that site conditions are ready to receive work.

.2 Do not apply gypsum board until bucks, anchors, blocking, sound attenuation, electrical and mechanical work is reviewed.

3.2 ACOUSTIC ACCESSORIES INSTALLATION

.1 Place acoustic insulation in partitions tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind partitions, and tight to items passing through partitions.

.2 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.

.3 Seal full perimeter of cut-outs around electrical boxes, ducts, and all penetrations in partitions where perimeter sealed with acoustic sealant.

3.3 GYPSUM BOARD INSTALLATION

.1 Install gypsum board to ASTM C840 and manufacturer's written instructions.

.2 Erect gypsum board with ends and edges occurring over firm bearing.

.3 Apply gypsum board to metal furring or framing using screw fasteners. For double layer application, use screw fasteners for both layers. Maximum spacing of screws 300 mm on centre.

.1 Single-Layer Application:

.1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C 840.

.2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.2 Double-Layer Application:

.1 Install gypsum backing 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.

.4 Erect exterior gypsum soffit board perpendicular to supports, with staggered end joints over supports.

.5 Treat cut edges and holes in moisture resistant gypsum board with sealant.

.6 Install backing board over metal studs to manufacturer's written instructions.

3.4 INSTALLATION - ACCESSORIES

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure using joint compound for full length.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.4 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.5 Control Joints:

.1 Construct of preformed units in ceilings, and of preformed units or two back-to-back casing beads set in gypsum board facing and supported independently on both sides of joint elsewhere.

.2 Provide continuous polyethylene dust barrier behind and across control joints.

.3 Locate control joints at 6 metres o.c. maximum or at changes in substrate construction. Where control joints occur at door frames, align control joint with outside edge of door frame.

.4 Install control joints straight and true.

.6 Expansion Joints:

.1 Construct expansion joints as detailed, at building expansion and construction joints. Provide continuous dust barrier.

.2 Install expansion joint straight and true.

.3 Splice corners and intersections together and secure to each member with three screws.

.7 Install cornice cap where gypsum board partitions do not extend to ceiling.

.8 Fit cornice cap over partition, secure to partition track with two rows of sheet metal screws staggered at 300 mm on centre.

.9 Splice corners and intersections together and secure to each member with three screws.

.10 Install access doors to electrical and mechanical fixtures specified in respective sections.

.1 Rigidly secure frames to furring or framing systems.

.11 Where gypsum board is installed above finished ceilings, fit work tight to items penetrating gypsum board work. Seal around full perimeter of items with caulking. Use fire retardant caulking at fire rated enclosures, acoustical caulking elsewhere.

3.5 JOINT TREATMENT

.1 Finish to ASTM C840. Refer to article “Schedule” for levels of finishing.

.2 Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

.3 Feather coats on to adjoining surfaces so that camber is maximum 0.8 mm.

.4 Taping, filling, and sanding is not required at surfaces behind ceramic tile.

3.6 SCHEDULES

.1 Gypsum Finishing Levels:

.1 Level 1: Above finished ceilings concealed from view.

.2 Level 2: Behind ceramic tile.

.3 Level 4: Walls and ceilings exposed to view.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Formed metal framing of studs and furring, at interior locations.

.2 Formed metal framing of studs for temporary rated corridors.

.3 Framing accessories.

1.2 RELATED REQUIREMENTS

.1 Section 01 53 00 - Temporary Construction.

.2 Section 05 41 00 - Structural Metal Stud Framing.

.3 Section 06 10 00 - Rough Carpentry.

.4 Section 09 21 16 - Gypsum Board Assemblies.

1.3 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM A123/A123M-15 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

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

.3 ASTM C645-14 - Standard Specification for Nonstructural Steel Framing Members

.4 ASTM C754-15 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

.5 ASTM C954-15 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

.6 ASTM C1002-14 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate the placement of components recessed within the stud framing assemblies including but not limited to access doors and frames, recessed washroom accessories, fire extinguisher cabinets.

.3 Coordinate simultaneous erection of studs with installation of services lines.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Cleaning and Waste Processing.

Part 2 Products

2.1 PERFORMANCE REQUIREMENTS

.1 Maximum Allowable Deflection: L/240 elsewhere at a lateral force of 240 Pa for maximum heights indicated.

.2 Design stud and track connections to accommodate vertical deflection movement of structure without imposing axial loads onto framing.

2.2 MANUFACTURERS

.1 Clark Detrich.

.2 Bailey.

2.3 STUD FRAMING MATERIALS

.1 Framing Assembly Components: ASTM C 645.

.2 Studs: ASTM A653/A653M, non-load bearing rolled steel, channel shaped, punched for utility access at 460 mm on centre, and as follows:.

.1 Depth: indicated.

.2 Thickness: as indicated, or as required to meet design requirements.

.3 Floor Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs; 50 mm flange height.

.4 Ceiling Track: Single leg track consisting of 50 mm deep leg ceiling track, 38 mm x 1.6 mm thick U-channel, and 38 x 38 mm x 1. 6 mm thick U-channel support clips. U channel installed continuous through top knock-out service hole, maximum 300 mm from top track, with support clip at each stud location.

.5 Furring and Bracing Members: Of same material as studs; thickness to suit purpose.

.6 Fasteners:

.1 Framing less than 0.84 mm: ASTM C 1002, self-drilling, self tapping screws.

.2 Framing 0.84 mm thick or thicker: to ASTM C 954 screws.

.7 Anchorage Devices: Drilled expansion bolts.

.8 Acoustic Sealant: As specified in Section 09 21 16.

2.4 FINISHES

.1 Framing Materials: Galvanize to Z180 zinc coating designation.

.2 Accessories: Same finish as framing members.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that rough-in utilities are in proper location.

3.2 ERECTION

.1 Install framing in accordance with ASTM C754.

.2 Align and secure bottom and bottom tracks at 600 mm on centre.

.3 Place insulating strip under floor tracks, and to isolate studs from uninsulated surfaces.

.4 Place two beads of acoustic sealant between tracks and substrate to achieve an acoustic seal.

.5 Place two beads of acoustic sealant between studs and adjacent vertical surfaces to achieve an acoustic seal.

.6 Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

.7 Install studs vertically at 600 mm on centre, unless otherwise indicated.

.8 Align stud web openings horizontally.

.9 Secure studs to tracks using fastener method. Do not weld. Screw penetration beyond joined material: minimum three exposed threads.

.10 Stud Splicing: Not permissible.

.11 Fabricate corners using minimum three studs.

.12 Provide double studs extending from floor to ceiling at wall openings wider than stud centres specified, not more than 50 mm from each side of openings. Secure studs together.

.13 Brace stud framing assembly rigid.

.14 Frame openings and around built-in equipment, cabinets, access panels on four sides. Extend framing into reveals. Coordinate clearances with equipment suppliers.

.15 Install steel studs or furring channels between studs for attaching electrical and other boxes.

.16 Blocking: Install blocking for support of handrails, hardware, and opening frames where required.

.1 Secure steel channels to studs.

.17 Refer to Drawings for indication of partitions extending stud framing through the ceiling to the structure above or to height above ceiling indicated. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.

.18 Coordinate placement of insulation in stud spaces after stud frame erection.

3.3 CEILINGS AND BULKHEADS

.1 Erect hangers and runner channels or use purpose-made grid suspension system for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

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

.3 Do not support light fixtures on suspension system.

.4 Frame perimeter of openings for access panels, light fixtures, diffusers, grilles and other openings with furring channels.

.5 Install 19 by 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

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

.7 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated. Extend gypsum board to underside of structure except where indicated otherwise. Allow for deflection.

3.4 ERECTION TOLERANCES

.1 Section 01 73 00: Tolerances.

.2 Erect metal studding to tolerance of 1:1000.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Ceramic tiling

.2 Tile accessories

.3 Mortar and grout

1.2 RELATED REQUIREMENTS

.1 Section 07 92 00 - Joint Sealants: Mildew resistant sealant

1.3 REFERENCES

.1 American National Standards Institute (ANSI)/Ceramic Tile Institute (CTI)

.1 ANSI A108/A118/A136.1-2009, Specification for the Installation of Ceramic Tile

.2 ANSI A118.10-1993, Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installations

.2 International Standards Organization (ISO)

.1 ISO 10545, Ceramic Tiles

.2 ISO 13007-1: 2010 Ceramic tiles -- Grouts and adhesives -- Part 1: Terms, definitions and specifications for adhesives

.3 Terrazzo Tile and Marble Association of Canada (TTMAC)

.1 Tile Specification Guide 09 30 00 Tile Installation Manual, 2012-2014

.2 Tile Maintenance Guide, latest edition

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Submit manufacturer's product data for each type of product specified.

1.5 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Operation and Maintenance Data: Submit TTMAC Maintenance Guide and additional information as follows.

.1 Manufacturer’s maintenance data sheets for floor sealers and other non-tile maintenance materials and accessories.

.2 Warning of maintenance practices or materials that may damage or disfigure finished Work.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 10: Maintenance and extra material requirements.

.2 Extra Stock Materials: Provide 10% of each size, colour, and surface finish of tile specified.

.1 Store in original containers, clearly marked to identify the following:

.1 Manufacturer and distributor’s name.

.2 Material series name and stocking number.

.3 Material description, including colour and pattern.

1.7 QUALITY ASSURANCE

.1 Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and having completed tile installations similar in material, design and extent to this Project.

.2 Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

1.8 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

.3 Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

.4 Store liquid materials in unopened containers and protected from freezing.

.5 Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 AMBIENT CONDITIONS

.1 Apply tile after completion of Work by other sections, to dry, clean, firm, level and plumb surfaces, free from oil or wax or any other material detrimental to tile adhesion.

.2 Maintain tile materials and substrate temperature between manufacturer's recommended minimum and maximum temperature range.

.3 Maintain temperature range for minimum 48 hours before and during installation and until materials are fully set and cured to manufacturer’s recommendations.

.4 Maintain adequate ventilation where Work generates toxic gases or where there is a risk of raising relative humidity to levels detrimental to building finishes and assemblies.

1.10 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Cleaning and Waste Processing.

Part 2 Products

2.1 PRODUCTS, GENERAL

.1 ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TTMAC installation methods specified in tile installation schedules, and other requirements specified.

.2 Factory Blending: For tile exhibiting colour variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colours as those taken from other packages and match accepted samples.

2.2 CERAMIC TILE MATERIALS

.1 Floor Tile (FT-1):

.1 Composition: Porcelain.
.2 Moisture Absorption: 0 to 0.5%.
.3 Size: 305 by 610 mm by 7.5 mm thick.
.4 Surface Finish: Matte.
.5 Glaze: Unglazed.
.6 Chemical Resistance: Pass Rating to EN 14411.
.7 Frost Resistance: Not Required.
.8 Slip Resistance: R10 ramp test; 0.5 wet DCOF.
.9 Manufacturer/Product/Colour:
.1 Olympia Tile, Unicolour Series Matte, Light Grey

.2 Floor Tile (FT-2): Existing

.1 Composition: Porcelain.
.2 Size: ±299 by ±597 mm by ±7.5 mm thick.
.3 Manufacturer/Product/Colour:
.1 Olympia Tile, Discovery Series.

2.3 TRIMS AND EDGING

.1 Purpose-made stainless steel tile trim, profiles as noted in Contract Drawings, finishes and colours to be selected by the Contract Administrator from the manufacturer's complete finish/colour range.

.1 Acceptable Manufacturers: Schluter, Haogin, Blanke.

2.4 MORTAR AND GROUT MATERIALS

.1 Mortar and grout materials: product of a single manufacturer.

.2 Self-Levelling Underlayment: Latex-modified, portland cement-based, as recommended by tile-setting manufacturer.

.3 Floor Tile Mortar: Improved modified dry-set cement mortar, fast setting non-sagging for large and heavy tile thin-set applications, complying with ANSI A118.4, A118.11 and ISO 13007 C2TFS1P1.

.1 Manufacturer/Product:
.1 Mapei Ultraflex LFT Rapid.
.2 Laticrete 4 XLT Rapid.
.3 Flextile 62 Full Coverage Mortar.

.4 Tile Grout:

.1 Polymer-Modified Grout: Fast-setting, sanded polymer-modified grout, complying with ANSI A118.6, ANSI A118.7 and ISO 13007 CG2WAF.
.1 Colour: selected by Contract Administrator from manufacturer’s standard range.
.2 Location: North Walkway.
.3 Manufacturer/Product:
.1 Mapei Ultracolor Plus.
.2 Laticrete Permacolor Select.
.3 Flextile 1600 RSG.

2.5 ACCESSORIES

.1 Joint Sealant: As specified in Section 07 92 00.

.2 Tile Cleaner: Neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

.3 Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout recommended by tile manufacturer.

.4 Anti-Slip Tape: Heavy-duty, pressure-sensitive adhesive, 50 mm wide roll (install with 50 mm spacing between strips), complete with floor preparation primer, and edge sealing compound.

.1 Colour: Negative One Skateboard Black.

.2 Basis-of-design Product: Flex-Tred as manufactured by Wooster.

2.6 MIXING MORTARS AND GROUT

.1 Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

.2 Add materials, water, and additives in accurate proportions.

.3 Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

Part 3 Execution

3.1 EXAMINATION

.1 Examine substrates, areas, and conditions where tile will be installed, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

.1 Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

.2 Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.

.1 Verify that surfaces that received a steel trowel finish have been mechanically scarified.

.2 Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

.3 Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.

.4 Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Contract Administrator.

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

3.2 PREPARATION

.1 Prepare substrate in accordance with manufacturer's recommendations, and as follows:

.1 Apply thin levelling coat of levelling compound as required to provide installation tolerances as required by manufacturer.

.2 Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

.3 Prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1:50 toward drains.

.2 Blending: For tile exhibiting colour variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colours as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

.3 Before installation ensure back of tile is free of contaminants.

3.3 TILE INSTALLATION

.1 Comply with TTMAC's "Specification Guide 09 30 00 Tile Installation Manual" for TTMAC installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile", that are referenced in TTMAC installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

.1 For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

.1 Tile floors in wet areas.

.2 Tile larger than 300 mm in any dimension.

.3 Tile with raised, ribbed or textured back.

.4 Tile installed with chemical resistant mortars and grout.

.5 Tiles with installation rated for heavy or extra heavy duty.

.2 Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

.3 Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

.4 Jointing Pattern: Lay tile in pattern and orientation indicated in Contract Drawings. Lay out tile work and centre tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

.5 Joint Widths: To match existing tile joint width, unless otherwise indicated

.6 Grouting:

.1 Allow proper setting time before grouting.

.2 Grout joints solidly with grout mixed to proper consistency to flow into and fill joints.

.3 Apply grout in dust free environment. Protect for minimum seven days.

.4 Ensure that grout is free of pits or voids. When sufficiently set tool surface to a slightly concave profile. Repoint as necessary.

.5 Maintain uniform colour throughout.

.6 As work progresses, remove excess grout and polish with clean cloths.

.7 Do not grout joints around fixtures, pipes or other fittings. Fill joints with mildew resistant silicone sealant.

.8 Grout Sealer: Apply grout sealer to grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

.7 Metal Edge and Transition Strips: Install where exposed edge of tile flooring meets existing tile flooring, solid metal closure at curtainwall or other flooring that finishes flush with or below top of tile and no threshold is indicated, and at edges of exposed wall tile.

3.4 LIPPAGE TOLERANCES

.1 Field Verification of Finished Installation: To TTMAC Manual.

3.5 CLEANING

.1 Section 01 74 00: Cleaning installed work.

.2 Clean tile and grout surfaces with manufacturer's recommended cleaning methods.

3.6 PROTECTION OF FINISHED WORK

.1 Protect finished areas from traffic until setting materials have sufficiently cured to TTMAC requirements.

.2 Protect finished floor areas from foot and wheel traffic from floors for a minimum 72 hours after completion of grouting.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Resilient sheet and tile flooring (RF)

.2 Rubber base (RB)

1.2 DEFINITIONS

.1 Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating other acceptable products.

1.3 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM F710-11 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

.2 ASTM F1344-15 Standard Specification for Rubber Floor Tile

.3 ASTM F1861-16 - Standard Specification for Resilient Wall Base

1.4 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide data on specified products, describing physical, characteristics; patterns and colours available.

.3 Samples:

.1 Submit samples of manufacturer’s full colour range in minimum 76mm by 76mm tiles for Contract Administrator to select three (3) colours. Once selected, submit four full size tiles for each colour selected in pattern specified.

1.5 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Qualification Data: for installer.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Closeout Submittals.

.2 Maintenance Data: Include recommended maintenance procedures, maintenance materials and suggested schedule for cleaning. Include detailed information regarding properties of stain resistance and procedures recommended for removal of spills and stains.

1.7 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Maintenance Materials:

.1 Furnish extra materials that match and are from same production runs as products installed, and that are packaged with protective covering for storage and identified with labels describing contents.

.2 Provide 10% of each colour, pattern and type of flooring material installed on project in full size tiles for maintenance use. Extra materials to be in one piece and from same production run as installed materials.

1.8 QUALITY ASSURANCE

.1 Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Protect roll materials from damage by storing on end.

.2 Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer.

1.10 AMBIENT CONDITIONS

.1 Store materials for three days prior to installation in area of installation to achieve temperature stability.

.2 Maintain ambient temperature required by adhesive manufacturer three days prior to, during, and 24 hours after installation of materials.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Cleaning and Waste Processing.

Part 2 Products

2.1 MANUFACTURERS

.1 Basis-of-Design Products: Subject to compliance with requirements, provide specified Products, or a product acceptable to the Contract Administrator.

.1 Resilient Tile Flooring – Rubber (RF-1): Tarkett; Mesto Configurations.

.2 Resilient Tile Flooring – Rubber (RF-2): Existing flooring. Tarkett; Mesto Configurations.

.3 Rubber Base (RB-1) for North Walkway: To match existing.

.1 Acceptable Products: Tarkett Baseworks.

.2 Colour: one colour to be selected by the Contract Administrator from manufacturer's standard range.

.4 Rubber Base (RB-2) for South Walkway: To match existing.

.1 Acceptable Product: Tarkett Baseworks.

.2 Colour: one colour to be selected by the Contract Administrator from manufacturer's standard range.

.5 Substitutions: Refer to Section 01 62 00.

2.2 MATERIALS

.1 Resilient Sheet Flooring (RF-1): Rubber tile to ASTM F1344.

.1 Size: 610mm by 610mm.

.2 Thickness: 2 mm.

.3 Design: Hammered.

.4 Colour: One colour to be selected by the Contract Administrator from manufacturer's standard range.

.2 Resilient Sheet Flooring (RF-2): Existing flooring.

.1 Size: 610mm by 610mm.

.2 Thickness: 2 mm.

.3 Design: Hammered.

.4 Colour: Existing

.3 Rubber Base (RB-1): ASTM F1861, Type TP (thermoplastic), Group I (solid homogeneous), minimum thickness 3.2 mm, height ±100 mm to match existing, in coils of manufacturer's standard lengths. Outside and inside corners: job-formed.

.1 Style: Standard toe.

.4 Rubber Base (RB-2): ASTM F1861, Type TP (thermoplastic), Group I (solid homogeneous), minimum thickness 6.35mm, height ±100mm to match existing, in coils of manufacturer's standard lengths. Outside and inside corners job-formed.

.1 Style: Monument

2.3 TRIMS AND EDGING

.1 Purpose-made stainless steel tile trim, profiles as noted in Contract Drawings, finishes and colours to be selected by the Contract Administrator from the manufacturer's complete finish/colour range.

.1 Acceptable Manufacturers: Schluter, Haogin, Blanke.

2.4 ACCESSORIES

.1 Sub-floor Filler and Leveler as per manufacturer's recommendations.

.2 Primers and Adhesive as per manufacturer's recommendations.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify concrete floors are dry to a maximum moisture content as required by flooring manufacturer, and exhibit negative alkalinity, carbonization, or dusting.

.3 Verify floor and lower wall surfaces are free of substances that may impair adhesion of new adhesive and finish materials.

3.2 PREPARATION

.1 Concrete Substrates: Prepare according to ASTM F710.

.1 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

.2 Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

.3 Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

.4 Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

.2 For renovation work, mechanically remove or treat existing adhesives to prevent residual bleeding through to new flooring or interfering with bonding of new adhesives.

.1 Apply skim coat of patching or leveling compound over existing asphalt base or other types of adhesives. Thickness as recommended by flooring manufacturer.

.3 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.4 Thoroughly clean surfaces of dust, dirt, grease, paint, other foreign material before installing flooring and base.

.5 Fill cracks, other openings, depressions in substrate with sub-floor filler mix featheredged. Level uneven joints, rough areas. Apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.6 Sweep, vacuum floors clean.

.7 Neutralize surface of concrete in accordance with manufacturer’s printed instructions.

.8 Prime concrete slab to resilient flooring manufacturer's printed instructions.

.9 Where flooring of different thickness abut apply filler to build a smooth gradual ramping so top of finished flooring meets top of adjacent material.

3.3 INSTALLATION - RESILIENT TILE FLOORING

.1 Install tile flooring to manufacturer's written instructions.

.2 Unpackage floor coverings and allow them to stabilize before cutting and fitting.

.3 Apply adhesive uniformly using recommended trowel. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.4 Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

.5 Lay flooring with joints and seams parallel to building lines and existing flooring.

.6 Seaming:

.1 Prepare, cut and finish seams in accordance with manufacturer’s printed instructions.

.7 As installation progresses, and after installation roll flooring with minimum 45 kg roller to ensure full adhesion. Weight seams as required until suitable bond is established.

.8 Scribe flooring to walls, columns, door frames, and other appurtenances to produce tight joints.

.9 Install floor patterning where indicated.

.10 Extend floor coverings into door reveals and similar opening. Continue flooring in areas that will be under built-in equipment without interrupting floor pattern.

.11 Terminate flooring at centreline of door openings where adjacent floor finish is dissimilar.

.12 Install edge strips at unprotected or exposed edges, and where flooring terminates.

3.4 INSTALLATION - RESILIENT BASE

.1 Lay out base to keep number of joints at minimum. Base joints at maximum length available.

.2 Clean substrate and prime with one coat of adhesive.

.3 Apply adhesive to back of base in accordance with manufacturer's instructions..

.4 Set base against wall and floor surfaces tightly by using 3 kg hand roller.

.5 Do not stretch or over-compress base material.

.6 Install straight and level to variation of 1:1000.

.7 Scribe and fit to door frames and other obstructions.

.8 Resilient Base RB-1 - Job-Formed Corners:

.1 Use straight pieces of maximum lengths possible.

.2 Wrap base minimum 300 mm beyond corners. No joint at corners permitted.

.3 Outside corners: Form without producing discolouration (whitening) at bends. Scribe back of base at bend locations and remove strips perpendicular to length of base that are only deep enough to produce snug fit, without removing more than half wall base thickness.

.4 Inside corners: Form by cutting inverted V-shape notch in toe of wall base at point where corner is formed. Scribe back of base where necessary to produce snug fit to substrate.

.9 Resilient Base RB-2 - Job-Formed Corners:

.1 Outside corners: Mitred and glued.

.2 Inside corners: Coped

3.5 CLEANING

.1 Comply with manufacturer's written instructions for cleaning and protection of flooring and wall base.

.2 Remove excess adhesive from floor, base and wall surfaces without damage, immediately after completing installation.

.3 Perform initial cleaning and maintenance after adhesives have cured, and in accordance with manufacturers' instructions:

3.6 PROTECTION OF FINISHED WORK

.1 Prohibit traffic on floor finish for 48 hours after installation. Prohibit rolling traffic on floor for minimum 72 hours after installation.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Surface preparation.

.2 Interior painting.

1.2 RELATED REQUIREMENTS

.1 Section 05 12 13 - Architecturally-Exposed Structural Steel.

.2 Section 08 44 13 - Glazed Aluminum Curtain Wall: Structural Steel.

1.3 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM D6886-03 - Standard Test Method for Speciation of the VOCs in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography

.2 Master Painters Institute (MPI)

.1 Architectural Painting Specifications Manual

.3 South Coast Air Quality Management District (SCAQMD), California State

.1 SCAQMD Rule 1113, Architectural Coatings

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Coordination: Coordinate with other Work having a direct bearing on Work of this section.

.2 Scheduling:

.1 Schedule painting operations to prevent disruption of and by other trades.

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data:

.1 Submit Product data on all specified finishing products.

.3 Samples:

.1 If requested by Contract Administrator, submit three drawdowns of each product and colour combination. Apply drawdowns using 4 mil WFT drawdown bar on Leneta form WD plain white coated cards size 100 by 150 mm, mounted on 216 by 280 mm sheets.

.2 When approved, sample panels shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.

.3 Label each card with the following:

.1 Job name.

.2 Date.

.3 Product name.

.4 Product number.

.5 Colour number as stated in the colour schedule.

.6 Name, address, and phone number of the supplying facility.

.4 Submit full range of available colours where colour availability is restricted.

1.6 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Record Documentation: Upon completion, provide itemized list of products used including the following:

.1 Manufacturer's name.

.2 Product name, type and use.

.3 Colour coding number.

.4 Manufacturer's Material Safety Data Sheets (MSDS).

1.7 MAINTENANCE MATERIAL SUBMITTALS

.1 Section 01 78 10: Maintenance and extra material requirements.

.2 Extra Stock Materials: Provide properly packaged maintenance material as follows.

.1 One 4 litre can of each coating type and colour.

.2 Label each container with colour, type, texture and room locations in addition to manufacturer's label.

1.8 QUALITY ASSURANCE

.1 Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

.2 Conform to MPI Painting Manual requirements for materials, preparation and workmanship.

.3 Paint Products: Paint manufacturers and paint Products listed under the Approved Product List section of the MPI Painting Manual.

1.9 DELIVERY, STORAGE, AND PROTECTION

.1 Section 01 61 00: Transport, handle, store, and protect products.

.2 Deliver products to site in sealed and labeled containers showing manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, colour designation, and written instructions for mixing and reducing.

.3 Store paint materials at minimum ambient temperature of 10 degrees C and a maximum of 32 degrees C, in dry, ventilated area and as required by manufacturer's written instructions.

.4 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.5 Keep areas used for storage, cleaning and preparation, clean and orderly to approval of Contract Administrator. After completion of operations, return areas to clean condition to approval of Contract Administrator.

.6 Remove paint materials from storage only in quantities required for same day use.

.7 Provide adequate fireproof storage lockers and warnings as required by authorities having jurisdiction for storing toxic and volatile/explosive/flammable materials.

.8 Fire Safety Requirements:

.1 Provide Type ABC fire extinguisher adjacent to storage area.

.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.

.3 Handle, store, use and dispose of flammable and combustible materials in accordance with the National Fire Code of Canada.

1.10 AMBIENT CONDITIONS

.1 Do not perform painting or decorating Work when ambient air and substrate temperatures are below 10 degrees C for both interior and exterior work, or as required by paint product manufacturer.

.2 Do not perform painting or decorating Work when relative humidity is above 85% or when dew point is less than 3 degrees C variance between the air/surface temperature required by paint Product manufacturer.

.3 Provide suitable weatherproof covering and sufficient heating facilities to maintain minimum ambient air and substrate temperatures for 24 hours before, during and after paint application.

.4 Do not perform painting and decorating Work when maximum moisture content of substrate exceeds:

.1 Wood: 15%.

.2 Gypsum board: 12%.

.3 Concrete: 12%.

.4 Concrete Floors: 8%.

.5 Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.

.6 Test concrete surfaces for alkalinity as required.

.7 Provide minimum lighting level of 323 lux on surfaces to be painted or decorated.

1.11 WASTE MANAGEMENT AND DISPOSAL

.1 Refer to Section 01 74 00 - Cleaning and Waste Processing.

.2 Dispose of waste materials in accordance with authorities having jurisdiction.

.3 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.4 Place non-reusable materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.5 To reduce contaminants entering waterways, sanitary/storm drain systems or into the ground, adhere to the following procedures:

.1 Retain cleaning water for water-based materials to allow sediments to be filtered out. In no case shall equipment be cleaned using free draining water.

.2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.

.3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.

.4 Dispose of contaminants in an approved legal manner in accordance with hazardous waste regulations.

.5 Dry out empty paint cans prior to disposal or recycling.

.6 Close and seal tightly partly used cans of materials including sealant and adhesive containers and store protected in well ventilated fire-safe area at moderate temperature.

.6 Set aside and protect surplus and uncontaminated finish materials and deliver or arrange collection for verifiable re-use or re-manufacturing.

Part 2 Products

2.1 REGULATORY REQUIREMENTS

.1 Conform to applicable code for flame and smoke rating requirements for finishes, storage, mixing, application and disposal of paint and related waste materials.

2.2 MATERIALS

.1 Use only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers) listed in the latest edition of the MPI Approved Product List (APL) on this project.

.2 Ancillary materials such as linseed oil, shellac, thinners, solvents to be of highest quality product and provided by an MPI listed manufacturer, and compatible with paint materials being used.

.3 Lead- and mercury-free.

.4 Provide material for each system from a single manufacturer.

.5 Fire Hazard: Flame spread and smoke developed ratings in accordance with local authorities having jurisdiction.

2.3 MIXING AND TINTING

.1 Coatings: Ready-mixed and pre-tinted; re-mix paint in containers before and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

.2 Paste, Powder or Catalyzed Paint: Mixed in accordance with manufacturer's written instructions.

.3 Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

.1 Do not exceed paint manufacturer's recommendations for addition of thinner. Do not use kerosene or any such organic solvents to thin water-based paints.

.2 Thin paint for spraying in accordance with paint manufacturer's instructions.

2.4 FINISH AND COLOUR

.1 Finish: To MPI Premium Grade finish requirements.

.2 Colours and Finishes: Based on two colours.

.3 Selection of colours will be from manufacturers' full ranges of colours.

.4 Where specific products are available in a restricted range of colours, selection will be based on the limited range.

.5 Tint second coat in a three-coat system slightly lighter colour than top coat to show visible difference between coats.

2.5 GLOSS/SHEEN RATINGS

.1 Paint gloss is defined as the sheen rating of applied paint with the following values:

Gloss Level	Description	Gloss @ 60 degrees	Sheen @ 85 degrees
G1	Matte Finish (flat)	0 to 5	10 max.
G2	Velvet-Like Finish	0 to 10	10 to 35
G3	Eggshell Finish	10 to 25	10 to 35
G4	Satin-Like Finish	20 to 35	35 min.
G5	Traditional Semi-Gloss Finish	35 to 70	

G6	Traditional Gloss	70 to 85	
G7	High Gloss Finish	More than 85	

.2 Gloss level ratings of painted surfaces as follows, unless otherwise indicated:

.1 Walls: G4.

.2 Ceilings: G1.

.3 Metal Doors and Frames: G5.

.4 Metal Fabrications: G5.

2.6 INTERIOR PAINT SYSTEMS

.1 Paint interior surfaces in accordance with the following MPI Painting Manual requirements.

.2 Structural Steel and Metal Fabrications: (columns, beams, curtain wall support structure, etc.).

.1 INT 5.1RR: High performance architectural latex (over waterbased rust-inhibitive primer)

.3 Galvanized Metal: (doors, frames, railings, misc. steel, pipes, overhead decking, ducts, etc.).

.1 INT 5.3M: High performance architectural latex.

.4 Gypsum Board: (gypsum wallboard and textured finishes).

.1 INT 9.2B: High performance architectural latex.

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing conditions before starting work.

.2 Verify that surfaces are ready to receive work as instructed by the product manufacturer.

.3 Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

.4 Test shop applied primer for compatibility with subsequent cover materials.

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.

.3 Apply paint when previous coat of paint is dry or adequately cured.

3.2 PROTECTION

.1 Protect adjacent surfaces and areas, including rating and instruction labels on doors, frames, equipment, piping, from painting operations with drop cloths, shields, masking, templates, or other suitable protective means.

.2 Clean and restore damaged surfaces as directed by Contract Administrator.

.3 Protect factory-finished products and equipment.

.4 As painting operations progress, place "WET PAINT" signs.

3.3 PREPARATION

.1 Clean and prepare surfaces in accordance with MPI requirements, manufacturer's product-specific recommendations, and as specified in this Section.

.2 Remove and store or mask miscellaneous hardware and surface fittings such as electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to painting. Clean and replace upon completion of painting Work in each area. Remove doors before painting to paint bottom and top edges and re-hang.

.3 Correct defects and clean surfaces which affect work of this section. Start of finish painting of defective surfaces indicates acceptance of substrate and making good defects will be at no additional cost.

.4 Metal Surfaces:

.1 Clean metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes or vacuum cleaning.

.2 Confirm preparation and primer used with fabricator of steel items.

.3 Do not allow ferrous metal surfaces to rust before applying finishes.

.4 Uncoated Steel Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Spot prime paint after repairs.

.5 Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces. Prime bare steel surfaces. Prime metal items including shop primed items.

.6 Galvanized Surfaces: Remove surface contamination and oils and wash with solvent.

.5 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

3.4 APPLICATION

.1 Apply paint or stain in accordance with MPI Painting Manual Premium Grade finish requirements.

.2 Apply products to adequately prepared surfaces, within moisture limits and acceptable environmental conditions.

.3 Test shop-applied primer for compatibility with subsequent cover materials.

.4 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.

.5 Apply coats of paint in continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Apply paint by brush, roller, or airless sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.7 Tint each coat of paint progressively lighter to enable confirmation of number of coats.

.8 Unless otherwise approved, apply a minimum of four coats of paint where deep or bright colours are used to achieve satisfactory results.

.9 Sand and dust between each coat to provide an anchor for next coat and to remove defects visible from a distance up to 1000 mm.

.1 Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

.10 Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.

.11 Allow applied coat to dry before next coat is applied.

.12 Finish surfaces both above and below sight lines as specified for surrounding surfaces.

.13 Finish closets and alcoves as specified for adjoining rooms.

.14 Prime and seal areas to receive adhesive-applied finishes.

.15 Continue paint finish behind wall-mounted items.

.16 Completely finish all surfaces of doors, including areas to receive door protection.

.17 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 or roll out runs and sags, and over-lap marks. Rolled surfaces shall be free of roller tracking and heavy stipple unless approved by Consultant.

.5 Remove runs, sags and brush marks from finished work and repaint.

.18 Spray Application:

.1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.

.2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.

.3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.

.4 Brush out immediately runs and sags.

.5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

.1 Refer to Section Divisions 21 through 26 for schedule of colour coding and identification banding of equipment, duct work, piping, and conduit.

.2 Unless otherwise specified, paint unfinished conduits, piping, hangers, ductwork and other mechanical and electrical equipment with colour and texture to match adjacent surfaces in the following areas:

.1 Exposed-to-view exterior and interior areas.

.2 High humidity interior areas.

.3 In unfinished areas leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish; touch up scratches and marks.

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

.5 Do not paint over nameplates.

.6 Paint inside of ductwork where visible behind louvers, grilles and diffusers for a minimum of 460 mm or beyond sight line, whichever is greater, with primer and one coat of matte black (non-reflecting) paint.

.7 Paint inside of light valances white.

.8 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.9 Paint yellow or band all natural gas piping in accordance with mechanical specification requirements.

.10 Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

3.6 FIELD QUALITY CONTROL

.1 Acceptable Surfaces:

.1 No visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm.

.2 No visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm.

.3 No visible defects are evident on ceiling, soffit and other overhead surfaces when viewed at normal viewing angles.

.4 Uniformity of colour, sheen, texture, and hiding across full surface area.

3.7 CLEANING AND RESTORATION

.1 Section 01 74 00: Cleaning installed work.

.2 Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.

.3 Re-install hardware items removed before undertaken painting operations.

.4 Remove protective coverings and warning signs as soon as practical after operations cease.

.5 Remove paint splashes on exposed surfaces. Remove smears and spatter immediately as operations progress.

.6 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Contract Administrator.

3.8 SCHEDULE OF ITEMS

.1 All exposed steel within walkways.

.2 New support members for the curtain wall.

.3 The underside of the existing roof decks.

.4 Exposed mechanical and electrical conduit and service lines.

.5 Existing doors, frames and surrounding steel framing.

.6 Gypsum walls and ceilings/ bulkheads.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Documents and certain applicable terminology,

.2 Associated requirements,

.3 Work expectations,

.4 Work by other parties,

.5 Words and terms,

.6 Examination,

.7 Closeout submittals,

.8 Operation and maintenance manual format and content requirements,

.9 Recording actual site conditions,

.10 Record documents,

.11 Warranties and bonds,

.12 Fabrication and workmanship,

.13 Quality Assurance,

.14 Demonstration and Training,

.15 Conditions for Demonstrations,

.16 Shop drawings and product data,

.17 Samples,

.18 Product quality, availability, storage, handling, protection, and transportation,

.19 Cleaning,

.20 Product changes and substitutions,

.21 Existing utilities,

.22 Manufacturer's instructions,

.23 Quality of Work, coordination, and fastenings,

.24 Accessibility of equipment,

.25 Coordination, work for other trades, electrical requirements, temporary use of equipment, and

.26 Existing facilities.

1.2 RELATED SECTIONS

.1 Applicable sections in Division 01, including:

- .1 Allowances,
- .2 Construction Progress Documentation,
- .3 Submittal Procedures,
- .4 Product Exchange Procedures,
- .5 Substitutions, and
- .6 Closeout Submittals.

.2 This section describes common work applicable to all Sections within project Divisions 21, 23, and 25.

1.3 COMPLEMENTARY DOCUMENTS

.1 Drawings, specifications, and schedules are complementary to each other and what is called for by one will be binding, as if called for by all.

.2 Should any discrepancy appear between the drawings and specifications that leaves the Contractor in doubt as to the true intent and meaning of the plans and specifications, the Contractor shall obtain a ruling from the Contract Administrator in writing before submitting the bid. If this is not done it will be assumed that the most expensive alternative has been included in the bid price.

.3 The drawings for mechanical work are performance drawings. They are generally diagrammatic and are not to scale unless detailed otherwise. They establish scope, material and installation quality and are not detailed installation instructions showing every offset, fitting, valve or every difficulty encountered during execution of work and will not be used as an excuse for deficiencies or omissions. Where required installations are not shown on plans or are only shown diagrammatically, install in such a way as to conserve headroom and interfere as little as possible with free use or space through which they pass, while adequate space is allowed for service, maintenance, repair, or replacement for all equipment.

.4 Drawings indicate general location and route of new and existing mechanical systems. The review of exact location and routing of systems prior to bidding is the responsibility of the Contractor. Install piping and duct systems not exactly shown in plan or indicated by note, by graphic, or diagrammatically in schematic or riser diagrams to provide an operational assembly or system.

.5 Install components to physically conserve headroom, to minimize furring spaces, to accommodate installed Work, or other obstructions.

.6 Install ceiling mounted or exposed mechanical components such as diffusers, sprinkler heads and grilles in accordance with reflected ceiling drawings or floor plans.

.7 Locate devices with primary regard for convenience of operation and usage.

.8 Examine all discipline drawings, specifications, and schedules and related Work to ensure that Work can be satisfactorily executed. Conflicts or additional Work beyond Work described, to be brought to the attention of the Contract Administrator.

.9 All specification sections of the Project Manual and Drawings are affected by requirements of Division 01 sections.

1.4 DESCRIPTION OF THE WORK

.1 Division of the Work among other contractors, subcontractors, suppliers or vendors is solely the Contractor's responsibility. The Contract Administrator does not assume any responsibility to act as an arbiter to establish subcontract terms or disagreements between sectors or disciplines of the Work.

1.5 CONTRACT METHOD

.1 Construct Work under the contract requirements in the applicable Division 00 sections.

.2 Refer to Section 01 21 00 for cash allowances.

.3 Contract Documents were prepared by the Contract Administrator. Any use which a third party makes of the Contract Documents, or any reliance on or decisions to be made based on them, are the responsibility of such third parties. The Contract Administrator accepts no responsibility for any damages suffered by any third party as a result of decisions made or actions based on the Contract Documents.

1.6 PERMITS, INSPECTION AND TESTING

.1 File all necessary notices and approved layouts, obtain and pay for all Local Authority and Fire Underwriters Inspections, approvals and permits applicable to each Mechanical Section. Make changes required to secure Local Authorities approval, without extra cost. Where conflicting requirements occur, comply with most stringent regulation. Note that requirements shown or specified may exceed minimum standards set by Local Authorities.

.2 The Contract Administrator may request the Mechanical Subcontractor to operate device or material installed for such time as Contract Administrator may require, as a thorough test, before final acceptance. Such tests shall not be construed as evidence of acceptance, and no claim for cost of such operation for test, or damage due to inadequacy or defect will be recognized.

.3 Note that site reviews by the Contract Administrator are for the purpose of determining in general if the work is proceeding in accordance with the Contract Documents, and to endeavour to guard The City against defects and deficiencies and not to superintend the execution of the work, which is the Mechanical Subcontractor's and their Subcontractors' responsibility.

1.7 WORDS AND TERMS

.1 Conform to definitions and their defined meanings as in Section 01 19 00.

.2 Refer to Section 01 19 00 for Specification Grammar.

.3 Conform to the following definitions and their defined meanings in addition to those referenced in Section 01 19 00:

.1 Install: To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.

.2 Supply: To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.

.3 Provide: Wherever the term "provide" is used in relationship to equipment, piping and other materials specified for the work, it means "supply, install and connect". Wherever the terms "provide" is used in connection with services such as testing, balancing, start-up, preparation of drawings for any part of the work, it means procure, prepare, supervise, take responsibility for, and pay for these services.

.4 Typical: A representative characteristic that is standard for all installations whether individually noted or not throughout the documents. "Typical" applies to each individual or combined installation except where specifically noted or otherwise indicated that the application is non-typical.

.5 Exposed: Any work not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors, in closets or cupboards or under counters is considered exposed.

.6 New: Produced from new materials.

.7 Renewed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.8 Defective: A condition determined exclusively by the Contract Administrator.

1.8 EXAMINATION

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

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

.3 Examine all contract documents to ensure work can be performed without changes to the Work as shown on plans. No allowance will be made later for necessary changes, unless notification of interferences have been brought to Contract Administrator's attention in writing, prior to bid closing.

.4 Verify that materials and equipment can be delivered to the place of the work and that sufficient space and access is available to permit installation as shown on the drawings.

1.9 CLOSEOUT SUBMITTALS

.1 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.2 Four weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, three final copies of operating and maintenance manuals in Canadian English.

.3 Copy will be returned with Contract Administrator's comments.

.4 Revise content of documents as required prior to final submittal.

.5 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, three final copies of operating and maintenance manuals, revised as per Contract Administrator's comments.

.6 Ensure spare parts, maintenance materials and special tools provided are new, undamaged or defective, and of same quality and manufacture as products provided in Work.

.7 If requested, furnish evidence as to type, source, and quality of products provided.

.8 Defective products will be rejected, regardless of previous inspections. Replace defective products at own expense.

.9 Pay costs of transportation.

1.10 OPERATION AND MAINTENANCE MANUAL FORMAT

.1 Refer also to Section 01 78 10 for formats for manuals. Where there is a discrepancy with this section, follow the requirements of 01 78 10.

.2 Organize data in the form of an instructional manual.

.3 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 8.5 x 11 inch (219 x 279 mm) with spine and face pockets.

.4 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

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

.6 Arrange content by systems under Section numbers and sequence of Table of Contents.

.7 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

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

.9 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

1.11 O&M CONTENTS - EACH VOLUME

.1 Refer also to Section 01 78 10 for formats for contents. Where there is a discrepancy with this section, follow the requirements of 01 78 10.

.2 Table of Contents: Provide:

.1 Title of project.

.2 Date of submission.

.3 Names, addresses, and telephone numbers of Contract Administrator and Contractor with name of responsible parties.

.4 Schedule of products and systems, indexed to content of volume.

.3 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.4 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

.5 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

.6 Certificate of Acceptance: Relevant certificates issued by authorities having jurisdiction, including code compliance certificate, life safety systems performance certificate.

.7 Training: Refer to Demonstration and Training in this Section.

1.12 RECORDING ACTUAL SITE CONDITIONS

.1 Record information on a full-sized set of drawings, and within the Project Manual.

.2 Annotate with coloured felt tip marking pens, maintaining separate colours for each major system, for recording changed information.

.3 Record information concurrently with construction progress. Do not conceal Work of the Project until required information is accurately recorded.

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

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

.2 Field changes of dimension and detail.

.3 Changes made by change orders.

.4 Details not on original Contract Drawings.

.5 References to related shop drawings and modifications.

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

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

.2 Changes made by Addenda and change orders.

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

1.13 RECORD DOCUMENTS

.1 Prior to Substantial Performance of the Work, electronically transfer the marked-up information from the as-built documents, as follows:

.1 Drawings: Scan the full-sized field-verified as-built drawing set and save to PDF format. Scans shall be in colour and with good resolution to ensure drawings and markups are legible.

.2 Specifications: Adobe Acrobat (PDF).

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

.3 Submit completed record documents to Contract Administrator on a CD, DVD, or by electronic transfer.

1.14 WARRANTIES AND BONDS

.1 Refer also to Section 01 78 10 for Warranties and Bonds.

.2 Provide written guarantee that complete installation including materials, work and operation of all equipment provide under Mechanical Sections are first class in every respect, subject only to improper usage by The City, and make good forthwith when reported all defects which develop within one year from date of acceptance of building by Contract Administrator at no additional cost to The City.

.3 In addition, guarantee heating and cooling systems through one complete heating or cooling season, as applicable.

.4 Deliver to the Contract Administrator all equipment manufacturers' guarantees specified in excess of one year.

1.15 FABRICATION AND WORKMANSHIP

.1 Employ skilled mechanics in their respective trades, under competent supervision, and where required by Provincial or Local regulations holder of acceptable qualification certificates.

1.16 QUALITY ASSURANCE

.1 Provide testing organization services as specified in subsequent Sections.

.2 Testing organization: Current member in good standing of their respective professional or industry organization and certified to perform specified services.

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

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

.5 Qualifications:

.1 Provide adequate workforce training through meetings and demonstrations.

.2 Provide a designated experienced person on site with de-construction experience throughout the project for consultation and supervision purposes.

1.17 DEMONSTRATION AND TRAINING

.1 Refer also to Section 01 79 00 for Demonstration and Training. Where there is a discrepancy with this section, follow the requirements of 01 79 00.

.2 Instruct The City's designated employees in proper care, operation, use and maintenance of all systems and equipment, and provide general explanatory literature required and start up supervision and instructions.

.3 Provide two weeks prior notice to the Contract Administrator and The City to schedule the training.

.4 The City will provide list of personnel to receive instructions, and will coordinate their attendance at agreed-upon times.

.5 Upon completion of instructions, forward to Contract Administrator a letter indicating person instructed and dates that the instruction took place. If in Contract Administrator's

opinion, this is not done satisfactorily, Contract Administrator may direct such instruction, and charge all costs involved to relevant section.

1.18 CONDITIONS FOR DEMONSTRATIONS

.1 Equipment has been inspected and put into operation in accordance with related sections.

.2 Testing, adjusting, and balancing have been performed and equipment and systems are fully operational.

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

1.19 SHOP DRAWINGS - ADMINISTRATIVE REQUIREMENTS

.1 Shop drawings shall be submitted electronically in PDF format documents to shopdrawings@eppsiepman.com.

.2 Shop drawing documents shall be grouped by specification section. Clearly list the specification section on the front page or cover sheet of the submittal. Shop drawings related to multiple sections may not be grouped together into a single document. Documents that are groups incorrectly will be returned without being examined and shall be considered rejected.

.3 Each drawing shall include the name of project as found on the drawings or specifications, the equipment supplier and the specification section that the equipment is specified under.

.4 Submit to Contract Administrator submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Work affected by submittal shall not proceed until review is complete.

.6 Present Shop Drawings, product data, samples and mock-ups in SI Metric and/or Imperial inch-pound units, to match the units used in the schedules.

.7 Review submittals prior to submission to Contract Administrator. 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.

.8 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

.9 Notify Contract Administrator, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

.10 Verify field measurements and affected adjacent Work are coordinated.

.11 Contractor's responsibility for errors and omissions in submission is not relieved by Contract Administrator's review of submittals.

.12 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Contract Administrator review.

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

1.20 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 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 coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications. Indicate layouts, quantity, details of equipment, control wiring diagrams, sizes, capacities and roughing in and exact requirements for concrete pits, bases and other supporting members.

.3 Each shop drawing must be certified by manufacturer and as such shall indicate that all product engineering has been performed to ensure the product will meet the requirements of the intended installation.

.4 Shop drawings for grilles, registers and diffusers shall be accompanied by an itemized list indicating the unit locations by room number and the unit size.

.5 Allow ten days for Contract Administrator's review of each submission.

.6 Adjustments made on Shop Drawings by Contract Administrator are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Contract Administrator prior to proceeding with Work.

.7 Make changes in Shop Drawings as Contract Administrator may require, consistent with Contract Documents. When resubmitting, notify Contract Administrator in writing of any revisions other than those requested.

.8 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.

.9 Submissions shall 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 other parts of the Work.

.10 After Contract Administrator's review, distribute copies.

.11 Submit one copy of Shop Drawings as a pdf document by email attachment for each requirement requested in specification Sections and as Contract Administrator may reasonably request. Any electronic copy of shop drawings shall bear all the required marks of certification and approval by the manufacturer and contractor(s) as indicated above. The Contract Administrator will review and mark up one copy of the shop drawing, and return to the contractor by email attachment. The contractor shall then make copies as required for ordering and documentation purposes. Multiple copies of shop drawings will not be returned.

.12 Submit one electronic copy of product data sheets or brochures for requirements requested in specification sections and as requested by Contract Administrator where Shop Drawings will not be prepared due to standardized manufacture of product. Submittals shall be submitted as a pdf document by email attachment, or delivered as a hard copy. Any electronic copy of shop drawings shall bear all the required marks of certification and approval by the manufacturer and contractor(s) as indicated above.

.13 Delete information not applicable to project.

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

.15 If upon review by Contract Administrator, no errors or omissions are discovered or if only minor corrections are made, one electronic copy will be returned and fabrication and installation of Work may proceed. If Shop Drawings are rejected, noted copy will be returned and re-submission of corrected Shop Drawings, through same procedure indicated above, must be performed before fabrication and installation of Work may proceed. The contractor shall then make copies as required for ordering and documentation purposes. Multiple copies of shop drawings will not be returned.

.16 Checking of shop drawings by the Contract Administrator does not constitute acceptance of responsibility. Such checking constitutes assistance only to the Mechanical Division in the proper execution of their work.

1.21 SAMPLES

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

.2 Deliver samples prepaid to Contract Administrator's business address unless otherwise instructed.

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

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

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

.6 Make changes in samples which Contract Administrator may require, consistent with Contract Documents.

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

1.22 PRODUCT QUALITY

.1 Products, materials, equipment, parts or assemblies (referred to as Products) incorporated in Work: New, not damaged or defective, of best quality (compatible with specification requirements) for purpose intended. If requested, provide evidence as to type, source and quality of Products provided.

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

.3 Should any dispute arise as to quality or fitness of Products, decision rests strictly with Contract Administrator.

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

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

1.23 AVAILABILITY

.1 Immediately upon signing Contract, review Product delivery requirements and anticipate foreseeable supply delays for any items.

.2 If delays in supply of Products are foreseeable, notify Contract Administrator of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

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

1.24 STORAGE AND PROTECTION

.1 Store and protect Products in accordance with manufacturers' written instructions.

.2 Store with seals and labels intact and legible.

.3 Store sensitive Products in weather tight, climate controlled, enclosures in an environment favourable to Product.

.4 For exterior storage of fabricated Products, place on sloped supports above ground.

.5 Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.

.6 Cover open ends of pipes, fixtures, ductwork, etc. to prevent entry of building rubbish.

.7 Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

.8 Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

.9 Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.25 TRANSPORTATION AND HANDLING

.1 Transport and handle Products in accordance with manufacturer's written instructions.

.2 Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.

.3 Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

.4 Protect all finished and unfinished work from soiling or damage, cover floors with tarpaulins or plywood as necessary, and repair any damage resulting from work of Mechanical Section.

.5 Protect finished surfaces to remain exposed, by paper, polyethylene or other satisfactory removable protective covering using paste acceptable to fixture manufacturer to prevent possible damage to finishes, until all reason for construction damage has passed and until acceptance by Contract Administrator, and make good any such damage.

1.26 SPECIAL CLEANING

.1 Maintain tidiness within work of Mechanical Sections and at completion remove protective paper, labels, etc. and tools and waste materials. Leave clean and in perfect operating condition.

.2 Remove dirt, rubbish, grease, and dust for which this section is responsible from all exposed surfaces and fixtures.

.3 Thoroughly clean equipment of dirt, cuttings and other foreign substances within the scope of work area. Disconnect, clean and reconnect whenever necessary for purpose of locating and removing obstructions. Repair work damaged in course of removing obstructions.

.4 Clean exposed surfaces of mechanical equipment, ductwork, piping, etc., and polish plated work.

.5 Remove tools, surplus, and waste material from the building site upon completion of work. Clean grease, dirt, and excess material from walls, floors, ceilings, surfaces, and fixtures for which this Contractor was responsible, and leave the premises suitable for immediate use.

.6 At the end of construction all systems shall be left ready for operation.

.7 This Section shall be responsible for repair work as may be necessary to remove dents and touch-up of factory finishes.

1.27 PRODUCT CHANGES & SUBSTITUTIONS

.1 Change in Product/Products: Submit request for substitution or alternative in accordance with this Section, the Instructions to Bidders, and Division 01 Product Exchange Procedures Division 01 Substitutions Sections. In case of a discrepancy between this section and Division 00 and Divisions 01, the more stringent requirements shall apply.

.2 The Instructions to Bidders specifies time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.

.3 Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

.4 Any substituted item submitted for consideration must not exceed the available space and weight limitations, and all additional costs for mechanical, electrical, structural and architectural revisions required to incorporate the substituted material shall be the responsibility of the Mechanical Division. Review maximum dimensions and weights when provided in the specification and schedules, and where not specified review the drawings for space limitations.

.5 A request constitutes a representation that the Bidder:

.1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

.2 Will provide the same warranty for the Substitution as for the specified Product.

.3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Contract Administrator.

.4 Waives claims for additional costs or time extension which may subsequently become apparent.

.5 Will reimburse Contract Administrator for review or redesign services associated with re-approval by authorities.

.6 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.28 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 the Work, building occupants, or pedestrian or 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.

1.29 MANUFACTURER'S WRITTEN INSTRUCTIONS

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

.2 Notify Contract Administrator in writing, of conflicts between specifications and manufacturer's instructions, so that Contract Administrator may establish course of action.

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

1.30 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 Contract Administrator if required Work is such as to make it impractical to produce required results.

.2 Do not employ anyone unskilled in their required duties. Contract Administrator reserves right to require dismissal from site any workers deemed incompetent or careless.

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

.4 Assume full responsibility for layout of own work and for any damage caused to property of others through improper location or poor workmanship.

1.31 ACCESSIBILITY OF EQUIPMENT

.1 The City places a high priority on being able to safely and efficiently gain access to systems and equipment for replacement and repair. All equipment must be accessible, as defined as follows:

.1 Ceiling mounted equipment shall only be considered accessible if a tradesman can place both hands on the equipment components which requires services. The component must be in clear view, and access must be gained from an 8 or 10 foot step ladder. If this is not possible, it should be reviewed by the Contract Administrator before deemed acceptable.

.2 Conduit, pipe, ducting and support racking or any other obstruction to accessibility shall be relocated at the contractor's expense by the contractor's forces.

1.32 COORDINATION

.1 Ensure cooperation of workers in laying out Work. Maintain efficient and continuous supervision.

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

.3 Check levels shown before commencement to ensure adequate falls for pipes and report discrepancies immediately. Failure to so check and report does not relieve this section from responsibility for consequent extra expenditures.

.4 Where space is indicated as reserve for future equipment, leave clear and install piping and other work so that connections can be made to future equipment.

.5 Secure approval where necessary to cut holes in either finished or unfinished work, employ section whose work is involved, cut openings no larger than necessary and without damage to adjoining work and carefully repair all damage to match adjacent work. Note the Mechanical Division is responsible for all required cutting and patching relating to this Contract, except as specifically noted otherwise.

.6 Provide and set bolts, templates, sleeves and fixing materials for fixing work under this section securely to work provided under other sections, in advance of other work, where required.

.7 Locate all openings in walls, partitions, beams, etc. required for installation of ducts, pipes and equipment, etc. specified in this section of the specifications and frame all openings as required.

.8 Installation of all equipment shall allow sufficient space to facilitate ease of maintenance. Clearance space shall allow for the removal of all components of equipment without hindrance. Where clearance requirements are not shown on the mechanical plans, manufacturer clearances must be maintained at a minimum.

1.33 WORK FOR OTHER TRADES

.1 The Mechanical Subcontractor shall install rough-ins and/or connections for all equipment requiring mechanical services, as shown on drawings or mentioned elsewhere in the specifications.

.2 Supply other trades with all necessary details, rough-in drawings, wiring diagrams, etc. as required.

1.34 ELECTRICAL REQUIREMENTS

.1 Motors and electrical equipment supplied under Mechanical Division shall comply with Electrical Section and electrical characteristics scheduled or shown.

.2 See "Installation and Wiring Controls" in Electrical Section for equipment supplied under Electrical Section.

.3 Supply to Electrical Section within four weeks after contract award, fully detailed diagrams of power and control wiring required for equipment supplied by Sections 21 – 25.

1.35 CONCEALMENT

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

.2 Before installation, inform Contract Administrator if there is interference. Install as directed by Contract Administrator.

1.36 ACCESS PANELS

.1 Provide in ample time for installation under relevant sections all necessary access panels or as required for proper maintenance. ULC approved access panels must be provided where access is through or into a fire partition or assembly. If access doors have been specified by architectural sections the architectural specification shall supersede this section.

1.37 REMEDIAL WORK

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

.2 Perform remedial work by specialists familiar with materials affected. Perform in a manner to neither damage nor put at risk any portion of Work.

1.38 ALTERATION WORK

.1 Where work is to be done in existing buildings, accurately survey, provide for avoidance of damage and interference to existing work and rectify any such damage due to work under Mechanical Sections. Accept existing work as it exists at time of tendering.

.2 Carefully dismantle existing mechanical equipment to be removed or relocated. Temporarily disconnect, remove, and reinstall existing equipment, piping, ductwork, conduit, light fixtures, and similar items, which interfere with the new installation after completion of new work or of existing installations to be demolished. Store equipment and materials on the premises as directed by the Contract Administrator.

.3 All usable salvaged equipment and materials shall remain the property of the Contract Administrator unless specifically noted otherwise. Such material shall be removed from the building and be safely and neatly stored on the site for removal by the Contract Administrator. The Contractor shall remove all rejected salvage from the site and legally dispose of it off site.

.4 Reuse existing equipment in new work after first repairing and reconditioning any defective items where noted. Safely cap and seal disconnected mechanical services within finished surfaces.

.5 The abandonment of existing equipment and material in place is not acceptable. All redundant services are to be removed back to active mains, which shall then be capped at existing point of connection.

.6 All mechanical equipment conflicting with new equipment being installed shall be moved or disconnected, without damage, by Contractor and shall remain property of The City. Remove ducts and piping not required in revised systems and interfering with new installation. This material shall become property of Contractor.

.7 Disconnect existing equipment indicated, intended to be reused, rough-in in new position, and after replacement connect fully, ready for use.

.8 Removal and relocation of mechanical equipment by relevant Mechanical Sections.

1.39 LOCATION OF FIXTURES

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

.2 Inform Contract Administrator of conflicting installation. Install as directed.

1.40 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.

1.41 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 Type 304 or 316 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.

1.42 WORK RESTRICTIONS AND STAGING

.1 Coordinate and implement work in stages as required in Division 01.

.2 Protect and secure work in progress as required in Division 01.

1.43 TEMPORARY USE OF EQUIPMENT

.1 No portion of any mechanical system or equipment provided under Mechanical Sections may be used for temporary heating without Contract Administrator's written permission and observance of the following procedure:

.1 Maintain and clean when necessary cleanable type filters and clean and oil just prior to take-over of building by The City.

.2 Ensure that mechanical air handling equipment is not operated during painting.

.3 Employ equipment manufacturers and subtrades to ensure and certify that all systems and equipment are in proper condition, and guarantee all work used prior to take-over as for new work, from date of acceptance of building by Contract Administrator.

.4 If permission for temporary use of mechanical equipment is granted, use Canadian Plumbing and Mechanical Contractors Association standard form of agreement as basis of responsibilities. Guarantee on complete installation shall not start until acceptance of building by Contract Administrator.

1.44 PROTECTION OF WORK IN PROGRESS

.1 Prevent overloading of any part of the Project.

.2 Do not cut, drill or sleeve any load bearing structural member, unless specifically indicated, without written approval of Contract Administrator.

1.45 EQUIPMENT START UP, AND VERIFICATION REPORTS

.1 The contractor shall supply the equipment commissioning reports for the mechanical equipment being installed.

.1 Forms shall be filled out in full, with all required and suggested fields.

.2 Forms shall include tester's signature and the signature by the project manager for the mechanical subcontractor.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Roof drains.

1.2 REFERENCES

.1 ASME A112.6.4 – Roof, Deck and Balcony Drains

1.3 SUBMITTALS FOR REVIEW

.1 According to Section 21 05 00 – Common Work For Mechanical.

.2 Product Data: Provide drawings indicating dimensions, support/fastening details, and performance characteristics.

1.4 CLOSEOUT SUBMITTALS

.1 According to Section 21 05 00 - Common Work For Mechanical.

.2 Include manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.

1.5 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years documented experience.

1.6 REGULATORY REQUIREMENTS

.1 Perform Work to the latest version of the Manitoba Plumbing Code and local Municipal requirements.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Transport, handle, store, and protect products according to Section 21 05 00 – Common Work For Mechanical.

Part 2 Products

2.1 ROOF DRAINS

.1 Standard Roof Drain (RD-1):

- .1 Manufacturer / Model: Watts RD-100
  - .1 Substitutions according to Section 21 05 00 – Common Work For Mechanical.
- .2 Epoxy coated cast iron roof drain with deep sump, wide serrated flashing flange, flashing clamp devices with integral gravel stop, self-locking polyethylene dome, and 100 mm pipe outlet. No flow control.
- .3 Assembly: AMSE A112.6.4.

.4 Strainer free area of 88386 mm^2 (137 $inch^2$).

.2 Parapet Wall Mounted Roof Drain (RD-2):

.1 Manufacturer / Model: Watts RD-270

.1 Substitutions according to Section 21 05 00 – Common Work For Mechanical.

.2 Epoxy coated cast iron scupper drain with flashing clamp, secured angle grate, and 75 mm pipe outlet. No flow control.

.3 Assembly: AMSE A112.6.4.

.4 Strainer free area of 9677 mm^2 (15 $inch^2$).

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer instructions.

.2 Connect roof drains to existing cast iron piping using flexible PVC fittings with stainless steel clamps, where necessary. Fittings to ASTM D 5926. Submit shop drawings if fittings are to be used.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Nameplates.

Part 2 Products

2.1 NAMEPLATES

.1 Provide laminated three-layer plastic with engraved black letters on light contrasting background colour. Nameplates to include customized information as follows:

- .1 PTAC Units:
  - .1 ID Tag: (PTAC-1)
  - .2 Circuit and Panel: (CIR 12, Panel 1B)
- .2 Electric Unit Heaters:
  - .1 ID Tag: (UH-1)
  - .2 Circuit and Panel: (CIR 14, Panel 1B)
- .3 Thermostats
  - .1 Connected Equipment: (PTAC-1, UH-1)

Part 3 Execution

3.1 PREPARATION

.1 Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

.1 Install plastic nameplates with sufficient adhesive to ensure permanent adhesion. Install nameplates level/plum in visible locations.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Packaged terminal air conditioning units, wall sleeves, and outdoor louvres.

1.2 REFERENCES

.1 ARI 310/380/CSA C744 – Packaged Terminal Air-Conditioners and Heat Pumps

.2 National Energy Code of Canada for Buildings

1.3 SUBMITTALS FOR REVIEW

.1 According to Section 21 05 00 – Common Work For Mechanical.

.2 Product Data: Provide drawings indicating dimensions, support details, performance characteristics, louvre/grilles, and electrical characteristics and connection requirements.

1.4 SUBMITTALS FOR CLOSEOUT

.1 According to Section 21 05 00 - Common Work For Mechanical.

.2 Include manufacturer's descriptive literature, operating instructions, installation instructions, and maintenance and repair data.

1.5 QUALITY ASSURANCE

.1 Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience.

.2 Coefficient of Performance: Minimum as prescribed by National Energy Code of Canada for Buildings.

.3 Provide equipment that operates using HCFC-free refrigerants.

1.6 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by ULC.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Transport, handle, store, and protect products according to Section 21 05 00 – Common Work For Mechanical.

.2 Protect finished cabinets from physical damage by leaving factory packing cases in place before installation and providing temporary covers after installation.

1.8 WARRANTY

.1 Submittals for project closeout according to Section 21 05 00 – Common Work For Mechanical.

.2 Warranty Period:

.1 Refrigeration System: Manufacturer's standard, minimum five years from date of Substantial Completion, including components and labour.

.2 Other Parts: Manufacturer's standard, minimum five years from date of Substantial Completion, including only components and excluding labour.

Part 2 Products

2.1 AIR CONDITIONING UNITS (PTAC-#)

.1 Packaged, self-contained, through-the-wall direct-expansion air cooled terminal air conditioning units, with wall sleeve, integrated supply/return grilles, electric refrigeration system, electric heating, built-in temperature controls; fully charged with refrigerant and filled with oil.

.2 Manufacturer/Model: Amana PTC153G

.1 Substitutions according to Section 21 05 00 – Common Work For Mechanical.

.3 Minimum Cooling Capacity: 14,700 BTU/H

.4 Minimum Heating Capacity: 4000 W (electric)

.5 Airflow: 360 cfm

.6 Outdoor Air: none

.7 Minimum Efficiency: COP 2.72

.8 Refrigerant: R-410A

.9 Electrical Requirements:

.1 208 V, 60 hz, 1 ph

.2 MCA 27.6 A

.3 MOCP 30 A

.4 Plug: 6-30 P

.10 Low Ambient Lockout Control:

.1 Outdoor thermostat to prevent compressor operation below 5 degrees C.

.11 Colour: Submit to Architect for written approval prior to ordering.

.12 Comes with outdoor drainage kit (spout) with extension tube.

.13 Exterior grille provided by Section 08 44 13 – Glazed Aluminum Curtain Wall, see ‘PTAC Unit Louver’. Coordinate installation of exterior grille with location of outdoor drainage kit spout. Spout to extend through grille.

.14 Controls:

.1 Amana 2246008 7-Day Programmable Electronic Thermostat

.1 Substitutions according to Section 21 05 00.

.2 Required Stages: 2 Heat, 1 Cool

.3 Electrical Requirements: 24 VAC

.4 Modes: Off, heat, cool, heat & cool, and program

.5 Setpoints:

.1 "Program Mode"

.2 Heating:

.1 Daily 06:00 – 19:00 → 21C

.2 Daily 19:00 – 06:00 → 15C

.3 Cooling:

.1 Daily 06:00 – 19:00 → 24C

.2 Daily 19:00 – 06:00 → 40C

.4 Stage 1 Heating – PTAC Units

.5 Stage 2 Heating – Electric Unit Heaters

.1 Stage 2 Heating Differential → 2C

.2 Keyed locking cover

2.2 WALL SLEEVES AND LOUVRES

.1 Wall Sleeves:

.1 Width: 42 inch

.2 Height: 16 1/16 inch

.3 Depth: 14 1/8 inch

.4 Insulated

.5 Galvanized steel construction with baked corrosion-inhibiting urethane primer and baked-polyester topcoat enamel.

.6 Colour: Submit to Architect for written approval prior to ordering.

.2 Louvres:

.1 Custom exterior louvres integrated into curtainwall, provided by architectural/structural division.

Part 3 Execution

3.1 INSTALLATION

.1 Install to manufacturer's written instructions.

.2 Coordinate installation of units with architectural and electrical work.

.3 Ensure PTAC units and sleeve are fully supported and secured in walkway envelope system. Ensure PTAC units are installed water / weather tight in walkway envelope.

.4 Label mechanical equipment according to Section 23 05 53 – Mechanical Identification.

3.2 COMMISSIONING

.1 Submit commission forms for PTAC units to Contract Administrator for review and approval prior to the start of commissioning. Forms to include static verification, start-up, and functional performance testing tasks.

.2 Commissioning to be performed by Contractor and witnessed by Contract Administrator.

.3 Submit one completed PTAC commissioning form for each PTAC unit installed. Sign and date each commissioning form. Include completed commissioning forms in O&M Manual.

.4 Template commissioning forms are provided on the following page.

3.3 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate location of circuit breakers and switches serving PTAC units and location and setting procedures for controls.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 02 41 19 - Selective Demolition.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Materials and equipment for patching and extending work: As specified in individual Sections.

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify field measurements and circuiting arrangements are as shown on Drawings.

.3 Verify that abandoned wiring and equipment serve only abandoned facilities.

.4 Electrical drawings are based on existing record documents and/or casual field observations. Coordinate full extent of demolition work with all disciplines. Coordinate on site with all trades prior to commencement of demolition.

.5 Report discrepancies to the Contract Administrator before disturbing the existing installation.

.6 Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

.1 Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

.2 Reroute/extend/re-feed existing electrical as required to maintain existing systems not indicated to be removed.

.3 Coordinate utility service outages with Utility Company.

.4 Provide temporary wiring and connections to maintain existing systems in service at the RBC Convention Centre, Delta Hotel and 155 Carlton during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.

.5 Existing Electrical Service: Maintain existing systems in service at the Delta Hotel and 155 Carlton until new systems are complete and ready for service. Disable systems only to make switch overs and connections. Obtain permission from the Contract Administrator at least forty eight hours before partially or completely disabling systems. Disable system at a time suitable to The City only. Minimize outage duration. Make temporary connections to maintain service in areas adjacent to work area as required.

.6 Existing Fire Alarm Systems: Maintain existing fire alarm systems in service at the RBC Convention Centre and 155 Carlton St. Disable existing system only to make switch overs and modifications. Notify Contract Administrator and local fire service and at least forty eight hours before partially or completely disabling system. Disable systems at a time suitable to The City only. Minimize outage duration and make all arrangements for fire watch during outage. Make temporary connections and relocations to maintain

service in areas adjacent to and in the work area as required. Where existing devices are covered to minimize dust infiltration during construction, ensure all dust caps are removed during non-construction periods.

.7 Where existing luminaires, equipment or devices are to be temporarily relocated, and are to remain in service, provide an apparatus suitable to support the equipment.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

.1 Demolish and extend existing electrical work to this Section and as indicated.

.2 The construction documents indicate major items of equipment, fixtures, and devices that exist and may not indicate every item or supporting wiring and conduit to be removed and/or relocated.

.3 Carefully examine the site and construction documents to verify the extent of work defined in the construction documents. Be responsible for determining which existing equipment and/or devices are to be removed and/or relocated.

.4 Remove, relocate, and extend existing installations to accommodate new construction including all existing equipment and/or devices indicated within the construction documents.

.5 Where existing equipment and/or devices are to be temporarily relocated, coordinate the required structure to support the equipment.

.6 Remove abandoned wiring to source of supply.

.7 Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

.8 Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

.9 Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

.10 Repair adjacent construction and finishes damaged during demolition and extension work.

.11 Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

.12 Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

3.4 CLEANING AND REPAIR

.1 Clean and repair existing materials and equipment which remain or are to be reused.

.2 Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts, broken electrical parts and lenses.

3.5 FINISHES

.1 Clean, prime and paint exposed wiring, conduit, junction and pull boxes, hangers, racking, and fasteners to prevent rusting and to match existing finishes where applicable.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Division 0 – Bidding & Contract Requirements

.2 General Requirements

.3 All Electrical Drawings and Division 25, 26, 27, 28 Series Specification Sections.

1.2 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 CAN3-C235-83 (R2015) - Preferred Voltage Levels for AC Systems, 0 to 50 000 V.

.3 CSA (Canadian Standards Association).

.4 ULC (Underwriters' Laboratories of Canada).

.5 ASTM E-814, - Fire Tests of Penetration Fire Stops.

.6 ANSI/ UL1479 - Fire Tests of Through Penetration Firestops

.7 Canada Green Building Council (CaGBC)

1.3 REGULATORY REQUIREMENTS

.1 Conform to CSA-C22.1-18.

.2 Comply with all CSA Electrical Bulletins in force at time of tender submission.

.3 Comply with all provincial by-laws, ordinances, codes, rulings, and other requirements.

.4 Comply with requirements of the electrical supply authority and the local inspection authority.

.5 Products: Listed and classified by CSA, or ULC and as suitable for the purpose specified and indicated. Where there is no alternative to supplying equipment which is not CSA certified, obtain special approval from the appropriate Inspection Departments.

1.4 DEFINITIONS

.1 The following are definitions of terms and expressions used in the specification:

.1 Inspection Authority: agent of any authority having jurisdiction over construction standards associated with any part of electrical work on site.

.2 Supply Authority: electrical power utility company responsible for delivery of electrical power to project.

.3 Electrical Code: Canadian Electrical Code or Local Code in effect at project location.

.4 Indicated: as shown on contract drawings or noted in Contract Documents.

.5 Install: To remove from site storage, move or transport to intended location, install in position, connect to utilities, repair site caused damage, and make ready for use.

.6 Supply: To acquire or purchase, ship or transport to the site, unload, remove packaging to permit inspection for damage, re-package, replace damaged items, and safely store on-site.

.7 Provide: Wherever the term "provide" is used in relationship to equipment, conduit and other materials specified for the work, it means "supply, install,

connect and leave in working order all materials and necessary wiring, supports, access panels, etc., as necessary for equipment indicated." Wherever the terms "provide" is used in connection with services such as testing, load balancing, start-up, preparation of drawings for any part of the work, it means procure, prepare, supervise, take responsibility for, and pay for these services.

.8 Typical: A representative characteristic that is standard for all installations whether individually noted or not throughout the documents. "Typical" applies to each individual or combined installation except where specifically noted or otherwise indicated that the application is non-typical.

.9 Exposed: Any work not concealed in wall, shaft, or ceiling cavities or spaces. Work behind doors, in closets or cupboards or under counters is considered exposed.

.10 New: Produced from new materials.

.11 Renewed: Produced or rejuvenated from an existing material to like-new condition to serve a new or existing service.

.12 Defective: A condition determined exclusively by the Contract Administrator.

1.5 PERMITS & FEES

.1 Submit all quantities of drawings and specifications necessary for examination and approval to Electrical Permit Department and Electrical Supply Authority prior to commencement of work.

.2 Obtain and pay for all permits necessary for the electrical installation.

1.6 INSPECTION

.1 Furnish a Certificate of Acceptance from the Inspection Authorities on completion of work. Copies of Certificate shall be included in Maintenance Manuals.

.2 Certificate of Inspection and Approval shall be submitted before final payment may be considered to be due.

.3 During the course of the project construction, the Contract Administrator will carry out periodic site reviews and prepare a deficiency list for remedial action by the Electrical Subcontractor. When requested, the Electrical Subcontractor shall respond in writing to the Contract Administrator, stating corrective action and completion date for each item listed as deficient. This response shall be in the hands of the Contract Administrator within three working days of receipt of the Site Review Report.

1.7 PRODUCT CHANGES & SUBSTITUTIONS

.1 Change in Product/Products: Submit request for substitution or alternative in accordance with this Section, the Instructions to Bidders, and Division 01 Product Exchange Procedures Division 01 Substitutions Sections. In case of a discrepancy between this section and Division 00 and Divisions 01, the more stringent requirements shall apply.

.2 The Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.

.3 Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

.4 Any substituted item submitted for consideration must not exceed the available space limitations, and all additional costs for mechanical, electrical, structural and architectural revisions required to incorporate the substituted material shall be the responsibility of the Electrical Division. Review maximum dimensions and weights when provided in the specification and schedules, and where not specified review the drawings for space limitations.

.5 A request constitutes a representation that the Bidder:

.1 Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.

.2 Will provide the same warranty for the Substitution as for the specified Product.

.3 Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Contract Administrator.

.4 Waives claims for additional costs or time extension which may subsequently become apparent.

.5 Will reimburse Contract Administrator for review or redesign services associated with re-approval by authorities.

.6 Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

1.8 SUBMITTALS FOR REVIEW

.1 Refer to Division 01.

.2 Progress Payment Application Template

.1 Prior to the first application for payment, submit for review a draft progress application template.

.2 Progress Application shall contain separate line items for the following systems:

.1 Lighting

.2 Branch Wiring, Conduit, Raceway, Boxes

.3 Electric Heat

.4 Fire Alarm

.3 Progress for each system shall break out labor and materials separately.

.3 Shop Drawings Administrative Requirements

.1 Shop drawings shall be submitted electronically in PDF format documents to shopdrawings@eppsiepman.com.

.2 Shop drawing documents shall be grouped by specification section. Clearly list the specification section on the front page or cover sheet of the submittal. Shop drawings related to multiple sections may not be grouped together into a single document. Documents that are groups incorrectly will be returned without being examined and shall be considered rejected.

.1 Each drawing shall include the name of project as found on the drawings or specifications, the equipment supplier and the specification section that the equipment is specified under.

.3 Submit to Contract Administrator submittals listed for review. Submit with reasonable promptness and in orderly sequence so as to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.4 Work affected by submittal shall not proceed until review is complete.

.5 Present Shop Drawings, product data, samples and mock-ups in SI Metric and/or Imperial inch-pound units, to match the units used in the schedules.

.4 Shop Drawings and Product Data

.1 Submit shop drawings and product data for review by the Contract Administrator. All drawings shall be in English and metric dimensions or in imperial where

indicated. Manufacture of equipment shall not commence until shop drawings have been reviewed.

.2 Material submitted for review shall be marked up bear the Contractor's and where applicable the Utility's reviewed stamp.

.3 Shop drawings shall be reviewed by the electrical subcontractor, Contractor, and where applicable the Utility prior to submittal to Contract Administrator, confirming that they meet all the design requirements. 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.

.4 Submittals not stamped, signed, dated, identified as to specific project, and attesting to their being reviewed will be returned without being examined and shall be considered rejected.

.5 Indicate details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment or material.

.6 Where applicable, include wiring, single line and schematic diagrams.

.7 Include wiring drawings or diagrams showing inter-connection with work of other sections.

.5 Provide scaled drawings showing layout of all electrical equipment and coordination of same with mechanical equipment in all electrical, electrical/mechanical and voice data rooms.

.6 Submit samples in accordance with General Conditions. Samples shall be forwarded to the Contract Administrator's office and returned. Approved samples will be retained until after tender closing, then all samples will be returned except for the sample submitted by the Manufacturer who has been listed by the successful Contractor in the tender documents. This sample will be used for comparison with the actual production run of successful manufacturer.

.7 Submit shop drawings of service entrance equipment to utilities.

1.9 CLOSEOUT SUBMITTALS

.1 Refer to Division 01.

.2 Prepare instructions and data using personnel experienced in maintenance and operation of described products.

.3 Four weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, one draft copy of operating and maintenance manuals in Canadian English.

.4 Copy will be returned with Contract Administrator's comments.

.5 Revise content of documents as required prior to final submittal.

.6 Two weeks prior to Substantial Performance of the Work, submit to the Contract Administrator, three final copies of operating and maintenance manuals in Canadian English.

.7 Summary audit documents associated with requirements for LEED classification documentation.

.8 Maintenance Data:

.1 Provide operation and maintenance data for incorporation into Maintenance Manuals.

.2 Include details of design elements, construction features, component function and maintenance requirements, to permit effective start-up, operation,

maintenance, repair, modification, extension and expansion of any portion or feature of installation.

.3 Include technical data, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists. Advertising or sales literature not acceptable.

.4 Include all warranty information.

.5 Submit Maintenance Manuals to the Contract Administrator for review. Manuals that are incomplete shall be returned to the Electrical Subcontractor for completion. Completed manuals shall be submitted, to the satisfaction of the Contract Administrator, before final payment may be considered to be due.

.6 Format

.1 Refer also to Section 01 78 10 for formats for manuals. Where there is a discrepancy with this section, follow the requirements of 01 78 10.

.2 Organize data in the form of an instructional manual.

.3 Binders: vinyl, hard covered, 3 'D' ring, loose leaf 8.5 x 11 inch (219 x 279 mm) with spine and face pockets.

.4 When multiple binders are used, correlate data into related consistent groupings. Identify contents of each binder on spine.

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

.6 Arrange content by systems under Section numbers and sequence of Table of Contents.

.7 Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

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

.9 Drawings: provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

.7 Contents

.1 Refer also to Section 01 78 10 for formats for contents. Where there is a discrepancy with this section, follow the requirements of 01 78 10.

.2 Table of Contents: Provide:

.1 Title of project.

.2 Date of submission.

.3 Names, addresses, and telephone numbers of Consultant and Contractor with name of responsible parties.

.4 Schedule of products and systems, indexed to content of volume.

.3 For each product or system, list names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

.4 Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions specified in Section 01 45 00.

.5 Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control, wiring, and schematic diagrams and performance curves.

.6 Include Systems Certifications where applicable.

.7 Include manufacturer specific warranties where applicable.

.8 Include a list of maintenance materials provided in each related section.

.9 Certificate of Acceptance: Relevant certificates issued by authorities having jurisdiction, including code compliance certificate, life safety systems performance certificate.

.10 Training: Record of Contract Administrator's training as specified.

.9 Maintenance Materials:

.1 Provide maintenance materials as specified. Include a list of the maintenance materials in each related section of the operation and maintenance data.

.2 Turn materials over to Contract Administrator in an orderly fashion upon completion of installation.

.10 Record Documentation:

.1 Prior to Substantial Performance of the Work, electronically transfer the marked-up information from the as-built documents, as follows:

.1 Drawings: Scan the full-sized field-verified as-built drawing set and save to PDF format. Scans shall be in colour and with good resolution to ensure drawings and markups are legible.

.2 Specifications: Adobe Acrobat (PDF).

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

.3 Submit completed record documents to Contract Administrator on a CD, DVD, or by electronic transfer.

.4 Project record documents shall comprise a complete and accurate record of the actual electrical installation. Record drawings that are inaccurate or incomplete shall be returned to the contractor for correction and completion.

.5 Record drawings shall contain a stamp bearing the words "Record Drawing" or "As-Built Drawing", the electrical subcontractor's company name, date, and the Contractor's signature.

.6 The Contract Administrator will recommend a suitable deficiency holdback until accurate and complete record drawings have been submitted in acceptable form.

.7 Record actual size and location of all cables including depth of cables where buried.

.8 Contractor to take all schedules/details from specification and put onto additional drawing sheets for Record Drawings.

1.10 EXAMINATION

.1 Prior to submitting a tender, examine the site and local conditions which will affect the work. Refer to the Architectural, Mechanical and Structural drawings, schedules and specifications for construction details to be certain that the electrical work can be satisfactorily carried out as specified. Claims for extra payments resulting from conditions which could reasonably be foreseen during an examination of the documents and/or site, will not be recognized.

.2 Ensure that all equipment designated as "Existing to Remain" or "Existing to be Relocated" is suitable for its intended re-use, including panelboards and circuits. Report any discrepancies to the Contract Administrator before tender close.

.3 Refer to General Conditions for instructions regarding a prearranged site visit during the tender period.

.4 Notify Contract Administrator of any discrepancies, omissions, etc., prior to the awarding of the contract, otherwise the Electrical Subontractor shall perform the work as directed at no additional cost to the Contract Administrator.

Part 2 Products

2.1 MATERIALS AND EQUIPMENT

.1 Provide labour, materials, transportation, equipment and facilities, etc., required for the complete electrical installation as indicated or implied on the drawings and specifications.

.2 Electrical equipment shall be new and of type and quality specified.

.3 Request for approval of material, as equal, shall conform to the specification.

.4 Equivalent materials and equipment

.1 Bidders shall submit a tender based on the specified materials and equipment only.

.2 Bidders may submit a tender based on equivalent materials and equipment only if such items have been approved as equals by the Contract Administrator.

.3 Bidders may submit, with their tender, an alternate price based on alternate materials and equipment only if such items have been approved as alternates by the Contract Administrator.

.4 Submissions for equals or alternates shall be received by the Contract Administrator, ten working days prior to tender closing. Submissions shall include sufficient manufacturer's data to clearly show equivalency, as well as an itemized list of equal or alternate items, the items for which they were submitted and a space for the Contract Administrator to indicate "approved equal", "approved alternate", or "not approved". Submittal list will be returned or may be picked up at the Contract Administrator's office. Where submissions are not returned by the Contract Administrator before tender closing or are not received by the Contract Administrator ten working days before close of tender, they are considered not approved.

.5 All submissions shall include the following phrase "We have reviewed all contract documents, contract drawings and specifications relating to the equipment presented herein" and shall bear the name and signature of the manufacturer or their agent.

2.2 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83(R2015).

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard. Equipment shall operate in extreme operating conditions established in above standard without damage to equipment.

2.3 FINISHES

.1 Clean and touch up surfaces of shop-painted equipment, scratched or marred during shipment or installation, to match original paint.

.2 Clean, prime and paint exposed wiring, conduit, junction and pull boxes, hangers, racking, and fasteners to prevent rusting and to match surrounding finishes where applicable.

2.4 LABELS AND WARNING SIGNS

.1 Manufacturer's nameplates and CSA labels shall be visible and legible after equipment is installed.

.2 Provide warning signs on equipment, as required, to meet the requirements of the Inspection Authorities, including indication of multiple power sources.

.3 Provide quantity as required of buried cable signs reading “Buried Cable” and “Buried High Voltage Cable”. Signs shall be installed at building structure/equipment, at locations as directed on site and as per Canadian Electrical Code.

2.5 PROTECTION

.1 Construction

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

.2 Shield and mark live part “LIVE ( ) VOLTS”, with appropriate voltage.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision.

2.6 SPARE PARTS AND MAINTENANCE MATERIALS

.1 Assemble spare parts as specified.

.2 Include the following:

.1 Part number.

.2 Identification of equipment or system for which parts are applicable.

.3 Installation instructions as applicable.

.3 Provide a written list complete with Contract Administrator’s signature assuring that spare parts have been received by the Contract Administrator.

2.7 ACCESS DOORS

.1 Access doors shall be minimum #12 gauge prime coat painted bonderized steel. Each shall be complete with a heavy flush frame and anchor, concealed hinges, positive locking screwdriver lock, and mounting and finishing provisions to suit the finish material for which they are supplied. Access doors in fire rated ceilings, walls, partitions, structures, etc. shall be ULC. listed and labeled and of a rating to maintain the fire separation integrity.

.2 Where access doors are located in surfaces where special finishes are required, they shall be of a recessed door type capable of accepting the finish in which they are to be installed so as to maintain the final building surface appearance throughout.

.3 Supply access doors in inaccessible construction shall give access to all concealed junction boxes, pullboxes, conductor joints and other similar electrical work which may need maintenance or repair.

.4 Before commencing installation of electrical work, submit to the Architect for approval, a list of required access doors showing the exact sizes and locations of such access doors. Locate access doors in walls and partitions to the Architect’s approval, and arrange electrical work to suit. Access doors shall be, wherever possible, of a standard size for all applications. Confirm exact dimensions with the Architect, prior to ordering.

.5 Access doors will be installed by the Division responsible for the particular type of construction in which access doors are required. Supply the access doors to the Division installing same at the proper time to avoid construction delays.

Part 3 Execution

3.1 COORDINATION WITH OTHER TRADES

.1 Refer to Mechanical, Structural, Architectural and Interior Design drawings and specifications for additional electrical work in connection with other Divisions. Where

such work is included in other sections of the specifications, provide equipment, conduit, wiring, etc. (in accordance with the approved manufacturer's shop drawings), as required, for operation of the specified equipment.

.2 Schedule execution of electrical work with associated work specified in other Divisions.

.3 Coordinate electrical work with work of other trades to avoid conflicts with pipes, air ducts or other equipment. Provide additional supports, wiring, etc., to relocate electrical equipment, as required, where structural members, air ducts, piping or other equipment interferes with the electrical installation.

3.2 QUALITY ASSURANCE

.1 Do complete installations in accordance with CSA C22.1-18.

.2 While not identified and specified by number in this Division, comply with CSA Electrical bulletins in force at time of tender submission. Comply with the requirements of all Provincial and local laws, rules, ordinances and codes.

.3 Electrical installations shall comply with all requirements of the electrical supply authority and the inspection authority.

.4 Electrical installation shall be in accordance with the applicable versions of the Canadian Electrical Code, Provincial and other codes, rules and regulations. Supply material and labour required to meet the requirements of these codes, rules and regulations even though the work is not shown on the drawings or mentioned in the specifications. Where the electrical installation calls for better quality materials or construction than the minimum requirements of these codes, rules and regulations, the electrical installation shall be as shown on the drawings and as specified.

3.3 WORKMANSHIP

.1 Install equipment, conduit and cables in a workmanlike manner to present a neat appearance to the satisfaction of the Contract Administrator. Install conduit and cable runs parallel and perpendicular to building lines in chases, behind furring or above ceilings, where such concealment is possible. In areas where systems are to be exposed, install neatly and group in a tidy appearance.

.2 Install equipment/junction boxes and apparatus requiring maintenance, adjustment or eventual replacement, with adequate clearances and accessibility for same.

.3 Provide for all requirements shown on shop drawings or manufacturer's installation instructions.

.4 Work deemed by the Contract Administrator to be unsatisfactory shall be replaced at no additional cost.

3.4 DELIVERY STORAGE AND HANDLING

.1 Deliver all materials to site in an orderly fashion.

.2 Store all materials in a clean and dry place, secure from vandalism or theft. All materials shall be left in shipping containers until required for use.

.3 Provide additional protection such as tarps, padding, wood skids, etc., as required to ensure protection of equipment and as directed by the Architect.

3.5 CONDUIT SLEEVES AND HOLES

.1 Install conduit, and sleeves, prior to pouring of concrete. Sleeves through concrete shall be sized for free passage of conduit.

.2 Holes through exterior walls and roof shall be flashed and made weatherproof.

.3 Make necessary arrangements for cutting of chases, drilling of holes and other structural work required to install electrical conduits, cables, pullboxes and outlet boxes.

.4 Install cables, conduits, and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.5 Provide a minimum of two (2) separate conduit sleeves embedded in each concrete lighting fixture base. At least one (1) unused conduit shall be for possible future extension of wiring.

.6 All conduits and cables shall be entered into the building above grade unless otherwise noted.

.7 All coring in buildings with electrical in the slab shall be scanned at Contractor's expense to prevent damage.

3.6 CUTTING AND PATCHING

.1 Pay the costs of all cutting and patching required for the installation of electrical work. Payment for cutting and patching shall be made through the Contractor.

.2 Cutting and patching required for the installation of electrical work shall be done by the particular trade whose work is involved. No cutting or patching shall be carried out by the tradesman employed on the electrical work.

.3 Obtain the approval of the Architect before arranging for any cutting. Patching shall restore the affected area to the original condition; materials and methods used for patching shall be in accordance with the requirements of the corresponding Divisions of the specification.

3.7 DEVICE INSTALLATION

.1 Device Location

.1 Locate devices as indicated.

.2 Do not install devices back-to-back in wall.

.3 Drawings are schematic only and do not indicate all architectural or structural elements.

.4 Change location of devices at no extra cost or credit, providing distance does not exceed 10'-0" (3 m) and information is provided before installation.

.5 Locate light switches on latch side of doors.

.6 Vertically align devices of different systems when shown in close proximity to each other and occurring at different mounting heights.

.7 Coordinate mounting heights and location of all equipment with Architectural, Mechanical and Structural Drawings prior to installation of rough-in boxes.

.2 Mounting Heights

.1 Mounting height of equipment is from finished floor to centre line of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not indicated, verify with Architect before proceeding with installation.

.3 Install electrical equipment at the following heights unless indicated or directed otherwise:

Device / Equipment	Mounting Height	
Devices above counters	150mm	6”****
Receptacles: - General	400mm	16”

- Mechanical/Shop Areas	1000mm	40”
- Clock	2150mm	84”
- Above top of continuous baseboard heater	200mm	8”
- Exterior	1000mm	40”
Switches, Dimmers, push buttons, Luxo bracket		
- General	1200mm	47”
- Accessible Suites	900mm	36”
Clocks	2150mm	84”
Exit Signs	25mm*****	1”*****
Emergency Lighting Battery Banks/Remote Headers	2350mm* or 150mm**	92”* or 6”**
Automatic Door Operator Pushbuttons	900mm	36”
Occupancy Sensors – Switch based with manual override controls.	1200mm	47”
Occupancy Sensors – General	Per manufacturers recommendations	
Fire Alarm Visual, Audible, & Combination Devices	2350mm* or 150mm**	92”* or 6”**
Fire Alarm Manual Pullstations	1200mm	47”
Fire Fighter Handsets	1500mm	59”
Thermostats		
General	1200mm	47”
- Accessible Suites	900mm	36”
- Intercom Stations	1200mm	47”
Proximity/Card Readers	900mm	36”
Communication Outlets	400mm	16”
Hand Dryers	1200mm	47”
Branch Circuit Panelboards, Control Panels, Annunciators. Install panels taller than 1800mm (72”) with bottom no more than 100mm (4”) above floor.	2000mm*	78”*
Enclosed circuit breakers	1600mm***	60”***

*Measured to top of device/equipment

**Measured from Ceiling to top edge of device where mounting height would be lower than required specification.

***Measured to operating handle of device.

****Coordinate counter backsplash heights with architectural drawings prior to rough-in. Maintain minimum 1” clearance above backsplash height.

*****Measured above door trim to underside of device.

.1 Coordinate all mounting heights with Architectural elevations.

.2 Where installed in block or brick, mounting heights shall be as above or at bottom of nearest course.

.4 Circuiting is representational within a panel only. Circuit all electrical equipment and devices to their individually respective, intended panels.

.5 Panelboards and other equipment which are to be surface mounted shall be installed on minimum 19mm (3/4") good one side, fir plywood mounting backboards. Treat backboards with wood preservative prior to installation and paint with primer and two (2) coats gray enamel before any equipment is mounted. Provide plywood mounted boards unless specified otherwise in other sections.

.6 Panelboards mounted on exterior concrete/block walls shall have minimum 3/4" air gap behind enclosure (to minimize condensation).

.7 All transformers, motor control centers and floor-mounted distribution panels shall be mounted on 100mm (4") concrete housekeeping pads. The Electrical Subcontractors shall be responsible for provision of these pads.

3.8 FIREPROOFING

.1 Where cables or conduits pass through block or concrete walls and floors and any fire-rated assembly, seal openings with firestopping systems that have been tested for specific fire-resistance-rated construction conditions conforming to the construction assembly type, penetrating item type, annular space requirements, and fire-rating involved in each instance.

.2 Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

.3 Openings within walls and floors designed to accommodate cabling systems subjected to frequent cable changes shall be provided with re-enterable products.

.4 Fire proofing of electrical cables, conduits, trays, etc, passing through fire barriers shall conform to local codes and inspection authorities.

.5 Fire stop materials shall be asbestos free and have been tested in accordance with ASTM E-814, and ULC 1479.

.6 Fire stop and smoke seals shall be done in accordance with Section 07 84 13.

.7 Approved manufacturers:

.1 Nelson Firestop Products

.2 Specified Technologies

.3 Hilti Firestop

3.9 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads operating at time of measurement. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Submit, at completion of work, a report listing phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

.3 Include load balance test results in maintenance manuals.

3.10 TESTING

.1 Conduct and pay for tests including, but not limited to, the following systems:

.1 Circuits originating from branch distribution panels.

.2 Lighting and its control.

.3 Heaters and associated control equipment including sequenced operation of systems where applicable.

.4 Systems:
.1 Fire Alarm

.5 Grounding systems.

.2 Furnish Manufacturer's Certificate or letter confirming that entire installation, as it pertains to each system, has been installed to manufacturer's instructions. Submit letter in accordance with this section.

.3 Carry out tests in presence of Contract Administrator where directed.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Submit test results in Maintenance Manuals.

3.11 CARE, OPERATION AND START-UP

.1 Instruct the Contract Administrator's operating personnel in the operation, care and maintenance of equipment. Arrangement of such instructional sessions shall be done at a time convenient to the Contract Administrator.

.2 Arrange and pay for services of Manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such a period, and for as many visits as necessary to put equipment into operation, and ensure that operating personnel are conversant with all aspects of its care and operation.

3.12 CLEANING

.1 Final cleaning shall be done in accordance with the specification.

.2 Final cleaning shall include, but not be limited to, all lighting reflectors, lenses, and other lighting surfaces that have been exposed to dust and dirt throughout the course of construction.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Building wire and cable.

.2 Armoured cable.

.3 Metal clad cable.

.4 Fire rated cable.

.5 Wiring connectors and connections.

1.2 RELATED SECTIONS

.1 Section 26 05 53 - Electrical Identification.

1.3 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 C22.2 No. 0.3-09 (R2014) - Test Methods for Electrical Wires and Cables.

.3 CSA C22.2 No. 48-15 - Non-metallic Sheathed Cable.

.4 CSA C22.2 No. 51-14 - Armoured Cables.

.5 CSA C22.2 No. 52-15 - Underground Secondary and Service Entrance Cables.

.6 CAN/CSA-C22.2 No. 65-18 - Wire Connectors.

.7 CSA C22.2 No. 75-17 - Thermoplastic-Insulated Wires and Cables.

.8 CSA C22.2 No. 123-16 - Metal Sheathed Cables.

.9 CAN C22.2 No.131-17 - Type TECK 90 Cable.

.10 CSA C22.2 No. 208-14 - Fire Alarm and Signal Cable.

.11 NECA (National Electrical Contractors Association) - National Electrical Installation Standards (NEIS).

.12 NETA (InterNational Electrical Testing Association) - ANSI/NETA ATS-2017 - Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.

.13 CSA (Canadian Standards Association).

.14 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

1.5 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide for Fire Rated Cable.

1.6 SUBMITTALS FOR INFORMATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors.

.3 Installation Data: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.7 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Record Documentation:

.1 Record actual locations of components and circuits.

.2 Record routing of all equipment and panelboard feeders.

1.8 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.9 REGULATORY REQUIREMENTS

.1 Conform to CSA-C22.1.

.2 Provide products listed and classified by CSA or ULC and as suitable for the purpose specified and indicated.

1.10 PROJECT CONDITIONS

.1 Conductor sizes are based on copper unless indicated as aluminum or "AL".

Part 2 Products

2.1 BUILDING WIRE AND CABLE

.1 Description: Single conductor insulated wire.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation: Thermoplastic material rated 90 degrees C.

.5 Insulation Temperature Rating: 90 degrees C.

.6 Underground Warning Tape: 100mm (4 inch) wide plastic tape, detectable type, coloured yellow with suitable warning legend describing buried electrical lines.

2.2 ARMOURED CABLE

.1 Description: Type ACWU90 and AC90.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation Temperature Rating: 90 degrees C.

.5 Insulation Material: Thermoplastic.

2.3 METAL CLAD CABLE

.1 Description: Type TECK90.

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 600 volts.

.4 Insulation Temperature Rating: 90 degrees C.

.5 Conductor Insulation Material: Cross-Linked Polyethylene (XPLE), type RW90.

.6 Armour Material: Aluminum.

.7 Armour Design: Interlocked metal tape.

.8 Outer jacket: PVC.

.9 Rating: Hazardous Location, CSA FT4

2.4 FIRE RATED CABLE

.1 Manufacturers:

.1 Pyrotenax; Product: System 1850.

.2 Substitutions: Not permitted.

.2 Description: Mineral Insulated

.3 Conductor: Copper

.4 Insulation Voltage Rating: 600V.

.5 Insulation: Magnesium Oxide

.6 Outer Jacket: Copper

2.5 CONNECTORS

.1 Pressure type connectors, fixture type splicing connectors, cable clamps and lugs, as required.

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that field measurements are as indicated.

.3 Verify that interior of building has been protected from weather.

.4 Verify that mechanical work likely to damage wire and cable has been completed.

.5 Verify that raceway installation is complete and supported.

3.2 WIRING METHODS

.1 Concealed Dry Interior Locations: Use only armoured cable and building wire in raceway.

.2 Exposed Dry Interior Locations: Use only building wire in raceway.

.3 Above Accessible Ceilings: Use only armoured cable, metal clad cable, and building wire in raceway.

.4 Wet or Damp Interior Locations: Use only metal clad cable, armoured cable with jacket, and building wire in raceway.

.5 Exterior Locations: Use only building wire Type RWU90 insulation in raceway, metal clad cable, and armoured cable with jacket.

.6 Use wiring methods indicated.

3.3 INSTALLATION

.1 Route wire and cable as required to meet project conditions.

.2 Install cable to the CSA-C22.1.

.3 Use solid conductor for feeders and branch circuits 10 AWG and smaller.

.4 Use stranded conductors for control circuits.

.5 Use conductor not smaller than 12 AWG for power and lighting circuits.

.6 Use conductor not smaller than 16 AWG for control circuits.

Maximum Conductor Length for 120V Branch Circuits

Breaker Size[A]	Conductor	
	Size [AWG]	Max Length [m]
15A	#12	20
	#10	35
	#8	55
	#6	90
20A	#12	15
	#10	25
	#8	40
	#6	65
	#4	110
30A	#10	15
	#8	25
	#6	45
	#4	70

.7 Pull all conductors into raceway at same time.

.8 Use suitable wire pulling lubricant for building wire 4 AWG and larger.

.9 Protect exposed cable from damage.

.10 All cable routed below grade shall enter/exit the building below grade unless noted otherwise.

.11 Support cables above accessible ceiling, using spring metal clips to support cables from structure. Do not rest cable on ceiling panels.

.12 Single conductor cables shall be installed one cable diameter apart on suspended cable tray or channel supports and shall be clamped with aluminum cable clamps. Cables shall be terminated using non-magnetic connectors and shall be watertight for top entry.

Cable armour shall be grounded via an aluminum plate at the supply end and isolated via an insulating plate, at the load end of the cable. A #3/0 AWG insulated (unless otherwise noted) copper ground wire shall be installed with each set of feeder cables. Cable bending radius shall be at least twelve times the overall cable diameter and bend shall not damage or distort the outer sheath.

.13 Armoured cable shall be used for connections from conduit systems to recessed luminaires in accessible ceilings. Cable shall be of sufficient length to allow the lighting fixture to be relocated to any location within an 1800mm (6') radius. Cable shall be clamped before entering the lighting fixture and shall be clipped before entering the conduit system junction box. (Minimum requirements).

.14 Fire Rated Cable shall be installed in complete unbroken lengths parallel with building lines and terminated as per manufacturer's instructions. Care shall be taken at all times to prevent the entry of moisture into the ends of the cable.

.15 Fire Rated Cable shall be surface-mounted to building surfaces with stainless steel banding or straps.

.16 Use suitable cable fittings and connectors.

.17 Neatly train and lace wiring inside boxes, equipment, and panelboards.

.18 Clean conductor surfaces before installing lugs and connectors.

.19 Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

.20 Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

.21 Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

.22 Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

.23 Identify wire and cable to Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Grounding electrodes and conductors.

.2 Equipment grounding conductors.

.3 Bonding.

1.2 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 IEEE 81-2012 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.

1.3 SYSTEM DESCRIPTION

.1 Metal and underground water pipe.

.2 Metal frame of the building.

.3 Metal and underground gas piping system.

1.4 PERFORMANCE REQUIREMENTS

.1 Maximum Grounding System Resistance: 5 ohms.

1.5 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide for grounding electrodes and connections.

1.6 SUBMITTALS FOR INFORMATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Test Reports: Indicate overall resistance to ground.

1.7 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Record Documentation: Record actual locations of components and grounding electrodes.

.3 Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.8 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three (3) years' experience.

1.9 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by ULC and/or CSA as suitable for the purpose specified and indicated.

Part 2 Products

2.1 MECHANICAL CONNECTORS

.1 Material: Bronze.

2.2 WIRE

.1 Material: Stranded copper.

.2 Grounding Electrode Conductor: Size to meet CSA-C22.1 requirements.

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

3.2 INSTALLATION

.1 Provide bonding to meet Regulatory Requirements.

.2 Exposed conductors shall be protected from mechanical injury.

.3 Mechanical connections shall be used for bonding connections to equipment. Soldered joints shall not be permitted.

.4 Buried connections of grounding and bonding conductors shall be made using exothermic welding process.

.5 Provide bonding wire connected to both ends of flexible conduit. Neatly attach to exterior of flexible conduit.

.6 Interface with site grounding system.

.7 Interface with lightning protection system.

.8 Bonding connections shall be made using a star configuration. Loop connections shall be avoided.

.9 Single conductor cables with metallic armour shall be bonded at the supply end only. Provide non-metallic entry plates for load end terminations. Provide a separate bonding conductor.

.10 Provide separate bonding conductor in all non-metallic raceways.

.11 Bond together metal siding not attached to grounded structure; bond to ground.

.12 Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.3 SYSTEM GROUNDING

.1 Install system and circuit grounding connection to neutral points of 600V and 208V systems.

.2 Grounding conductors shall be routed in or adjacent to primary conduits or cables.

3.4 EQUIPMENT BONDING

.1 Install bonding connections to typical equipment included in, but not necessarily limited to:

.1 Distribution Panels

.2 Building Steel Work

3.5 FIELD QUALITY CONTROL

.1 Perform ground continuity and resistance tests using fall-of-potential measurement system method per IEEE 81-2012 standards. A report shall be submitted to the Contract Administrator from the testing agency.

.2 Perform tests before energizing electrical system.

.3 Disconnect ground fault indicator, if provided, during tests.

.4 A ground electrode with an unsatisfactory resistance test result shall be altered as necessary until the required resistance reading is achieved.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Conduit and equipment supports.

.2 Anchors and fasteners.

1.2 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 CECA - Canadian Electrical Contractors Association.

.3 CSA (Canadian Standards Association).

.4 ULC (Underwriters' Laboratories of Canada).

1.3 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide manufacturer's catalogue data for fastening systems.

1.4 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA and as suitable for purpose specified and shown.

Part 2 Products

2.1 PRODUCT REQUIREMENTS

.1 Materials and Finishes: Provide adequate corrosion resistance.

.2 Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.

.3 Anchors and Fasteners:

.1 Concrete Structural Elements: Use expansion anchors.

.2 Steel Structural Elements: Use beam clamps and spring steel clips.

.3 Concrete Surfaces: Use expansion anchors.

.4 Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts and hollow wall fasteners.

.5 Solid Masonry Walls: Use expansion anchors.

.6 Sheet Metal: Use sheet metal screws.

.7 Wood Elements: Use wood screws.

2.2 STEEL CHANNEL

.1 U-shape, galvanized steel, size 1.6" x 1.6" (40 x 40 mm), 0.1" (2.5 mm) thick, surface-mounted, suspended or set in poured concrete walls and ceilings as required.

2.3 INSTALLATION

.1 Install products to manufacturer's written instructions.

.2 Provide anchors, fasteners, and supports to CSA-C22.1.

.3 Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

.4 Do not use powder-actuated anchors.

.5 Obtain permission from Consultant before using powder-actuated anchors.

.6 Do not drill or cut structural members.

.7 Obtain permission from Consultant before drilling or cutting structural members.

.8 Do not use plastic cable ties.

.9 Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

.10 Install surface-mounted cabinets and panelboards with minimum of four anchors.

.11 In wet and damp locations use steel channel supports to stand cabinets and panelboards 25 mm (1 inch) off wall.

.12 Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Metal conduit.

.2 Flexible metal conduit.

.3 Liquid tight flexible metal conduit.

.4 Electrical metallic tubing.

1.2 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.

.2 Section 26 05 34 - Boxes.

.3 Section 26 05 26 - Grounding And Bonding.

.4 Section 26 05 29 – Electrical Supporting Devices.

.5 Section 26 05 53 - Electrical Identification.

1.3 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 18.1-13 (R2018) - Metallic Outlet Boxes.

.3 CSA C22.2 No. 45.1-07 (R2017) - Electrical Rigid Metal Conduit - Steel.

.4 CSA C22.2 No. 56-17 - Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.5 CSA-C22.2 No. 83.1-07 (R2017) - Electrical Metallic Tubing - Steel.

.6 CSA (Canadian Standards Association).

.7 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

1.5 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Record Documentation:

.1 Accurately record actual routing of conduits equal to or larger than 35mm (1-1/4").

.2 Accurately record actual routing of backbone conduit runs.

1.6 REGULATORY REQUIREMENTS

.1 Design conduit size to CSA-C22.1.

.2 Provide products listed and classified by CSA or ULC as suitable for purpose specified and shown.

1.7 DELIVERY, STORAGE, AND PROTECTION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Accept conduit on site. Inspect for damage.

.3 Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

Part 2 Products

2.1 CONDUIT REQUIREMENTS

.1 Minimum Size: 21 mm (3/4 inch) unless otherwise specified.

.2 Outdoor Locations, Above Grade: Use rigid steel conduit.

.3 Dry Locations:

.1 Concealed: Use electrical metallic tubing.

.2 Exposed: Use electrical metallic tubing.

.4 Hazardous Areas: Use rigid steel conduit or TECK cable complete with conduit seal fittings and compound.

.5 Raised Floor Systems: Liquid-tight flexible metal conduit or TECK cable.

2.2 METAL CONDUIT

.1 Rigid Steel Conduit: C22.2 No. 45.1.

.2 Fittings and Conduit Bodies: All steel fittings.

2.3 FLEXIBLE METAL CONDUIT

.1 Description: Interlocked steel construction.

.2 Fittings: CSA C22.2 No. 56.

.3 Provide a separate ground wire in all flexible metal conduit.

2.4 LIQUID TIGHT FLEXIBLE METAL CONDUIT

.1 Description: Interlocked steel construction with PVC jacket.

.2 Fittings: CSA C22.2 No. 56.

.3 Provide a separate ground wire in all liquid tight flexible metal conduit.

2.5 ELECTRICAL METALLIC TUBING (EMT)

.1 Description: CSA C22.2 N0. 83.1; galvanized tubing.

.2 Fittings and Conduit Bodies: CSA C22.2 No. 83.1; steel, set screw type in dry locations, watertight connectors in sprinklered areas

.3 Refer to Section 26 05 53 for colour requirements.

2.6 FITTINGS

.1 Fittings shall be manufactured for use with conduit specified.

.2 Insulated throat liners on connectors.

.3 Steel raintight connector fittings complete with O-rings, for use on weatherproof or sprinklerproof enclosures. Steel raintight couplings shall be used for surface conduit

installation exposed to moisture or sprinkler heads. Steel raintight connectors shall be used for all top entries to panels, contactors and motor control centres.

.4 Expansion fittings

.1 Outdoor locations - Weatherproof expansion fittings with internal bonding assembly, suitable for 100 mm (4") or 200 mm (8") linear expansion.

.2 Panel Entry - Weatherproof expansion fittings for linear expansion as required.

.3 Flexible watertight conduit between junction boxes with integral bonding jumper suitable for linear and lateral movement greater than 19 mm (3/4”).

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that field measurements are as shown on Drawings.

.3 Verify routing and termination locations of conduit prior to rough-in.

.4 Drawings do not contain all conduits. Provide all conduit as required for a complete system.

.5 All conduit sizes indicated on drawings are minimum sizes unless otherwise noted. Where larger conduit sizes are required to meet Canadian Electrical Code requirements, Contractor shall provide larger size at no additional cost. Increase conduit size at no extra costs where required to accommodate length of run and voltage drop requirements in accordance with Canadian Electrical Code requirements.

3.2 INSTALLATION

.1 Install conduit to CSA C22.1.

.2 Install non-metallic conduit to manufacturer's written instructions.

.3 Arrange supports to prevent misalignment during wiring installation.

.4 Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

.5 Group related conduits; support using conduit rack.

.6 Construct rack using steel channel. Provide space on each for 25% additional conduits.

.7 Fasten conduit supports to building structure and surfaces to Section 26 05 29.

.8 Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

.9 Do not attach conduit to ceiling support wires.

.10 Arrange conduit to maintain headroom and present neat appearance.

.11 Provide flexible metal conduit for all connections to motors, recessed lighting, suspended lighting, transformers, and equipment subject to movement or vibration.

.12 Conduit Routing:

.1 All conduit shall be concealed except in mechanical and electrical rooms or as otherwise noted.

.2 Where surface conduit is installed:

.1 Locate more than 2000 mm (78 inches) from infrared or gas-fired heaters.

.2 Group conduits on suspended or surface rack support.

.3 Route conduit parallel and perpendicular to walls.

.4 Route conduit installed above accessible ceilings parallel and perpendicular to walls.

.5 Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.

.6 Route conduit in and under slab from point-to-point.

.7 Do not route conduits through structural members unless otherwise indicated.

.8 Do not route conduit through terrazzo or concrete toppings unless otherwise indicated.

.9 Do not route conduit horizontally in masonry walls unless otherwise indicated.

.13 Conduits in Poured Concrete:

.1 Submit marked up drawings of proposed conduit routing complete with conduit sizes to Contract Administrator for approval prior to installation.

.2 Coordinate installation of conduit to suit reinforcing steel.

.3 Locate in centre third of slab.

.4 Provide minimum separation of 150 mm (6”) between parallel conduit runs.

.5 Do not install conduit in drop panels, beams, or columns unless approved by the Contract Administrator.

.6 Where conduits are grouped, or do not follow perpendicular to parallel to building lines, provide photos in electronic format (minimum resolution 1920x1080) of conduit installation prior to concrete pour.

.7 Record drawings shall indicate location of all conduit embedded in concrete, or run below slab complete with dimensions to building lines.

.8 For slab-on-grade, conduit larger than 27 mm (1”) shall be routed below slab and encased in minimum 75 mm (3”) of concrete.

.14 Maintain adequate clearance between conduit and piping.

.15 Maintain 300 mm (12 inch) clearance between conduit and surfaces with temperatures exceeding 40 degrees C (104 degrees F).

.16 Cut conduit square using saw or pipe cutter; de-burr cut ends.

.17 Bring conduit to shoulder of fittings; fasten securely.

.18 Where threaded connections are used, threads shall be of sufficient length to ensure a tight connection.

.19 Where conduit becomes blocked, remove and replaced blocked sections.

.20 Join non-metallic conduit using cement as recommended by manufacturer.

.1 Wipe non-metallic conduit dry and clean before joining.

.2 Apply full even coat of cement to entire area inserted in fitting.

.3 Allow joint to cure for 20 minutes, minimum.

.21 Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

.22 Install no more than equivalent of two 90-degree bends between boxes.

.1 Use conduit bodies to make sharp changes in direction, as around beams.

.2 Use hydraulic one-shot bender to fabricate and factory elbows for bends in metal conduit larger than 53 mm (2 inch) size.

.3 All metallic conduit shall be bent cold. Replace sections where conduit is kinked or flattened by more than 10% of its original diameter.

.23 Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

.24 Ensure conduit systems are dry prior to installation of wiring.

.25 Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic and control expansion joints, and where conduit transitions from below to above grade.

.26 Provide polypropylene pull string in each empty conduit except sleeves and nipples.

.27 Use suitable caps to protect installed conduit against entrance of dirt and moisture.

.28 Ground and bond conduit to Section 26 05 26.

.29 Identify conduit to Section 26 05 53.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Wall and ceiling outlet boxes.

.2 Pull and junction boxes.

1.2 RELATED SECTIONS

.1 Section 07 84 00 - Firestopping.

.2 Section 26 27 26 - Wiring Devices.

1.3 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 18.1-13 (R2018) - Metallic Outlet Boxes.

.3 CSA C22.2 No. 40-17 - Junction and Pull Boxes.

.4 CSA C22.2 No. 85-14 - Rigid PVC Boxes and Fittings.

.5 CSA (Canadian Standards Association).

.6 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Coordinate installation of outlet box for equipment connected under Section 26 05 80.

1.5 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Record Documentation: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

1.6 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by CSA or ULC, and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 OUTLET BOXES

.1 Sheet Metal Outlet Boxes: CSA-C22.2 No. 18, galvanized steel.

.1 Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 13 mm (1/2 inch) male fixture studs where required.

.2 Concrete Ceiling Boxes: Concrete type.

.2 Non-metallic Outlet Boxes: CSA-C22.2 No. 18.

.3 Cast Boxes: CSA-C22.2 No. 18, Type FS or FD as indicated or as required, cast ferric alloy. Provide gasketed cover by box manufacturer. Provide threaded hubs.

.4 In-wall Boxes: 18 gauge white powder coated steel complete with trim ring, will accept standard single gang outlet boxes, wiring devices and cover plates, complete with screw-on steel cover with cable exit.

.5 Wall Plates for Finished Areas: As specified in Section 26 27 26.

.6 Exposed boxes and covers to be painted to match new paint colour on existing structural steel and steel deck. ('white') Submit to Contract Administrator for written approval prior to ordering or painting.

2.2 PULL AND JUNCTION BOXES

.1 Sheet Metal Boxes: CSA-C22.2 No. 18, galvanized steel.

.2 Surface Mounted Cast Metal Box: CSA-C22.2 No. 18, Type 4 or as indicated; flat-flanged, surface mounted junction box:

.1 Material: Galvanized cast iron.

.2 Cover: Provide with ground flange, neoprene gasket, and stainless steel cover screws.

.3 In-Ground Cast Metal Box: CSA-C22.2 No. 18, Type 6, flanged, recessed cover box for flush mounting:

.1 Material: Galvanized cast iron.

.2 Cover: Non-skid cover with neoprene gasket and stainless steel cover screws.

.3 Cover Legend: "ELECTRIC".

.4 Fibreglass Hand Holes: Die moulded glass fibre hand holes:

.1 Cable Entrance: Pre-cut 150 x 150 mm (6 x 6 inch) or as indicated, cable entrance at centre bottom of each side.

.2 Cover: Glass fibre weatherproof cover with non-skid finish.

.5 Exposed boxes and covers to be painted to match new paint colour on existing structural steel and steel deck. ('white') Submit to Contract Administrator for written approval prior to ordering or painting.

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify locations of floor boxes and outlets throughout prior to rough-in.

3.2 INSTALLATION

.1 Install boxes to CSA-C22.1.

.2 Install in locations as shown on drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

.3 Set wall mounted boxes at elevations to accommodate mounting heights specified in section for outlet device and as indicated. Coordinate locations with architectural drawings.

.4 Electrical boxes are shown on drawings in approximate locations unless dimensioned. Adjust box location up to 3 m (10 ft.) if required to accommodate intended purpose.

.5 Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

.6 Maintain headroom and present neat mechanical appearance.

.7 Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

.8 Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 150 mm (6 inches) from ceiling access panel or from removable recessed luminaire.

.9 Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

.10 Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

.11 Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.

.12 Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

.13 Use flush mounting outlet box in finished areas.

.14 Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

.15 Do not install flush mounting box back-to-back in walls; provide minimum 150 mm (6 inches) separation. Provide minimum 600 mm (24 inches) separation in acoustic rated walls.

.16 Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

.17 Use stamped steel bridges to fasten flush mounting outlet box between studs.

.18 Install flush mounting box without damaging wall insulation or reducing its effectiveness.

.19 Use in-wall boxes for wall mounted television and smart board power and communications applications.

.20 Do not install in-wall box back-to-back in walls; provide minimum 150 mm (6 inches) separation. Provide minimum 600 mm (24 inches) separation in acoustic rated walls.

.21 Secure in-wall box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

.22 Use stamped steel bridges to fasten in-wall outlet box between studs.

.23 Install in-wall mounting box without damaging wall insulation or reducing its effectiveness.

.24 Use adjustable steel channel fasteners for hung ceiling outlet box.

.25 Do not fasten boxes to ceiling support wires.

.26 Support boxes independently of conduit.

.27 Use gang box where more than one device is mounted together.

.28 The use of sectional boxes is not permitted.

.29 Use gang box with plaster ring for single device outlets.

.30 Use cast outlet box in exterior locations where exposed to the weather and wet locations.

.31 Set floor boxes level.

.32 Large Pull Boxes: Where pull boxes have a long dimension of 305 mm (12 inches) or more, use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

3.3 ADJUSTING

.1 Adjust flush-mounting outlets to make front flush with finished wall material.

.2 Install knockout closures in unused box openings.

3.4 CLEANING

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Clean interior of boxes to remove dust, debris, and other material.

.3 Clean exposed surfaces and restore finish.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Nameplates and labels.

.2 Wire markers.

.3 Conduit markers.

1.2 RELATED SECTIONS

.1 Section 09 91 10 - Painting.

1.3 REFERENCES

.1 CSA (Canadian Standards Association).

.2 ULC (Underwriters' Laboratories of Canada).

1.4 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide catalogue data for nameplates, labels, and markers.

.3 Installation Data: Provide list of all equipment requiring nameplates complete with associated nameplate configuration for review.

1.5 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA or ULC and as suitable for purpose specified and shown.

1.6 LANGUAGE

.1 All identification shall be in English.

Part 2 Products

2.1 NAMEPLATES AND LABELS

.1 Nameplates:

.1 Exterior –Stainless steel, etched and color filled with stamped product specific labelling.

.2 Interior - Engraved three-layer laminated plastic, white letters on blue background for normal power and systems, white letters on red background for life safety power and systems, and white letters on orange background for standby power and systems.

.3 Locations:

.1 Electrical distribution and motor control centres..

.1 Nameplates at individual breakers shall include:

.1 Load Name

.2 Room Location of Load

.3 Breaker Size/Poles

.2 Circuit breakers and fused switches which directly feed a single conductor cable shall include the maximum continuous load allowed:
.1 "MAXIMUM CONTINUOUS LOAD: X AMPS"
.3 Adjustable circuit breakers shall include the maximum continuous load allowed:
.1 "MAXIMUM CONTINUOUS LOAD: X AMPS"
.4 Mechanical equipment disconnect switches:
.1 Nameplate shall include:
.1 Mechanical Equipment Mark
.2 Panel Name & Circuit number
.5 Fire Alarm System Equipment
.1 Nameplate shall include:
.1 Room Number
.2 Equipment Name
.3 Fed From:
.1 Room Number.
.2 Panel Name and Circuit Number
.6 Fire Alarm Equipment Branch Circuit Breakers
.1 Nameplate shall indicate "FIRE ALARM PANEL" or approved wording.

.4 Letter Size:
.1 Use 6mm (1/4 inch) letters for identifying equipment mark designations and system types.
.2 Use 3mm (1/8 inch) letters for identifying supporting information.
.3 Use 6mm (1/4 inch) letters for identifying grouped equipment and loads.
.5 Nameplates on exterior equipment shall be UV & weather resistant.
.6 Wording on nameplates shall be approved prior to manufacture. Submit schedule of nameplates and wording.

.2 Labels: Plastic self-adhesive non-smear labels with 5mm (3/16 inch) black letters on white background.
.1 Locations:
.1 Wiring devices, including lighting control devices and receptacles.
.1 Label shall include:
.1 Indicate associated panel and circuit number.
.2 E.g. "A-32" (A is for Panel-A, and 32 is the circuit number)
.3 Lighting controls to include brief description of lighting being controlled.
.4 E.g. "Pendants"

2.2 WIRE MARKERS

.1 Wire Markers: Permanent tape type wire markers not susceptible to thermal or mechanical influence.

.2 Locations:

.1 Each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.
.1 Legend:

.1 Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

.2 Control Circuits: Control wire number indicated on Shop Drawings.

2.3 CONDUIT MARKERS

.1 Manufacturers:

.1 Brady; Product: BMP71 Indoor/Outdoor Vinyl Labels.

.2 Substitutions: Refer to Section 26 05 00.

.2 Description: Vinyl label.

.3 Location: Provide markers for each conduit longer than 4.7m (10ft.).

.4 Spacing: 6m (20ft.) on centre.

.5 Colour:

.1 Normal Power System: Blue

.2 Fire Alarm System: Red.

.6 Legend:

.1 600 Volt System: 600V.

.2 120/208 Volt System: 120/208V.

.3 Fire Alarm System: FIRE ALARM.

Part 3 Execution

3.1 PREPARATION

.1 Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

.1 Install nameplate and label parallel to equipment lines.

.2 Secure nameplate to equipment front using rivets or screws.

.3 Conduit shall be integrally colour coded through a colouring process applied by the conduit manufacturer.

.4 Provide identification on all junction box covers indicating associated system, panel and circuit numbering using permanent marker.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Electrical connections to equipment specified under other sections.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

.2 Section 26 05 33 - Conduit.

.3 Section 26 05 19 - Building Wire And Cable.

.4 Section 26 05 34 - Boxes.

1.3 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 127-18 - Equipment and Lead Wires.

.3 ANSI/NEMA WD 6-2016 Wiring Devices—Dimensional Specifications.

.4 NEMA WD 1-1999 (R2015) - General Colour Requirements for Wiring Devices.

.5 CSA (Canadian Standards Association).

.6 ULC (Underwriters' Laboratories of Canada).

1.4 ADMINISTRATIVE REQUIREMENTS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Coordination:

.1 Coordinate with other work having a direct bearing on work of this section.

.2 Obtain and review shop drawings, product data, and manufacturer's instructions for equipment provided under other sections.

.3 Determine connection locations and requirements.

.3 Sequencing:

.1 Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.

.2 Sequence electrical connections to coordinate with start-up schedule for equipment.

1.5 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide wiring device manufacturer's catalogue information showing dimensions, configurations, and construction.

1.6 SUBMITTALS FOR INFORMATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Installation Data: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions

for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.7 REGULATORY REQUIREMENTS

.1 Products: Listed and classified by CSA or ULC, and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 MECHANICAL CONNECTIONS

.1 Include motor starters, disconnects, conduit, wire, fittings, interlocks, outlet boxes, junction boxes, and all associated equipment required to provide power wiring for mechanical equipment, unless otherwise indicated.

.2 Include pushbutton stations, motor protective switches, interlocks, conduit, wire, devices, and fittings required to provide control wiring for mechanical equipment, except for temperature/humidity control systems.

.3 All equipment, mounted on the exterior of the building, shall be weatherproof.

2.2 CORDS AND CAPS

.1 Attachment Plug Construction: Conform to NEMA WD 1.

.2 Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.

.3 Cord Construction: NFPA 70, Type SJO, multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

.4 Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit over-current protection.

2.3 AUTOMATIC DOOR OPERATORS

.1 Power: Wire and connect motorized door operators as indicated.

.2 Controls: Wire and connect all associated controls including but not limited to entry pushbuttons, vertical kick bars, motion sensors, electric strikes, electric locks, key switches etc. Confirm controls requirements with automatic door shop drawings and automatic door subcontractor.

.3 Interface with Other Systems: Interface with access control system and intrusion alarm system as indicated. Coordinate sequencing of door operators with other systems to Contract Administrator's requirements.

.4 Execution: Coordinate complete installation with automatic door shop drawings and automatic door subcontractor.

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 ELECTRICAL CONNECTIONS

.1 Make electrical connections to equipment manufacturer's written instructions.

.2 Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.

.3 Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.

.4 Provide receptacle outlet where connection with attachment plug is indicated or as required. Provide cord and cap where field-supplied attachment plug is indicated or as required.

.5 Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

.6 Install disconnect switches, controllers, control stations, and control devices as indicated or as required by the manufacturer of the associated equipment.

.7 Modify equipment control wiring with terminal block jumpers as indicated or as required.

.8 Provide interconnecting conduit and wiring between devices and equipment where indicated or as required.

.9 Mechanical Equipment:

- .1 Power Wiring
  - .1 Install power feeders, starters, disconnects, and associated equipment and make connections to all mechanical equipment.
  - .2 Install branch circuit wiring for mechanical system control panels, time clocks, and control transformers.
  - .3 Flexible connections to motors shall not exceed 6 feet (1.83 m), unless approved by Contract Administrator.
- .2 Controls
  - .1 Install all electrical controls as indicated on the drawing schedules.
  - .2 Wire and connect line voltage remote thermostats for unit heaters, electric heaters and rooftop units.
- .3 Disconnects
  - .1 Disconnects shall be mounted independently from the equipment that it’s serving.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Receptacles.

.2 Device plates and decorative box covers.

1.2 RELATED SECTIONS

.1 Section 26 05 34 - Boxes.

1.3 REFERENCES

.1 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.2 CSA C22.2 No. 42-10 (R2015) - General Use Receptacles, Attachment Plugs, and Similar Wiring Devices

.3 CSA C22.2 No. 42.1-13 (R2017) - Cover Plates for Flush-Mounted Wiring Devices.

.4 CSA C22.2 No. 55-15 - Special use switches.

.5 CAN/CSA C22.2 No. 111-18 - General-Use Snap Switches.

.6 CSA C22.2 No. 184-15 - Solid-State Lighting Controls.

.7 CSA (Canadian Standards Association).

.8 ULC (Underwriters' Laboratories of Canada).

1.4 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Product Data: Provide manufacturer's catalogue information showing dimensions, colours, and configurations.

1.5 SUBMITTALS FOR INFORMATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Installation Data: Submit manufacturer's installation instructions.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Extra Stock Materials:

.1 Provide two (2) of each style, size, and finish wall plate.

1.7 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

1.8 REGULATORY REQUIREMENTS

.1 Provide products listed and classified by CSA and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 RECEPTACLES

.1 Manufacturers:

.1 Leviton
.2 Hubbell
.3 Cooper
.4 Legrand
.5 Substitutions: Refer to Section 01 62 00.

.2 General-duty duplex convenience receptacle:

.1 Grade: Commercial Specification Grade Nema WD-6 Compliant, CSA-C22.2 No.42.
.2 Style: Standard.
.3 Device Body: Smooth ivory nylon face and base.
.4 CSA Configuration: Type as specified and indicated.
.5 Tamper resistant as indicated or as per Electrical Code.

.3 Suitable for No. 10 AWG for back and side wiring.

.4 Break-off links for use as split receptacles.

.5 Double wipe contacts and riveted grounding contacts.

.6 Receptacles shall be of one manufacturer throughout the project.

2.2 WALL PLATES

.1 Nylon Cover Plate: Impact resistant unbreakable nylon with reinforcing ribs. Style and colour shall match wiring device. Combination or multi-gang covers as required or indicated. Jumbo or standard size as indicated or specified.

.2 Standard Stainless Steel Cover Plate: 430 type stainless steel cover plate complete with protective plastic film. Combination or multi-gang covers as required or indicated. Jumbo or standard size as indicated or specified.

.3 Metallic While-in-Use covers: Nema 3R rated, die-cast aluminum construction with powder coated “chip resistant” paint corrosion protection and plug/cord management, suitable for horizontal mounting on device box only, and padlock provision.

.4 Weatherproof Cover Plate: Gasketed cast metal with gasketed double hinged device covers suitable for horizontal mounting on device box only. Provide single hinged device cover for GFI type receptacle only.

.5 Exposed boxes and covers to be painted or ordered to match new paint colour on existing structural steel and steel deck. (‘white’) Submit to Contract Administrator for written approval prior to ordering or painting.

Part 3 Execution

3.1 EXAMINATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Verify that outlet boxes are installed at proper height.

.3 Verify that wall openings are neatly cut and will be completely covered by wall plates.

.4 Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

.1 Provide extension rings to bring outlet boxes flush with finished surface.

.2 Clean debris from outlet boxes.

3.3 INSTALLATION

.1 Install to CSA-C22.1 and to manufacturer's written instructions.

.2 Install devices plumb and level.

.3 Install receptacles with grounding pole on bottom.

.4 Use exterior use receptacles for exterior applications unless noted otherwise.

.5 Connect wiring device grounding terminal to branch circuit equipment grounding conductor and outlet box.

.6 Install decorative plates on switch, receptacle, and blank outlets in finished areas.

.7 Use jumbo size plates for outlets installed in masonry walls.

.8 Stainless steel protective coverings shall be maintained until project completion and turn-over to Contract Administrator.

.9 Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

.10 Use weatherproof covers for parking receptacles, and dust-tight applications only, or as indicated.

3.4 INTERFACE WITH OTHER PRODUCTS

.1 Coordinate locations of outlet boxes provided under Section 26 05 34 to obtain mounting heights specified and as indicated on drawings.

3.5 FIELD QUALITY CONTROL

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Inspect each wiring device for defects.

.3 Verify that each receptacle device is energized.

.4 Test each receptacle device for proper polarity.

3.6 ADJUSTING

.1 Adjust devices and wall plates to be flush and level.

3.7 CLEANING

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Luminaires.

.2 LED luminaires and drivers.

.3 Luminaire accessories.

1.2 RELATED SECTIONS

.1 Section 23 82 00 - Terminal Heat Transfer Units: Air distribution accessories for air handling luminaires.

1.3 REFERENCES

.1 ANSI/NEMA C78.379-2006 - American National Standard for Electric Lamps - Classification of the Beam Patterns of Reflector Lamps.

.2 CSA-C22.1-18 - Canadian Electrical Code, Part I (24th Edition), Safety Standard for Electrical Installations.

.3 CSA-C22.2 No. 9.0-96 (R2006) - General Requirements for Luminaires.

.4 CSA-C22.2 No. 250.0-08 - Luminaires.

.5 CSA-C22.2 No. 141-15 - Emergency lighting equipment.

.6 NEMA WD 6-2002 (R2008) - Wiring Devices - Dimensional Requirements.

.7 CSA (Canadian Standards Association).

.8 ULC (Underwriters' Laboratories of Canada).

1.4 SUBMITTALS FOR REVIEW

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

.3 Product Data: Provide dimensions, ratings, and performance data.

1.5 SUBMITTALS FOR INFORMATION

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Installation Data: Submit data indicating application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.6 CLOSEOUT SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Operation and Maintenance Data: Submit manufacturer's operation and maintenance instructions for each product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Extra Stock Materials:

.1 Provide two (2) of each plastic lens type.

1.8 QUALITY ASSURANCE

.1 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five (5) years documented experience.

.2 Conform to requirements of CSA C22.1, and to the Manitoba Hydro Power Smart Commercial Lighting Program.

.3 Products: Listed and classified by CSA, and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 LUMINAIRES

.1 Manufacturers:

.1 Refer to Luminaire Schedule on drawings.

.2 Substitutions: Refer to Section 26 05 00 Common Work Results for Electrical.

.1 All requests for substitutions shall be complete with photometric layouts indicating proposed luminaire performance in a 1' by 1' grid.

2.2 LED LUMINAIRES AND DRIVERS

.1 All Luminaires

.1 Comply with IES LM-79-08 Approved Method for measuring lumen maintenance of LED light sources.

.2 Comply with IES LM-80-08 Approved Method for electrical and photometric measurement of SSL product.

.3 LED's shall be Restriction of Hazardous Substances Directive (RoHS) compliant.

.4 LED arrays shall be sealed, high performance, long life type; minimum 70% rated output at 50,000 hours.

.5 LED luminaires shall deliver a minimum of 60 lumens per watt.

.1 LED's shall be "Bin No. 1" quality.

.6 Drivers shall be solid state and accept 120 through 277 VAC at 60 Hz input.

.7 The LED light source shall be fully dimmable with use of compatible dimmers switch designated for low voltage loads.

.8 LED color temperatures: CRI 85, 2700K as noted +/- 145K.

.9 LED color temperatures: CRI 85, 4000K as noted +/- 275K.

.10 LED color temperatures: CRI 85, 5000K as noted +/-283K.

.11 Luminaires shall have internal thermal protection.

.12 Luminaires shall not draw power in the off state. Luminaires with integral occupancy, motion, photo-controls, or individually addressable luminaires with external control and intelligence are exempt from this requirement. The power draw for such luminaires shall not exceed 0.5 watts when in the off state.

.13 Color spatial uniformity shall be within .004 of CIE 1976 diagram.

.14 Color maintenance over rated life shall be within .007 of CIE 1976.

.15 Indoor luminaires shall have a minimum CRI of 85.

.16 Luminaire manufacturers shall adhere to device manufacturer guidelines, certification programs, and test procedures for thermal management

.17 LED package(s)/module(s)/array(s) used in qualified luminaires shall deliver a minimum 70% of initial lumens, when installed in-situ, for a minimum of 50,000 hours.

.18 Luminaires shall be fully accessible from below ceiling plane for changing drivers, power supplies and arrays.

.2 Power Supplies and Drivers

.1 Power Factor: 0.90 or higher

.2 Maximum driver case temperature not to exceed driver manufacturer recommended in-situ operation.

.3 Output operating frequency: 60Hz.

.4 Interference: EMI and RFI compliant with FCC 47 CFR Part 15.

.5 Total Harmonic Distortion Rating: 20% Maximum.

.6 Meet electrical and thermal conditions as described in LM-80 Section 5.0.

.7 Primary Current: Confirm primary current with Drawings.

.8 Secondary Current: Confirm secondary current specified by individual luminaire manufacturers.

.9 Compatibility: Certified by manufacturer for use with individually specified luminaire and individually specified control components.

.10 Solid-state control components to be integral or external per each specified luminaire. Remote control gear to be enclosed in Class 1, Class 2, or NEMA 3R enclosures as required.

2.3 ACCESSORIES

.1 Description: Standard down light reflector shall be semi-specular unless noted otherwise.

.2 Joiner Fittings: As specified for linear lighting systems, or as required for end to end continuous row mounting as indicated on drawings. Fittings to match style and finish of luminaire specified.

.3 End Caps: As specified for linear lighting systems, or as required for end of row or stand-alone luminaire installations as indicated on drawings. End caps to match style and finish of luminaire specified.

.4 Power Cord: As required for suspended lighting systems where wiring is exposed between fixture canopy and fixture lamp assembly. Power cord shall match finish of lighting fixture. Provide 0-10V combination cable as required for dimming purposes. Length of cable shall be suitable for minimum suspension length of 4’-0” from ceiling finish. Confirm final lengths with installation requirements.

2.4 SOURCE QUALITY CONTROL

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Certify fluorescent ballast design and construction by Certified Ballast Manufacturers, Inc.

Part 3 Execution

3.1 INSTALLATION

.1 Support luminaires larger than 600 x 1200mm (24 x 48 inch) size independent of ceiling framing.

.2 Locate recessed ceiling luminaires as indicated on reflected ceiling plan.

.3 Install surface mounted luminaires, plumb and adjust to align with building lines and with each other. Secure to prevent movement.

.4 Exposed Grid Ceilings: Fasten surface mounted luminaires to ceiling grid members using bolts, screws, or suitable clips.

.5 Install recessed luminaires to permit removal from below.

.6 Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

.7 Install clips to secure recessed grid-supported luminaires in place.

.8 Install end to end, or continuous rows of luminaires with appropriate joiner fittings to match the luminaire manufacturer and finish.

.9 Install linear lighting with appropriate end caps where practicable.

.10 Lighting installed in corridors shall be oriented to maximize light distribution along the corridor rather than across it.

.11 Install accessories provided with each luminaire.

.12 Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

.13 Bond products and metal accessories to branch circuit equipment grounding conductor.

.14 Install specified lamps in each luminaire, emergency lighting unit and exit sign.

3.2 FIELD QUALITY CONTROL

.1 Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.3 ADJUSTING

.1 Aim and adjust luminaires as directed.

3.4 CLEANING

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Clean electrical parts to remove conductive and deleterious materials.

.3 Remove dirt and debris from enclosures.

.4 Clean photometric control surfaces as recommended by manufacturer.

.5 Clean finishes and touch up damage.

3.5 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate luminaire operation for minimum of one (1) hours.

3.6 PROTECTION OF FINISHED WORK

.1 Refer to 26 05 00 Common Work Results for Electrical.

.2 Re-lamp luminaires that have failed lamps and at Substantial Completion.

3.7 SCHEDULES

.1 As per drawings.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Electric unit heaters.

1.2 SUBMITTALS FOR REVIEW

.1 According to Section 21 05 00 – Common Work For Mechanical.

.2 Product Data: Provide unit size, finish, and performance data.

1.3 CLOSEOUT SUBMITTALS

.1 According to Section 21 05 00 – Common Work For Mechanical.

.2 Operation and Maintenance Data:

.1 Include instructions for safe operating procedures.

.2 Include instructions for replacement parts and troubleshooting diagnostics.

Part 2 Products

2.1 ELECTRIC UNIT HEATERS (UH-#)

.1 Ceiling surface mounted electric resistance heater with down flow discharge fan. Totally enclosed and lifetime-lubricated ball bearing motor. Stainless steel tubular heating elements with aluminum fins. Painted steel enclosure with integrated supply and return air grilles.

.2 Manufacturer / Model: Ouellet ODSA05008

.1 Substitutions according to Section 21 05 00 – Common Work For Mechanical.

.3 Minimum Heating Capacity: 5000 W

.4 Airflow: 310 cfm

.5 Control:

.1 Low voltage 24 V contact

.2 Activated by call for Stage 2 Heating on PTAC thermostat (24V).
See Section 23 73 13 – Air Conditioning Units – Packaged Terminal.

.3 Integrated fan delay to purge heater of residual heat

.6 Electrical Requirements: 5000 W, 208 V, 60 Hz, 1 ph

.7 Colour: white

Part 3 Execution

3.1 EXAMINATION

.1 Verify existing ceiling surface conditions before starting work.

.2 Verify that field conditions are acceptable and are ready to receive work.

.3 Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

.1 Install according to manufacturer's written instructions.

.1 Use manufacturer provided ceiling mounting bracket.

.2 Locate each unit in position indicated.

.3 Install unit with sufficient clearance from adjacent construction, piping, ductwork, and other obstructions to allow access for service and maintenance.

.4 Support unit heaters from structure using construction details shown on Drawings.

.5 Label mechanical equipment according to Section 23 05 53 – Mechanical Identification.

3.3 FIELD QUALITY CONTROL

.1 Verify operation of each electric heating unit by measuring input voltage and current simultaneously for period of ten minutes of continuous operation.

3.4 COMMISSIONING

.1 Submit commission forms for electric unit heaters to Contract Administrator for review and approval prior to the start of commissioning. Forms to include static verification, start-up, and functional performance testing tasks.

.2 Commissioning to be performed by Contractor and witnessed by Contract Administrator.

.3 Submit one completed electric unit heaters commissioning form for each electric unit heater installed. Sign and date each commissioning form. Include completed commissioning forms in O&M Manual.

3.5 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate location of circuit breakers and switches serving electric heating branch circuits, and location and setting procedures for thermostats and other heating controls.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 Fire alarm initiating and signaling devices.

.2 Auxiliary fire alarm equipment and wiring.

1.2 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical

.2 Section 26 05 19 - Building Wire and Cable.

1.3 REFERENCES

.1 The latest version of the following including all amendments:

.1 CAN/ULC S524 - Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC S525 - Audible Signal Devices for Fire Alarm Systems, Including Accessories.

.3 CAN/ULC S526 - Visible Signal Devices for Fire Alarm Systems.

.4 CAN/ULC S529 - Smoke Detectors for Fire Alarm Systems.

.5 CAN/ULC S536 - Inspection and Testing of Fire Alarm Systems.

.6 CAN/ULC-S537 - Standard for Verification of Fire Alarm Systems.

.7 CAN/ULC S541 - Speakers for Fire Alarm Systems, Including Accessories.

.8 ULC ORD-C386-1990 - Flame Detectors.

1.4 SYSTEM DESCRIPTION

.1 Fire Alarm System:

.1 Existing Mircom fire alarm system for 155 Carlton St

.2 Existing Notifier fire alarm system for RBC Convention Centre

.2 The fire alarm system shall carry out fire alarm and protection functions consisting of receiving alarm signals, initiating alarm and trouble sequences, continuous supervision of fire alarm components and wiring, actuation of annunciators and auxiliary functions and signals to remote monitoring agency.

.3 Fire alarm system shall be modular in design complete with 15% spare capacity to allow for future system expansion

.4 The fire alarm system shall include, but not be limited to the following:

.1 Control panel

.2 Trouble signal devices

.3 Power supplies and booster facilities

.4 Manual alarm stations

.5 Automatic alarm initiating devices

.6 Audible and visual signal devices

.7 End-of-line devices

.8 Annunciators

.9 Ancillary devices

.10 Input and output modules

.11 Isolator modules

1.5 SUBMITTALS FOR REVIEW

.1 Section 01 33 00: Submission procedures.

.2 Product Data: Provide electrical characteristics and connection requirements.

.3 Shop Drawings:

.1 Provide system wiring diagram showing each device and wiring connection required.

.1 Wiring diagram shall be specific to the project and shall meet manufacturer's recommendations and required building codes and standards.

1.6 SUBMITTALS FOR INFORMATION

.1 Section 01 33 00: Submission procedures.

.2 Test Reports: Indicate satisfactory completion of required tests and inspections.

.3 Installation Data: Manufacturer's special installation requirements.

.1 Indicate application conditions and limitations of use stipulated by Product testing agency.

.2 Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

1.7 CLOSEOUT SUBMITTALS

.1 Section 01 78 10: Submission procedures.

.2 Maintenance Contracts: Provide service and maintenance of fire alarm system for one (1) year from Date of Substantial Completion.

.3 Operation Data: Operating instructions.

.4 Maintenance Data: Maintenance and repair procedures.

.5 Record Documentation: Record actual locations of initiating devices, signaling appliances, and end-of-line devices. Include zone number and device number for each device installed. Include circuit number for signalling appliances.

.6 Test reports from CAN/ULC S536 and CAN/ULC-S537 verification testing.

1.8 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Stock Materials:

.1 Provide six (6) keys of each type.

.2 Provide three (3) of the following devices:

.1 Ceiling mounted smoke detector

.2 Ceiling mounted combination horn/strobe, standard cd rating

1.9 QUALITY ASSURANCE

.1 Design and install fire alarm system to CAN/ULC S524.

.2 Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum fifteen (15) years documented experience and with service facilities within 160 km (100 miles) of Project.

1.10 REGULATORY REQUIREMENTS

.1 Products Requiring Electrical Connection: Listed and classified by ULC and as suitable for the purpose specified and indicated.

Part 2 Products

2.1 MANUFACTURERS

.1 All new devices shall be compatible with existing fire alarm systems

.1 Mircom for devices located in South Walkway.

.2 Notifier for devices located in North Walkway.

.2 Substitutions: Refer to Section 01 62 00.

2.2 AUTOMATIC INITIATING DEVICES

.1 Ceiling Mounted Smoke Detector: Addressable photoelectric type with adjustable sensitivity with inter-changeable plug-in base and loop polling LED (Green). LED shall provide (Red) visual indication of detector actuation. Provide auxiliary relay contact as indicated. Provide sounder bases as indicated. Smoke detector shall be equal to Notifier FSP-851A.

2.3 SIGNAL LINE ISOLATOR MODULES

.1 Fully addressable isolator modules on a Class A initiating or notification device loop to suit CAN/ULC S524 and CAN/ULC S537.

2.4 SIGNALING APPLIANCES

.1 Alarm Horns and Strobes: The signalling device shall be 2-wire, and shall operate at 24VDC. Horn sound rating shall be rated at a sound level of at least 95dB at 3m (10ft). Horn tones and volume shall be field adjustable by way of integral switch. Strobe candela (cd) rating shall be field adjustable by way of integral switch. Standard strobe cd shall be field adjustable from 15 – 115cd. High cd strobes shall be field adjustable from 135 – 185cd. Provide ceiling or wall mounted, standard or high cd, indoor or outdoor units as indicated. All devices shall be red in color with exception to residential dwelling units, which will be white. Alarm horns and strobes shall be equal to Notifier SpectrAlert Advance series.

2.5 END-OF-LINE DEVICES

.1 End-of-line devices shall control supervisory current where required, and sized to ensure correct supervisory current for each circuit. Open, short or ground fault in any circuit will alter supervisory current in that circuit, initiating an alarm or trouble condition.

2.6 FIRE ALARM WIRE AND CABLE

.1 Fire Alarm Power Branch Circuits: Building wire as specified in Section 26 05 19.

.2 Initiating Device and Indicating Appliance Circuits:

.1 Description: Type FAS solid conductor, complete with red tinted interlocking armour as required

.2 Conductor: Copper unless otherwise noted.

.3 Insulation Voltage Rating: 300 volts.

.4 Insulation: Coded PVC insulation and with overall red PVC jacket in accordance with the Canadian Electrical Code, rated 105 degrees C. Use shielded cable as per manufacturer’s recommendations only.

.3 To initiating circuits: 18 AWG minimum, and in accordance with manufacturer's requirements.

.4 To audible signal circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

.5 To visual signal circuits: 12 AWG minimum, and in accordance with manufacturer's requirements.

.6 Wiring shall be as per manufacturer's recommendations. All wiring shall be in conduit unless noted otherwise. All wiring shall be armoured securex unless noted otherwise.

Part 3 Execution

3.1 INSTALLATION

.1 Install products to manufacturer's written instructions and CAN/ULC S524, local and national codes, as indicated, and as recommended by the manufacturer.

.2 All initiating and signalling devices, control panels and remote annunciators shall be flush mounted unless indicated otherwise.

.3 Install devices at heights indicated in Section 26 05 00.

.4 Locate detectors minimum 0.45m (18") from air discharge or return grille as measured from the edge of the detector, and not closer than 300 mm (12") to lighting fixtures.

.5 Locate ceiling mounted detectors minimum 100mm (4") from edge of ceiling where it meets the wall as measured from the edge of the detector.

.6 Detectors shall be located such that a clear space of 450mm is maintained between the detector and any obstructions except where ceiling mounted obstructions protrude less than 100 mm (4") from the ceiling.

.7 In areas without finished ceilings, mount detectors at underside of deck above unless otherwise indicated.

.8 Mount end-of-line devices in separate box adjacent to last device in circuit.

.9 Mount outlet box for electric door holder to withstand 36 kg (80 lbs) pulling force.

.10 Make conduit and wiring connections to duct smoke detectors, sprinkler valve tamper and flow switches, fire suppression system control panels, door release devices, smoke control fans and equipment.

.11 Circuiting for fire alarm devices shall be as follows:

.1 Provide Class "A" addressable initiating/alarm circuits throughout unless indicated otherwise.

.2 Provide Class "B" audible/visual signal circuits for signal circuits throughout unless indicated otherwise.

.3 Circuits shall have a minimum 15% spare capacity for future system expansion.

.4 All SLC, signal and power riser wiring shall be supervised, including internal wiring between modules.

.12 Where wiring is required to be surface mounted within finished areas, wiring shall be installed in a single piece metal raceway unless noted otherwise. Color of raceway shall be white unless noted otherwise.

.13 Where devices are surface mounted in finished areas, provide a surface mounted metal raceway device box. Color of box shall match the device.

.14 Branch circuit breakers supplying fire alarm equipment shall be lockable in the "ON" position. A red lamacoid nameplate shall be affixed on the electrical panel adjacent the associated circuit breaker indicating "FIRE ALARM PANEL" or other approved wording.

.15 Programming of room names and numbers shall match Contract Administrator's name and numbering scheme.

3.2 WIRING METHODS

.1 Concealed Dry Interior Locations: Use FAS wire in raceway for all main runs. Armoured Securex for individual device drops only.

.2 Exposed Dry Interior Locations: Use only FAS wire in raceway.

.3 Above Accessible Ceilings: Use FAS wire in raceway for all main runs. Armoured Securex for individual device drops only.

.4 Wet or Damp Interior Locations: Use only FAS wire in raceway.

3.3 INTERCONNECTIONS

.1 Interconnect with all systems and devices as identified on the drawings.

3.4 FIELD QUALITY CONTROL

.1 Section 01 45 00: Field inspection and testing.

.2 Test to CAN/ULC S536 and CAN/ULC-S537 and local inspection authority requirements.

.3 Include services to re-test system one (1) month prior to completion of warranty.

3.5 MANUFACTURER'S FIELD SERVICES

.1 Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.6 CLOSEOUT ACTIVITIES

.1 Demonstration: Demonstrate normal and abnormal modes of operation, and required responses to each.

END OF SECTION