CFIA OLF Building 201

3851 FALLOWFIELD RD. NEPEAN, ONTARIO

AUDITORIUM, BREAK AREAS & C-WING MILLWORK

GRC Project #1217

Issued for Tender

September 29, 2017

LIST OF SPECIFICATIONS

Pages

END OF TABLE

Part 1 General

1.1 TAXES

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

1.2 FEES, PERMITS and CERTIFICATES

.1 Pay all fees and obtain all permits except for the building permit. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

1.3 REGULATORY REQUIREMENTS

.1 References and Codes:

.1 Materials shall be new and work shall conform to the minimum applicable standards of the “References” indicated in the specification sections, the National Building Code of Canada 2015 (NBC) and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.

.2 Building Smoking Environment:

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

.3 Hazardous Material Discovery:

.1 Stop work immediately when material resembling spray or trowel-applied asbestos, Polychlorinated Biphenyl (PCB), mould or other designated substance, hazardous substance is encountered during demolition work.

.1 Take preventative measure and promptly notify Consultant.

.2 Do not proceed until written instructions have been received from Consultant.

1.4 FIRE SAFETY REQUIREMENTS

.1 Comply with both the National Building Code of Canada 2015 and the National Fire Code of Canada 2015 for safety of persons in buildings in the event of a fire and the protection of buildings from the effects of fire, as follows;

.1 The National Building Code (NBC): for fire safety and fire protection features that are required to be incorporated in a building during construction.

.2 The National Fire Code (NFC):

.1 The on-going maintenance and use of the fire safety and fire protection features incorporated in buildings.

.2 The conduct of activities that might cause fire hazards in and around buildings.

.3 Limitations on hazardous contents in and around buildings.

.4 The establishment of fire safety plans.

.5 Fire safety at construction and demolition sites.

.2 Welding and cutting:

.1 At least one week prior to commencing cutting, welding or soldering procedure, provide to Consultant:

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

.2 Completed welding permit as defined in NFC.

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

.2 “Fire Watchers” as described in NFC shall be assigned when welding or cutting operations are carried out in areas where combustible materials within 15m may be ignited by conduction or radiation.

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

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

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

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

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

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

1.5 HOT WORK PERMIT

.1 Hot work means any work where a flame is used or a source of ignition may be produced, i.e., riveting, welding, cutting, grinding, burning and heating.

.2 Before the beginning of work, the Contractor must have applied for and received A "Hot Work Permit" from CFIA.

1.6 EXAMINATION and PREPARATION

.1 Examine site and conditions likely to affect work and be familiar and conversant with existing conditions.

.2 Before commencing work, establish location and extent of services lines in area of work and notify Consultant of findings.

1.7 WASTE MANAGEMENT

.1 Comply with Environmental Protection Act, Ontario Regulations: O. Reg. 102/94 – Waste Audits and Waste Reduction Work Plans; and O. Reg. 103/94 – Industrial, Commercial and Institutional Source Separation Programs; for waste management on construction and demolition projects.

.2 Conduct "waste audit" to determine what waste will be generated during construction and demolition operations. Prepare written "waste reduction work plan" and implement the principles to reduce, reuse and recycle materials to the extent that is possible.

.3 Provide a "source separation program" to disassemble and collect in an orderly fashion the following "materials designated for alternative disposal" from the "general waste" stream:

.1 brick and concrete;

.2 cardboard;

.3 gypsum board;

.4 steel; and

.5 wood (not including painted, treated or laminated wood).

.4 Submit complete records of all removals from site for both "materials designated for alternative disposal" and "general waste" including:

.1 time and date of removal;

.2 description of material and quantities; and

.3 proof that materials have been received at an approved Waste Processing Site or certified Waste Disposal Site as required.

1.8 CLOSEOUT SUBMITTALS

.1 Operational and Maintenance Manuals:

.1 Submit to Consultant four (4) copies of approved Operations Data and Maintenance Manual in both official languages, compiled as follows:

.1 Bind data in vinyl hard cover 3 "D" ring type loose-leaf binders for 212 x 275mm size paper. Binders must not exceed 75mm thick or be more than 2/3 full.

.2 Enclose title sheet labelled "Operation Data and Maintenance Manual," project name, date and list of contents. Project name must appear on binder face and spine.

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

.2 Include following information plus data specified:

.1 Maintenance instruction for finished surface and materials.

.2 Copy of hardware and paint schedules.

.3 Description: operation of the equipment and systems defining start-up, shut-down and emergency procedures, and any fixed or adjustable set points that affect the efficiency of the operation. Include nameplate information such as make, size, capacity and serial number.

.4 Maintenance: use clear drawings, diagrams or manufacturers' literature which specifically apply and detail the following:

.1 lubrication products and schedules;

.2 trouble shooting procedures;

.3 adjustment techniques; and

.4 operational checks.

.5 Suppliers' names, addresses and telephone numbers and components supplied by them must be included in this section. Components must be identified by a description and manufacturers part number.

.6 Guarantees showing:

.1 name and address of projects;

.2 guarantee commencement date (date of Interim Certificate of Completion);

.3 duration of guarantee;

.4 clear indication of what is being guaranteed and what remedial action will be taken under guarantee; and

.5 signature and seal of Guarantor.

.7 Additional material used in project listed under various Sections showing name of manufacturer and source of supply.

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

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

.2 Records:

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

.3 Guarantees and Warranties:

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

1.9 PROJECT CLEANLINESS

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

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

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

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

.5 Provide adequate ventilation during use of volatile or noxious substances. Use of

building ventilation systems is not permitted for this purpose.

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

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

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

1.10 FINAL CLEANING

.1 In preparation for acceptance of the project, on an interim or final certificate of completion, perform final cleaning.

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

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

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

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

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

.7 Clean and polish interior and exterior glass surfaces, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, mechanical and electrical fixtures and all other exposed finished Work. Replace broken, scratched or disfigured glass.

.8 Remove stains, spots, marks and dirt from exposed finished Work.

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

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

.11 Floors to be inspected by Owner prior to finishing. Finishing of accepted flooring surfaces to include, at minimum:

- .1 Clean and finish firm-surface floorings in accordance with manufacturer's instructions.
- .2 Vacuum and shampoo carpeting.
- .3 Mechanically wash tiled and epoxy surfaces.
- .4 Finishes to be completely dry prior to any foot traffic.

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

1.11 SECURITY CHECK

.1 All personnel employed on this project will be subject to security check. Obtain requisite clearance, as instructed, for each individual required to enter the premises.

.2 Personnel will be checked daily at start of work shift and given a pass, which must be worn at all times. Pass must be returned at end of work shift and personnel checked out.

1.12 SITE SAFETY TRAINING

.1 All personnel employed on this project must attend a site specific safety training program of approximately 1 hour. Coordinate with Consultant to schedule training of personnel prior to commencing work.

1.13 COST BREAKDOWN

.1 Before submitting first progress claim, submit breakdown of Contract Amount in detail as directed by Consultant and aggregating the Contract Amount. After approval by Consultant cost breakdown will be used as the basis of progress payments.

END OF SECTION

Part 1 General

1.1 WORK SEQUENCE

.1 Construct Work to accommodate Owner's continued use of premises during construction.

.2 Coordinate Progress Schedule and co-ordinate with Owner Occupancy during construction.

.3 Maintain fire access/control at all times

1.2 CONTRACTOR USE OF PREMISES

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

.1 Owner occupancy.

.2 Coordinate use of premises under direction of Consultant.

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

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

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

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

.7 Generally, carry out work during "regular hours", Monday to Friday from 07:00 to 18:00 hours.

.8 Carry out noise generating work and other work disruptive to building use and occupants during "off hours", Monday to Friday from 18:00 to 07:00 hours and on Saturdays, Sundays, and statutory holidays

.9 Provide Consultant minimum 48 hours notice for work to be carried out during "off hours"

.10 Maintain building security integrity at all times. Remove and install doors same day, ensure any security system downtime is restored before off hours.

1.3 OWNER OCCUPANCY

.1 Owner will occupy premises during entire construction period for execution of normal operations.

.2 Building entrances and exits to remain safe and operational at all times. Provide Consultant minimum 5 working days notice should any entrances or exits require interruption.

.3 Co-operate with Owner in scheduling operations to minimize conflict and to facilitate Owner usage.

1.4 ALTERATIONS, ADDITIONS OR REPAIRS TO EXISTING BUILDING

.1 Execute work with least possible interference or disturbance to occupants and normal use of premises. Arrange with Consultant to facilitate execution of work.

1.5 EXISTING SERVICES

.1 Establish location and extent of service lines in area of work before starting Work. Notify Consultant of findings.

.2 Where unknown services are encountered, immediately advise Consultant and confirm findings in writing.

.3 Provide independent temporary services for all project requirements. No building or site utilities are permitted to be used.

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

1.6 EXISTING CONDITIONS

.1 All existing surfaces and finishes, including roadways and landscaping, impacted or damaged by work must be repaired to match existing conditions.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

.1 Contractor to schedule and administer project meetings throughout the progress of the work.

.2 Contractor to prepare agenda for meetings.

.3 Contractor to distribute written notice of each meeting four days in advance of meeting date.

.4 Existing building boardroom to be used for project meetings.

.5 Contractor to preside at meetings.

.6 Contractor to record the meeting minutes. All significant proceedings and decisions will be recorded. Actions by parties will be identified.

.7 Contractor to reproduce and distribute copies of minutes within three days after meetings and transmit to meeting participants affected parties not in attendance.

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

1.2 PRECONSTRUCTION MEETING

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

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

.3 Consultant to establish time and location of meeting and notify parties concerned minimum 5 days before meeting.

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

.5 Agenda to include:

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

.2 Schedule of Work: in accordance with Section 01 32 16.06 - Construction Progress Schedule - Critical Path Method (CPM) .

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

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

.5 Delivery schedule of specified equipment.

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

1.3 PROGRESS MEETINGS

.1 During course of Work schedule progress meetings bi-weekly.

.2 Agenda to include the following:

- .1 Review, approval of minutes of previous meeting.
- .2 Review of Work progress since previous meeting.
- .3 Field observations, problems, conflicts.
- .4 Problems which impede construction schedule.
- .5 Review of off-site fabrication delivery schedules.
- .6 Corrective measures and procedures to regain projected schedule.
- .7 Revision to construction schedule.
- .8 Progress schedule, during succeeding work period.
- .9 Review submittal schedules: expedite as required.
- .10 Maintenance of quality standards.
- .11 Review proposed changes for affect on construction schedule and on completion date.
- .12 Other business.

Part 2 Products

2.1 NOT USED

Part 3 Execution

3.1 NOT USED

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Definitions:

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

.2 Bar Chart (Gantt chart): graphic display of schedule-related information. In typical bar chart, activities or other Project elements are listed down left side of chart, dates are shown across top, and activity durations are shown as date-placed horizontal bars.

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

.4 Cash Flow: projection of progress payment requests based on cash loaded construction schedule.

.5 Completion Milestones: they are firstly Substantial Completion and secondly Final Certificate.

.6 Constraint: applicable restriction or limitation, either internal or external to project, that will affect performance of Project. Factors that affect activities can be scheduled.

.7 Control: process of comparing actual performance with planned performance, analyzing variances, evaluating possible alternatives, and taking appropriate corrective action as needed.

.8 Critical Activity: any activity on a critical path.

.1 Most commonly determined by using critical path method.

.9 Critical Path: sequence of activities that determines duration of Project. Generally, it is the longest path through Project.

.1 Usually defined as those activities with float less than or equal to specified value, often zero.

.10 Critical Path Method (CPM): network analysis technique used to determine the amount of scheduling flexibility (amount of float) on various logical network paths in Project schedule network, and to determine the minimum total Project duration.

.11 Data Date: date through which project status and progress were last determined and reported for analyses, such as scheduling and performance measurements.

.12 Duration: total number of work periods (not including holidays or other non-working periods) required to complete activity or other Project element.

.1 Usually expressed as workdays or work weeks.

.13 Early Finish Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can finish, based on network logic and schedule constraints.

.1 Early finish dates can change as Project progresses and changes are made to Project plan.

.14 Early Start Date: in critical path method, earliest possible point in time on which uncompleted portions of activity (or Project) can start, based on network logic and schedule constraints.

.1 Early start dates can change as Project progresses and changes are made to Project Plan.

.15 Finish Date: point in time associated with activity's completion.

.1 Usually qualified by one of following: actual, planned, estimated, scheduled, early, late, baseline, target, or current.

.16 Float: amount of time that activity may be delayed from its early start without delaying Project finish date.

.1 This resource is available to both Owner and Contractor.

.17 Impact Analysis: schedule analysis technique that adds a modeled delay to an accepted construction schedule to determined possible outcome of that delay on project completion.

.18 Lag: modification of logical relationship that directs delay in successor activity.

.19 Late Finish Date (LF): in critical path method, latest possible point in time that activity may be completed without delaying specified milestone (usually Project finish date).

.20 Late Start Date (LS): in critical path method, latest possible point in time that activity may begin without delaying specified milestone (usually Project finish date).

.21 Lead: modification of logical relationship that allows acceleration of successor task.

.22 Logic Diagram: see Project network diagram.

.23 Master Schedule: summary-level schedule that identifies major deliverable; work breakdowns structure and key milestones.

.24 Milestone: significant point or event in Project, usually completion of major deliverable.

.25 Monitoring: capture, analysis, and reporting of Project performance, usually as compared to plan.

.26 Non-Critical Activities: activities which when delayed, do not affect specified Contract duration.

.27 Project Control System: fully computerized system utilizing commercially available software packages.

.28 Project Network Diagram: schematic display of logical relationships of Project activities.

.1 Always drawn from left to right to reflect Project chronology.

.29 Project Plan: formal, approved document used to guide both Project execution and Project control.

.1 Primary uses of Project plan are to document planning assumptions and decisions, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines.

.2 Project plan may be summary or detailed.

.30 Project Planning: development and maintenance of Project Plan.

.31 Project Planning, Monitoring and Control System: overall system operated to enable monitoring of Project Work in relation to established milestones.

.32 Project Schedule: planned dates for performing activities and planned dates for meeting milestones.

.33 Quantified days duration: working days based on 5 day work week, discounting statutory holidays.

.34 Risk: uncertain event or condition that, if it occurs, has positive or negative effect on Project's objectives.

.35 Start Date: point in time associated with activity's start, usually qualified by one of following: actual, planned, estimated, scheduled, early, late, target, baseline, or current.

.36 Work Breakdown Structure (WBS): deliverable-oriented hierarchical decomposition of Work to be executed by contractor to accomplish project objectives and create required deliverables. It organizes and defines total scope of Project. Each descending level represents an increasingly detailed definition of Project Work. WBS is decomposed into Work packages.

1.2 ADMINISTRATIVE REQUIREMENTS

.1 Project Meeting:

.1 Meet with Consultant within 10 working days of Award of Contract date, to establish Work requirements and approach to project construction operations.

.2 Participate in regular project progress meetings with Consultant specifically intended to discuss update of detailed schedule and contract changes.

.2 Scheduling:

.1 Planning: ensure that planning process is iterative and results in generally top-down processing with more detail being developed as planning progresses, and decisions concerning options and alternatives are made.

.2 Ensure project schedule efficiencies through monitoring of Project in detail to ensure integrity of Critical Path, by comparing actual completions of individual activities with their scheduled completions, and review progress of activities that has started but are not yet completed..

.3 Monitor sufficiently often so that causes of delays can immediately be identified and removed.

.3 Project monitoring and reporting:

.1 Keep team aware of changes to schedule, and possible consequences as project progresses.

.2 Use narrative reports to provide advice on seriousness of difficulties and measures to overcome them.

.3 Begin narrative reporting with statement on general status of Project followed by summarization of delays, potential problems, corrective measures and Project status criticality.

.4 Critical Path Method (CPM) Requirements:

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

.2 Revise Master Schedule and Detail Schedule deemed impractical by Consultant and resubmit for approval.

.3 Change to Contract Duration:

.1 Acceptance of Master Schedule and Detail Schedule showing scheduled Contract duration shorter than specified Contract duration does not constitute change to Contract.

.2 Duration of Contract may only be changed through bilateral Agreement.

.4 Consider Master Schedule and Detail Schedule deemed practical by Consultant, showing Work completed in less than specified Contract duration, to have float.

.5 First Milestone on Master Schedule and Detail Schedule will identify start Milestone with an "ES" constraint date equal to Award of Contract date.

.6 Calculate dates for completion milestones from Plan and Schedule using specified time periods for Contract.

.7 Interim Certificate with "LF" constraint equal to calculated date.

.8 Calculations on updates to be such that if early finish of Interim Certificate falls later than specified Contract duration then float calculation to reflect negative float.

.9 Delays to non-critical activities, those with float may not be basis for time extension.

.10 Do not use float suppression techniques such as imposed dates other than required by Contract.

.11 Allow for and show Master Plan and Detail Schedule adverse weather conditions normally anticipated.

.1 Specified Contract duration has been predicated assuming normal amount of adverse weather conditions.

.12 Provide necessary crews and manpower to meet schedule requirements for performing Work within specified Contract duration.

.1 Simultaneous use of multiple crews on multiple fronts on multiple critical paths may be required.

.13 Arrange participation on and off site of subcontractors and suppliers, as required by Consultant, for purpose of network planning, scheduling, updating and progress monitoring.

.1 Approvals by Consultant of original networks and revisions do not relieve Contractor from duties and responsibilities required by Contract.

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

1.3 SUBMITTALS

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

.2 Submit to Consultant Project Control System for planning, scheduling, monitoring and reporting of project progress.

.3 Submit Project Control System to Consultant for approval.

.4 Include costs for execution, preparation and reproduction of schedule submittals in bid documents.

.5 Submit letter ensuring that schedule has been prepared in co-ordination with major sub-contractors.

.6 Refer to article "PROGRESS MONITORING AND REPORTING" of this specification Section for frequency of Project control system submittals.

.7 Submit impact analysis of schedule for changes that result in extension of contract duration.

.1 Include draft schedule update and report as outlined in article "PROGRESS MONITORING AND REPORTING".

.8 Submit Project planning, monitoring and control system data as part of initial schedule submission and monthly status reporting in following form.

.1 Master Schedule Bar Chart.

.2 Construction Detail schedule Bar Chart.

.3 Listing of project activities including milestones and logical connectors, networks (sub-networks) from Project start to end. Sort activities by activity identification number and accompany with descriptions. List early and late start and finish dates together with durations, codes and float.

.4 Criticality report listing activities and milestones with zero total float used as first sort for ready identification of critical paths through entire project. List early and late starts and finishes dates, together with durations, codes and float for critical activities.

.5 Progress report in early start sequence, listing for each trade, activities or finished within 2 months from monthly update date. List activity identification number, description and duration. Provide columns for entry of actual start and finish dates, duration remaining and remarks concerning action required.

1.4 QUALITY ASSURANCE

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

1.5 WORK BREAKDOWN STRUCTURE (WBS)

.1 Prepare construction Work Breakdown Structure (WBS) within 15 working days of Award of Contract date.

.1 Develop WBS through at least five levels: project, stage, element, sub-element and work package.

1.6 MASTER SCHEDULE

.1 Structure and base CPM construction networks system on WBS coding in order to ensure consistency throughout Project.

.2 Prepare comprehensive construction Master Schedule (CPM logic diagram) within 15 working days of finalizing Agreement to confirm validity or alternates of identified milestones.

.1 Master Schedule will be used as baseline.

.1 Revise baseline as conditions dictate and as required by Consultant.

.2 Consultant as Project progresses will review and return revised baseline within 7 work days.

.3 Reconcile revisions to Master Schedule and Cash Flow Projections with previous baseline to provide continuous audit trail.

.4 Initial and subsequent Master Schedule will include:

.1 Bar chart identifying coding, activity durations, early/late and start/finish dates, total float, completion as percentile, current status and budget amounts.

.2 Network diagram showing coding, activity sequencing (logic), total float, early/late dates, current status and durations.

1.7 DETAIL SCHEDULE

.1 Provide detailed project schedule (CPM logic diagram) within 15 working days of Award of Contract date showing activity sequencing, interdependencies and duration estimates. Include listed activities as follows:

.1 Shop drawings.

.2 Samples.

.3 Approvals.

.4 Procurement.

.5 Construction.

.6 Installation.

.7 Site works.

.8 Testing.

.9 Commissioning and acceptance.

.2 Relate Detail Schedule activities to basic activities and milestones developed and approved in Master Schedule.

.3 Clearly show sequence and interdependence of construction activities and indicate:

.1 Start and completion of all items of Work, their major components, and interim milestone completion dates.

.2 Activities for procurement, delivery, installation and completion of each major piece of equipment, materials and other supplies, including:

.1 Time for submittals, resubmittals and review.

.2 Time for fabrication and delivery of manufactured products for Work.

.3 Interdependence of procurement and construction activities.

.3 Include sufficient detail to assure adequate planning and execution of Work. Activities should generally range in duration from 3 to 15 workdays each.

.4 Provide level of detail for project activities such that sequence and interdependency of Contract tasks are demonstrated and allow co-ordination and control of project activities. Show continuous flow from left to right.

.5 Ensure activities with no float are calculated and clearly indicated on logical CPM construction network system as being, whenever possible, continuous series of activities throughout length of Project to form "Critical Path". Increased number of critical activities is seen as indication of increased risk.

.6 Insert Change Orders in appropriate and logical location of Detail Schedule. After analysis, clearly state and report to Consultant for review effects created by insertion of new Change Order.

1.8 PROGRESS MONITORING AND REPORTING

.1 On ongoing basis, Detail Schedule on job site must show "Progress to Date". Arrange participation on and off site of subcontractors and suppliers, as, and when necessary, for purpose of network planning, scheduling, updating and progress monitoring. Inspect Work with Consultant at least once monthly to establish progress on each current activity shown on applicable networks.

.2 Update and reissue project Work Breakdown Structure and relevant coding structures as project develops and changes.

.3 Perform Detail Schedule update monthly with status dated (Data Date) on last working day of month. Update to reflect activities completed to date, activities in progress, logic and duration changes.

.4 Do not automatically update actual start and finish dates by using default mechanisms found in project management software.

.5 Submit to Consultant copies of updated Detail Schedule.

.6 Requirements for monthly progress monitoring and reporting are basis for progress payment request.

.7 Submit monthly written report based on Detail Schedule, showing Work to date performed, comparing Work progress to planned, and presenting current forecasts. Report must summarize progress, defining problem areas and anticipated delays with respect to Work schedule, and critical paths. Explain alternatives for possible schedule recovery to mitigate any potential delay. Include in report:

.1 Description of progress made.

.2 Pending items and status of: shop drawings,.

.3 Status of Contract completion date and milestones.

.4 Current and anticipated problem areas, potential delays and corrective measures.

.5 Review of progress and status of Critical Path activities.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 ADMINISTRATIVE

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

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

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

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

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

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

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

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

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

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

1.2 SHOP DRAWINGS AND PRODUCT DATA

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

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

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

.4 Allow 10 days for Consultant's review of each submission.

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

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

.7 Accompany submissions with transmittal letter, in duplicate, containing:

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

.8 Submissions include:

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

.9 After Consultant's review, distribute copies.

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

.11 Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.

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

.2 Testing must have been within 8 years of date of contract award for project.

.12 Submit electronic copies of certificates for requirements requested in specification Sections and as requested by Consultant.

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

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

.13 Submit electronic copies of manufacturer’s instructions for requirements requested in specification Sections and as requested by Consultant.

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

.14 Submit electronic copies of Manufacturer's Field Reports for requirements requested in specification Sections and as requested by Consultant.

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

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

.17 Delete information not applicable to project.

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

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

.20 The review of shop drawings by the Consultant is for sole purpose of ascertaining conformance with general concept.

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

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

1.3 SAMPLES

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

.2 Deliver samples prepaid to Consultant's business address.

.3 Notify Consultant 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 Consultant are not intended to change Contract Price. If adjustments affect value of Work, state such in writing to Consultant prior to proceeding with Work.

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

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

1.4 MOCK-UPS

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

1.5 PHOTOGRAPHIC DOCUMENTATION

.1 Submit electronic colour digital photography in jpg format, fine resolution, monthly with progress statement.

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

.3 Number of viewpoints: 2 locations.

.1 Viewpoints and their location as determined by Consultant.

.4 Frequency of photographic documentation: monthly.

1.6 CERTIFICATES AND TRANSCRIPTS

.1 Immediately after award of Contract, submit Workers' Compensation Board status.

.2 Submit transcription of insurance immediately after award of Contract.

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Province of Ontario

.1 Occupational Health and Safety Act and Regulations for Construction Projects, R.S.O. 1991, as amended by O. Reg. 252/142005

1.2 SUBMITTALS

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

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

.1 Results of site specific safety hazard assessment.

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

.3 Submit 2 copies of Contractor's authorized representative's work site health and safety inspection reports to authority having jurisdiction,.

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

.5 Submit copies of incident and accident reports.

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

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

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

1.3 FILING OF NOTICE

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

.2 Contractor shall be responsible and assume the Principal Contractor role for each work zone location and not the entire complex. Contractor shall provide a written acknowledgement of this responsibility with 3 weeks of contract award.

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

1.4 SAFETY ASSESSMENT

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

1.5 SITE SPECIFIC SAFETY TRAINING

.1 All personnel must attend a mandatory site specific safety training session. Provide minimum 72 hours notice to Consultant requesting site training.

1.6 MEETINGS

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

1.7 REGULATORY REQUIREMENTS

.1 Do Work in accordance with Section 01 00 10 - General Instructions.

1.8 GENERAL REQUIREMENTS

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

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

.3 Contractor to follow all in-house safety and training procedures.

1.9 RESPONSIBILITY

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

.2 Contractor will be responsible and assume the role Constructor as described in the Ontario Occupational Health and Safety Act and Regulations for Construction Projects.

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

1.10 UNFORESEEN HAZARDS

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

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

1.11 POSTING OF DOCUMENTS

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

1.12 CORRECTION OF NON-COMPLIANCE

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

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

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

1.13 BLASTING

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

1.14 POWDER ACTUATED DEVICES

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

1.15 WORK STOPPAGE

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 INSPECTION

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

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

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

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

1.2 ACCESS TO WORK

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

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

1.3 PROCEDURES

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

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

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

1.4 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 Consultant as failing to conform to Contract Documents. Replace or re-execute in accordance with Contract Documents.

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

1.5 REPORTS

.1 Submit 4 copies of inspection and test reports to Consultant.

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

1.6 TESTS AND MIX DESIGNS

.1 Furnish test results and mix designs as requested.

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

1.7 MOCK-UPS

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

.2 Construct in locations as specified in specific Section.

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

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

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

1.8 MILL TESTS

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 WATER SUPPLY

.1 Provide own continuous supply of potable water for construction use. Site and building water services are not to be used.

.2 Make arrangements and pay to deliver any water required for construction activities.

1.3 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Site and building heating services are not to be used.

.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 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.

.5 Permanent heating system of building is not to be used.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

- .1 Conform to 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.

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

1.4 TEMPORARY POWER AND LIGHT

.1 Provide and pay for temporary power during construction for temporary lighting, operating of tools and equipment.

.2 Arrange and pay for generators or other means of power supply for all construction and work activities. Site and building electrical services are not to be used.

1.5 TEMPORARY COMMUNICATION FACILITIES

.1 Any communication facilities and services required by Contractor must be independent of the site and building communication services.

1.6 FIRE PROTECTION

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

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

.2 Scaffolding shop drawings:

.1 Provide complete scaffolding shop drawings of all building scaffolding indicating components and connectors, platforms, load capacity, attachment to existing building and imposed loads on existing structure.

.2 Shop drawings to bear seal of professional engineer licensed to practice in the province of Ontario, Canada.

1.2 INSTALLATION AND REMOVAL

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

.1 Identify areas which have to be graveled to prevent tracking of mud.

.2 Indicate use of supplemental or other staging area.

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

.3 Remove from site all such work after use.

1.3 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2 and reviewed shop drawings.

.2 Provide and maintain scaffolding.

.3 Installation and use of scaffolding must not permanently or visibly impact existing building and finishes to remain.

.4 Do not exceed structural capacity of existing building components.

1.4 HOISTING

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

.2 Hoists cranes to be operated by qualified operator.

1.5 ELEVATORS

.1 Elevators are not to be used

1.6 SITE STORAGE/LOADING

.1 Confine work and operations of employees to work staging area as indicated in contract documents. Do not encumber premises with products.

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

1.7 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt building occupants and normal building operations.

.2 Do not restrict any access lanes and fire routes on property

.3 Limit parking to North side of main parking lot at East side of building

.4 Provide and maintain adequate access to project site.

1.8 OFFICES

.1 Provide site offices of sufficient size to accommodate contractor's own needs.

.2 Restrict location of site offices to staging areas as indicated in contract documents.

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

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

1.9 EQUIPMENT, TOOL AND MATERIALS STORAGE

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

.2 Locate materials not required to be stored in weatherproof sheds on site in staging area identified in contract documents.

1.10 SANITARY FACILITIES

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

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

.3 Use of building sanitary facilities is not permitted

1.11 CONSTRUCTION SIGNAGE

.1 No signs or advertisements, other than warning and safety signs, are permitted on site.

.2 Signs and notices for safety and instruction in both official languages Graphic symbols to CAN/CSA-Z321.

.3 Maintain approved signs and notices in good condition for duration of project, and dispose of off site on completion of project or earlier if directed by Consultant.

1.12 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Maintain and protect traffic on any roads during construction period except as otherwise specifically directed by Consultant.

.2 Do not restrict or inhibit regular use and access of all roads and access routes.

.3 Protect building occupants and public from damage to person and property.

.4 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with regular traffic.

.5 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.6 Construct access and haul roads necessary.

.7 Haul roads: constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic to be avoided.

.8 Consult with Consultant for locations of buried site services prior to impacting site. Do not construct haul loads over buried services.

.9 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.10 Dust control: adequate to ensure safe operation at all times.

.11 Location, grade, width, and alignment of construction and hauling roads: subject to approval by Consultant.

.12 Provide snow removal during period of Work.

1.13 CLEAN-UP

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

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 INSTALLATION AND REMOVAL

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

.2 Remove from site all such work after use.

1.2 HOARDING

.1 Site Hoarding: erect temporary chain-link or welded wire fabric fencing enclosures using the following:

- .1 Height: minimum 1800mm
- .2 Galvanized or prefinished metal shapes and wire
- .3 45mm minimum dimension schedule 40 vertical and horizontal steel support framing. Support framing to complete perimeter of each fence panel with welded connections
- .4 Minimum 2.5mm base metal wire thickness
- .5 Woven wire fabric with maximum 65mm openings
- .6 Heavy duty post connectors between panels
- .7 Ballasted footing supports

.2 Erect fencing to prohibit all unauthorized access to construction staging area and dangerous work areas.

.3 Provide barriers around trees and plants designated to remain. Protect from damage by equipment and construction procedures.

1.3 DUST TIGHT SCREENS

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

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

1.4 ACCESS TO SITE

.1 Provide and maintain existing and proposed access roads as may be required for access to Work.

.2 All personnel must sign-in at security kiosk prior to accessing site.

.3 Contractor is to provide a list of names including sub-trades to the Consultant 7 days before accessing the work site.

1.5 FIRE ROUTES

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

1.6 PROTECTION OF BUILDING FINISHES

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

.2 Provide necessary screens, covers and hoardings.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

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

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

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

.4 Cost for such testing will be born by Owner in event of conformance with Contract Documents or by Contractor in event of non-conformance.

1.2 QUALITY

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

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

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

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

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

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

1.3 STORAGE, HANDLING AND PROTECTION

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

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

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

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

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

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

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

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

.9 Touch-up damaged factory finished surfaces to Consultant's satisfaction. Use touch-up materials to match original. Do not paint over name plates.

1.4 TRANSPORTATION

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

1.5 MANUFACTURER'S INSTRUCTIONS

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

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

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

1.6 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 Consultant if required Work is such as to make it impractical to produce required results.

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

1.7 CO-ORDINATION

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

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

1.8 CONCEALMENT

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

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

1.9 REMEDIAL WORK

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

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

1.10 LOCATION OF FIXTURES

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

.2 Inform Consultant of conflicting installation. Install as directed.

1.11 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.

1.12 FASTENINGS - EQUIPMENT

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

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

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

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

1.13 PROTECTION OF WORK IN PROGRESS

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

1.14 EXISTING UTILITIES

.1 When working nearby, breaking into or connecting to existing services or utilities, execute Work at times directed by local governing authorities, without disturbance to Work and building occupants.

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SUBMITTALS

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

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

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

.3 Include in request:

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

1.2 MATERIALS

.1 Required for original installation.

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

1.3 PREPARATION

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

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

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

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

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

1.4 EXECUTION

.1 Execute cutting, fitting, and patching including excavation and fill, to complete Work.

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

.3 Uncover Work to install ill-timed Work.

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

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

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

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

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

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

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

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 SITE CONDITIONS

.1 Review "Designated Substance Report" and take precautions to protect environment.

.2 If material resembling spray or trowel-applied asbestos or other designated substance listed as hazardous be encountered, stop work, take preventative measures, and notify Consultant immediately.

.1 Proceed only after receipt of written instructions have been received from Consultant.

.3 Notify Consultant before disrupting building access or services.

1.2 WASTE MANAGEMENT

.1 Separate and recycle demolition materials in accordance with 01 00 10 - General Instructions

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 EXAMINATION

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

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

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

.4 Disconnect, cap, plug or divert, as required, existing public utilities within the property where they interfere with the execution of the work, in conformity with the requirements of the authorities having jurisdiction. Mark the location of these and previously capped or plugged services on the site and indicate location (horizontal and vertical) on the record drawings. Support, shore up and maintain pipes and conduits encountered.

.1 Immediately notify Consultant and utility company concerned in case of damage to any utility or service

.2 Immediately notify the Consultant should uncharted utility or service be encountered, and await instruction in writing regarding remedial action.

3.2 PREPARATION

.1 Protection of In-Place Conditions:

- .1 Prevent movement, settlement, or damage to adjacent and parts of building to remain in place. Provide bracing and shoring required.
- .2 Keep noise, dust, and inconvenience to occupants to minimum. Building must remain fully operational and occupied at all times.
- .3 Protect building systems, services and equipment.
- .4 Provide temporary dust screens, covers, railings, supports and other protection as required.
- .5 Do Work in accordance with Section 01 35 29.06 - Health and Safety Requirements.
- .6 All floor areas are under negative pressure. Ensure that demolition work does not compromise building indoor environment.

.2 Demolition/Removal:

- .1 Remove items as indicated.
- .2 Remove parts of existing building to permit new construction.
- .3 Trim edges of partially demolished building and elements to suit new work.

3.3 CLEANING

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

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 09 91 99 - Painting.

1.02 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM A53/A53M-12, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
- .2 ASTM A307-14, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- .3 ASTM A 325-14, Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

.2 Canadian General Standards Board (CGSB)
- .1 CSA G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.3 Canadian Standards Association (CSA International)
- .1 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

1.03 SYSTEM DESCRIPTION

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

1.04 SUBMITTALS

.1 Submittals in accordance with section 01 33 00 – Submittal Procedures

.2 Shop Drawings
- .1 Indicate construction details, sizes of steel sections and thickness of steel sheet and pipe.
- .2 Submit shop drawing bearing stamp of a qualified professional engineer registered in Province of Ontario.

1.05 QUALITY ASSURANCE

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

2 PRODUCTS

2.01 MATERIALS

.1 Steel sections: to CSA G40.20/G40.21 Grade 300 W.

.2 Steel pipe: to ASTM A53/A 53M, standard weight, schedule 40 seamless black.

.3 Welding materials: to CSA W59.

.4 Bolts: to ASTM A307.

.5 High strength bolts: to ASTM A325M.

2.02 FABRICATION

.1 Weld connections where possible, otherwise bolt connections. Countersink exposed fastenings, cut off bolts flush with nuts. Make exposed connections of same material, colour and finish as base material on which they occur.

.2 Accurately form connections with exposed faces flush; mitres and joints tight. Make risers of equal height.

.3 Grind or file exposed welds and steel sections smooth.

.4 Shop fabricate handrail in sections as large and complete as practicable.

2.03 PIPE/TUBING GUARDS

.1 Construct handrails from steel pipe as indicated and in accordance with reviewed engineered shop drawings.

2.04 FINISHES

.1 Shop coat primer: to CAN/CGSB 1.40.

.2 Unless indicated otherwise, paint all exposed surfaces in accordance with Section 09 91 99 – Painting.

2.05 SHOP PAINTING

.1 Clean surfaces in accordance with Steel Structures Painting Council Manual Volume 2.

.2 Apply one coat of shop primer.

.3 Use primer as prepared by manufacturer without thinning or adding admixtures. Paint on dry surfaces, free from rust, scale, grease, do not paint when temperature is below 7 degrees C.

.4 Do not paint surfaces to be field welded.

3 EXECUTION

3.01 INSTALLATION OF HANDRAILS

.1 Install plumb and true in exact locations, using welded connections wherever possible to provide rigid structure. Provide anchor bolts, bolts and plates for connecting handrails to structure.

.2 Install in accordance with NAAMM, Metal Stair Manual.

.3 Hand items over for casting into concrete or building into masonry to appropriate trades together with setting templates.

.4 Do welding work in accordance with CSA W59 unless specified otherwise.

.5 Touch up primer to bolts, welds, cuts and burned or scratched surfaces at completion of erection.

3.02 CLEANING

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

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

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 - Submittal Procedures

1.2 REFERENCES

.1 ESR-3269 ICC-ES Evaluation Report, International Code Council Standards for Glass Balustrade Guard Rail Applications.

.2 NAAMM Metal Finishes Manual; national Association of Architectural Metal Manufacturers.

.3 American Society for Testing and Materials International, (ASTM)
.1 ASTM C 1048 – Standard Specification for Heat Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.

.4 American National Standards Institute, (ANSI)
.1 ANSI Z97.1-2015 - Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements for Railing Assembly:
.1 Support distributed load 1.5kN/M, applied horizontally at right angles in any direction to the railing.
.2 Support concentrated horizontal load of 0.89kN, applied in any direction at any point along railing system.
.3 Railing system to be designed and reviewed on site by a Professional Engineer registered in the Province of Ontario, engaged by the Contractor.

1.4 SUBMITTALS

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

.2 Submit Manufacturer’s technical product data for railing components and accessories.

.3 Dimensioned drawings of railing assemblies indicating the following:
.1 Elevations; include joint locations, transitions and terminations.
.2 Manufacturer’s installation and maintenance instructions.

.4 Shop drawings to bear the seal and signature of a Professional Engineer registered in the Province of Ontario.

.5 Samples of manufacturer’s finishes.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data in accordance with Section 01 00 10 – General Instructions.

1.6 QUALITY ASSURANCE

.1 Components and installation are to be in accordance with state and local building codes.

.2 All components and fittings are furnished by the same manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.2 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.3 Store materials in area of installation for minimum period of 48 hours prior to installation.

PART 2 Products

2.1 MATERIALS

.1 Aluminum Components: Conforming to ASTM B 221/ASTM B221M, Alloy 6063-T52.

.2 Stainless Steel Components: Conforming to ASTM A 666, Type 304.

2.2 COMPONENTS

.1 Glazing: Clear tempered safety glass to ANSI Z97.1, conforming to NBC requirements, factory-formed to the required sizes.

.2 Profile: 63 mm nominal width by 105 mm nominal height rectangular cross-section.

.3 Finish: Base Cladding: Sheet metal cladding added to exposed shoe base sections. Adhere with double-sided tape and/or silicone adhesive. Provide end caps where ends of shoe base sections are exposed.
  .1 Type 304 Brushed Stainless.

.4 Fasteners: Types and sizes indicated in shop drawings for concrete attachment.

.5 Polyvinyl chloride glazing accessories:
  .1 Setting block: as recommended by the system manufacturer.
  .2 Spacer blocks: 6mm as recommended by the system manufacturer.

.6 Sealant: Two part RTV structural silicone sealant specially formulated for glazing applications. Standard of acceptance: Tremco Proglaze II or approved equivalent.

.7 Grout: Non-shrink cementitious grout as recommended by the system manufacturer.

2.3 FABRICATION

.1 Fabricate railing assembly components to lengths and configurations complying with shop drawings.

.2 Machine joint edges smooth and plane to produce hairline seams when site assembled; supply concealed sleeve connectors for joints.

.3 Isolate dissimilar metals to prevent electrolytic action by applying primer to concealed surfaces of metal components

PART 3 Execution

3.1 INSTALLATION

.1 Install handrails in accordance with manufacturer's recommended installation instructions and approved shop drawings.

3.2 CLEANING

.1 Clean glazing surfaces after installation, complying with requirements contained in the manufacturer's instructions. Remove excess glazing sealant compounds, dirt or other substances.

.2 Remove protective films from metal surfaces.

.3 Clean railing surfaces with clean water and mild detergent. Do not use abrasive chemicals, detergents, or other implements that may mar or gouge the material.

3.3 PROTECTION

.1 Institute protective measures required throughout the remainder of the construction period to ensure that all the materials do not incur any damage or deterioration.

.2 Repair components damaged by subsequent construction activities in accordance with manufacturer's recommendations; replace damaged components that cannot be repaired to Architect's acceptance.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM International

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

.2 CSA International

.1 CSA O141-05, Softwood Lumber.

.2 CSA O325-07, Construction Sheathing.

.3 National Lumber Grades Authority (NLGA)

.1 Standard Grading Rules for Canadian Lumber 2014.

1.2 QUALITY ASSURANCE

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

.2 Plywood panels in accordance with CSA standards.

1.3 DELIVERY, STORAGE AND HANDLING

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

.2 Develop Construction Waste Management Plan related to Work of this Section and in accordance with Section 01 00 10 - General Instructions.

Part 2 Products

2.1 FRAMING STRUCTURAL AND PANEL MATERIALS

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

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 Pressure treated with wood preservative

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

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

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

.3 Pressure treated with wood preservative

.3 Plywood panels: to CSA O325.

.1 Thickness as indicated.

Part 3 Execution

3.1 INSTALLATION

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

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

.3 Install furring and blocking as required to space-out and support facings, parapets and other work as required.

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

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

.6 Countersink bolts where necessary to provide clearance for other work.

3.2 PROTECTION

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

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

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 - Submittal Procedures

.3 Section 07 92 00 - Sealants

.4 Section 09 91 99 - Painting

1.2 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC) and Architectural Woodwork Institute (AWI)
- .1 Architectural Woodwork Standards, Edition 2

.2 Canadian Standards Association (CSA International)
- .1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.
- .2 CSA O121-17, Douglas Fir Plywood
- .3 CSA O115-M1982 (R2001), Hardwood and Decorative Plywood.
- .4 CSA O112.5-Series-M-1977(R2006), Urea Resin Adhesives for Wood (Room- and High-Temperature Curing).
- .5 CSA O112.4 Series-M1977(R2006), Standards for Wood Adhesives.

.3 National Hardwood Lumber Association (NHLA)
- .1 Rules for the Measurement and Inspection of Hardwood and Cypress 2011

.4 American National Standards Institute (ANSI)
- .1 ANSI 208.1-99, Particleboard.

.5 National Electrical Manufacturers Association (NEMA)
- .1 NEMA LD3-2000, High Pressure Decorative Laminates.

1.3 SUBMITTALS

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

.2 Provide shop drawings to:
- .1 Indicate details of construction, profiles, jointing, fastening and other related details.
- .2 Indicate materials, thicknesses, finishes and hardware.
- .3 Indicate locations of service outlets in casework, typical and special installation conditions and connections, attachments, anchorage and location of exposed fastenings.

.3 Hardware List:
- .1 Submit contract hardware list.

.2 Indicate specified hardware, including make, model, material, function, finish and other pertinent information.

.4 Samples:
.1 Provide duplicate samples: sample size 100 x 100 mm.
.2 Provide duplicate colour samples of laminated plastic and wood veneer for colour selection.

1.4 DEFINITIONS

.1 Plywood: Layers or plies of wood veneer, permanently bonded together in panels with the grain of each layer at 90 deg. to adjacent layers. The outer plies are called "face" and "back". The inner plies are called the "core". The term "plywood", as used in this specification, does not include assemblies manufactured with particleboard, hardboard, MDF, or fibreboard cores.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data in accordance with Section 01 00 10 – General Instructions.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.

PART 2 Products

2.1 MATERIALS

.1 Softwood lumber: unless specified otherwise, S4S, moisture content 15 % or less in accordance with following standards:
.1 CSA O141
.2 CAN/CSA-Z809 or FSC or SFI certified
.3 NLGA Standard Grading Rules for Canadian Lumber
.4 AWMAC custom grade, moisture content as specified

.2 Douglas fir plywood (DFP): to CSA O121, standard construction.
.1 Forestry Stewardship Council (FSC) certified.
.2 Urea-formaldehyde free

.3 Hardwood plywood: To CSA-0115, specifications in accordance with QSI Section 200, based on veneer face grades established by HPVA, as follows:
.1 (Auditorium): White oak species, flat cut, book matched for exposed work, of uniform grain pattern and colour throughout, free of dark streaks and blemishes. Sharp variation of grain pattern and colour between adjacent jointed pieces is not acceptable.
.2 (Break Areas and C Wing Millwork): Black walnut species, flat cut, book matched for exposed work, of uniform grain pattern and colour throughout, free of dark streaks and blemishes. Sharp variation of grain pattern and colour between adjacent jointed pieces is not acceptable.

.3 Exposed faces: Grade AA.
.4 Semi-exposed faces: Grade B
.5 Urea-formaldehyde free.

.4 Solid hardwood: moisture content 12% or less in accordance with following standards:
.1 National Hardwood Lumber Association (NHLA)
.2 AWMAC premium grade
.3 Species: select black walnut (Break Areas and C Wing Millwork). Select white oak (Auditorium)
.4 Forestry Stewardship Council (FSC) certified.
.5 Apply to all exposed edges of plywood of uniform grain and pattern and colour throughout, free of dark streaks or blemishes. Sharp variation of grain pattern or colour between adjacent jointed pieces is not acceptable.

.5 Particle board: to ANSI 208.1
.1 Urea-formaldehyde free.
.2 Type 2, Medium Density (M) of 720 kg/m3, Grade 3 (2-M-3).

.6 Laminated plastic for flatwork: to NEMA LD 3.
.1 Type: Counter Top
.1 Grade: CC High pressure solid colour through (standard grade).
.2 Thickness: minimum 0.86mm
.3 Finish: Matte
.4 Pattern: solid pattern. Consultant to select from manufacturer's complete availability of all series.

.7 Laminated plastic adhesive: urea resin adhesive to CSA O112.5.

.8 Nails and staples: to CSA B111.

.9 Wood screws: steel plain, type and size to suit application.

.10 Splines: metal.

.11 Sealant: in accordance with Section 07 92 00 - Sealants

2.2 WOOD VENEER CASEWORK

.1 Casework (Auditorium):
.1 Fabricate caseworks to AWMAC Premium quality grade as indicated.
.1 Black walnut veneer plywood, smooth finished, square edge, thickness as indicted.
.2 Unit edges for all exposed component ends: solid black walnut 6mm thick x thickness of panel.
.3 Finish: in accordance with Section 09 91 99 - Painting

.2 Casework (Break Rooms & C Wing Millwork):
.1 Fabricate caseworks to AWMAC premium quality grade.
.2 Case bodies (ends, divisions and bottoms).
.1 Plywood, smooth finished both sides, square edge, thickness as indicted, but not less than AWMAC standards

.2 Exposed finish: Black walnut veneer adhered to Plywood core.
.3 Interior finish (hidden from view when doors / drawers closed): Black walnut veneer.

.3 Backs:
.1 Plywood, smooth finished both sides, square edge, thickness as indicted, but not less than 12mm.
.2 Exposed finish: Black walnut veneer adhered to Plywood core.
.3 Interior finish (hidden from view when doors / drawers closed): Black walnut veneer.

.4 Shelving:
.1 Plywood, smooth finished both sides, square edge, thickness as indicted, but not less than AWMAC standards
.2 Edge banding: Strips same width as plywood edges, solid black walnut of 6 mm depth, same width as plywood edges.
.3 Interior finish (hidden from view when doors / drawers closed):
.1 Black walnut veneer.

.3 Drawers:
.1 Fabricate drawers to AWMAC premium grade supplemented as follows:
.2 Sides and Backs.
.1 Plywood, smooth finished both sides, square edge, thickness as indicted, but not less than 15mm.
.2 Exposed finish: Black walnut veneer adhered to Plywood core.
.3 Edge banding: Solid black walnut of 6 mm depth, same width as plywood edges.
.4 Interior finish (hidden from view when doors / drawers closed): Black walnut veneer.

.3 Bottoms:
.1 Plywood, smooth finished both sides, square edge, thickness as indicted, but not less than 12mm.
.2 Exposed finish: Black walnut veneer adhered to Plywood core.
.3 Interior finish (hidden from view when doors / drawers closed): Black walnut veneer.

.4 Fronts:
.1 Particle Board square edge, thickness as indicted, but not less than 19mm.
.2 Exposed finish: Black walnut veneer adhered to particleboard core.
.3 Edge banding: Solid black walnut of 6 mm depth, same width as particle board edges.

.4 Casework Doors:
.1 Fabricate doors to AWMAC premium custom grade supplemented as follows:
.2 Particle Board, square edge, thickness as indicted, but not less than 19mm.
.1 Exposed finish: Black walnut veneer.
.2 Interior finish (hidden from view when doors / drawers closed): Black walnut veneer.
.3 Edge banding: Solid black walnut of 6 mm depth, same width as particle board edges.

.5 Countertops:
.1 Plastic laminate on 19 mm thick particle board core.

.6 Base:
.1 Cabinets set onto floor shall have a minimum 75mm recessed base x 100mm high unless noted otherwise.

.7 Finish for solid wood: clear lacquer in accordance with Section 09910 – Painting.

2.3 HARDWARE

.1 Hinges - typical
.1 Concealed hinge, 110 degree opening, self-closing, finish to satin chrome

.2 Door and drawer pulls:
.1 Style: BP 3487 105
.2 Colour: 170
.3 Manufacturer: Richelieu

.3 Shelf standards: recessed extruded anodized aluminum standards with slotted shelf connectors at 25mm intervals. Provide with minimum 4 open shelf rests per shelf

.4 Door bumpers: clear neoprene with adhesive backing

.5 Collars: black plastic

.6 Grommets: stainless steel, nominal 75mm diameter, flange depth to suit substrate

.7 Drawer slides:
.1 Standard installations: bottom edge mounted concealed ball bearing drawer slides, minimum 34kg weight capacity, full extension, zinc finish complete with face frame slide bracket kit

.8 Sliding glass door hardware for display case for 6mm glass:
.1 Manufacturer: Richelieu
.2 Hardware set: BP15510
.3 Track set: 1551210

2.4 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

.3 Use fasteners compatible with material through which they pass.

2.5 FABRICATION

.1 For manufactured units, fabricate in accordance with manufacturer's printed instructions and reviewed shop drawings.

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

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

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

.5 Apply unit edges for flatwork to cover exposed edge of core material.

PART 3 Execution

3.1 INSTALLATION

.1 For manufactured systems, install in accordance with manufacturer's instructions and reviewed shop drawings.

.2 Do architectural woodwork to Quality Standards of the Architectural Woodwork Manufacturers Association of Canada (AWMAC), except where specified otherwise.

.3 Install prefinished millwork at locations shown on drawings. Position accurately, level, plumb straight.

.4 Fasten and anchor millwork securely. Provide heavy duty fixture attachments for wall mounted millwork.

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

.6 Install hardware to standard hardware location dimensions in accordance with manufacturer's recommendations and to project design requirements.

3.2 ADJUSTING

.1 Adjust cabinet hardware for optimum, smooth operating condition.

.2 Lubricate hardware and other moving parts.

.3 Adjust cabinet door hardware to ensure tight fit at contact points with frames.

3.3 CLEANING

.1 Clean millwork surfaces.

.2 Remove excess glue from surfaces.

3.4 PROTECTION

.1 Protect millwork from damage until final inspection.

3.5 SCHEDULE

.1 Install recessed shelf standards in each millwork unit with doors for full height of unit. Provide 2 standards per side.

.2 Install millwork doors with handles and hinges

.3 Install millwork drawers with handles and slides

.4 Install grommets at all penetrations

.5 Install bumpers (minimum 2) at each door and drawer

.6 Install other items as indicated.

END OF SECTION

1 GENERAL

1.01 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 - Submittal Procedures.

1.02 REFERENCES

.1 Underwriter's Laboratories of Canada (ULC).
- .1 CAN/ULC S101-14, Standard Method of Fire Endurance Tests of Building Construction and Materials.
- .2 CAN/ULC S102-11, Standard Method of Test for Burning Characteristics of Building Materials and Assemblies.
- .3 ULC S115-11, Fire Tests of Fire stop Systems.

1.03 SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:
- .1 Submit shop drawings to show location, proposed material, reinforcement, anchorage, fastenings and method of installation.
- .2 Construction details should accurately reflect actual job conditions.

.4 Quality assurance submittals:
- .1 Test reports: in accordance with CAN/ULC S101 for fire endurance and CAN/ULC S102 for surface burning characteristics.
  - .1 Submit certified test reports from approved independent testing laboratories, indicating compliance of applied fire stopping with specifications for specified performance characteristics and physical properties.
- .2 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, cleaning procedures.
- .3 Manufacturer's Field Reports: submit to manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3 - FIELD QUALITY CONTROL.

1.04 QUALITY ASSURANCE

.1 Installer of this Section must have minimum 5 years experience in the installation of firestopping.

.2 All firestopping to be performed by a single company experienced in the installation of firestopping.

.3 Site Meetings: as part of Manufacturer's Services described in PART 3 - FIELD QUALITY CONTROL, schedule site visits, to review Work, at stages listed.
- .1 After delivery and storage of products, and when preparatory Work is complete, but before installation begins.
- .2 Twice during progress of Work at 25% and 60% complete.
- .3 Upon completion of Work, after cleaning is carried out.

1.05 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 00 10 – General Instructions.

1.06 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:
- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Deliver materials to the site in undamaged condition and in original unopened containers, marked to indicate brand name, manufacturer, ULC markings.

.2 Storage and Protection:
- .1 Store materials indoors in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
- .2 Replace defective or damaged materials with new.

2 PRODUCTS

2.01 MATERIALS

.1 All firestopping components, systems and assemblies to be by a single manufacturer for this Project.

.2 Fire stopping and smoke seal systems: in accordance with CAN/ULC S115.
- .1 Asbestos-free materials and systems capable of maintaining effective barrier against flame, smoke and gases in compliance with requirements of CAN/ULC S115 and not to exceed opening sizes for which they are intended and conforming to specified special requirements described in PART 3 .
- .2 Firestop system rating: to meet or exceed fire resistance rating of assembly.

.3 Service penetration assemblies: systems tested to CAN/ULC S115.

.4 Service penetration fire stop components: certified by test laboratory to CAN/ULC S115.

.5 Fire-resistance rating of installed fire stopping assembly in accordance with OBC.

.6 Fire stopping and smoke seals at openings intended for ease of re-entry such as cables: elastomeric seal.

.7 Fire stopping and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control: elastomeric seal.

.8 Primers: to manufacturer's recommendation for specific material, substrate, and end

use.

.9 Water (if applicable): potable, clean and free from injurious amounts of deleterious substances.

.10 Damming and backup materials, supports and anchoring devices: to manufacturer's recommendations, and in accordance with tested assembly being installed as acceptable to authorities having jurisdiction.

.11 Sealants for vertical joints: non-sagging.

3 EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 PREPARATION

.1 Examine sizes and conditions of voids to be filled to establish correct thicknesses and installation of materials.
.1 Ensure that substrates and surfaces are clean, dry and frost free.

.2 Prepare surfaces in contact with fire stopping materials and smoke seals to manufacturer's instructions.

.3 Maintain insulation around pipes and ducts penetrating fire separation

.4 Mask where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces.

3.03 INSTALLATION

.1 Install fire stopping and smoke seal material and components in accordance with manufacturer's certified tested system listing.

.2 Seal holes or voids made by through penetrations, poke-through termination devices, and unpenetrated openings or joints to ensure continuity and integrity of fire separation are maintained.

.3 Provide temporary forming as required and remove forming only after materials have gained sufficient strength and after initial curing.

.4 Tool or trowel exposed surfaces to neat finish.

.5 Remove excess compound promptly as work progresses and upon completion.

3.04 SPECIAL REQUIREMENTS

.1 Location of special requirements for fire stopping and smoke seal materials at openings and penetrations in fire resistant rated assemblies are as follows:

.1 Movement: up to 50mm deflection at top of non-loadbearing wall assemblies.

3.05 SEQUENCES OF OPERATION

.1 Proceed with installation only when submittals have been reviewed by Consultant.

.2 Install floor fire stopping before interior partition erections.

.3 Metal deck bonding: fire stopping to precede spray applied fireproofing to ensure required bonding.

.4 Mechanical pipe insulation: certified fire stop system component.
.1 Ensure pipe insulation installation precedes fire stopping.

3.06 FIELD QUALITY CONTROL

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

.2 Manufacturer's Field Services:
.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - SUBMITTALS.
.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

3.07 CLEANING

.1 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Remove temporary dams after initial set of fire stopping and smoke seal materials.

3.08 SCHEDULE

.1 Fire stop and smoke seal at:
.1 Penetrations through fire-resistance rated masonry, concrete, and gypsum board partitions and walls.
.2 Top of fire-resistance rated masonry and gypsum board partitions.
.3 Intersection of fire-resistance rated masonry and gypsum board partitions.
.4 Control and sway joints in fire-resistance rated masonry and gypsum board partitions and walls.
.5 Penetrations through fire-resistance rated floor slabs, ceilings and roofs.
.6 Openings and sleeves installed for future use through fire separations.
.7 Around mechanical and electrical assemblies penetrating fire separations.
.8 Rigid ducts: greater than 129 cm^2: fire stopping to consist of bead of fire stopping material between retaining angle and fire separation and between retaining angle and duct, on each side of fire separation.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 ASTM

.1 ASTM C 920-14a, Standard Specification for Elastomeric Joint Sealants

1.2 SUBMITTALS

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

.2 Product Data:

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

.2 Manufacturer's product to describe:

.1 Caulking compound.

.2 Primers.

.3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

.3 Samples:

.1 Submit 2 samples of each type of material and colour.

.2 Cured samples of exposed sealants for each colour where required to match adjacent material.

.4 Manufacturer's Instructions:

.1 Submit instructions to include installation instructions for each product used.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 - General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

1.5 SITE CONDITIONS

.1 Ambient Conditions:

.1 Proceed with installation of joint sealants only when:

.1 Ambient and substrate temperature conditions are within limits permitted by joint sealant manufacturer or are above 4.4 degrees C.

.2 Joint substrates are dry.

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

.2 Joint-Width Conditions:

.1 Proceed with installation of joint sealants only where joint widths are more than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:

.1 Proceed with installation of joint sealants only after contaminants capable of interfering with adhesion are removed from joint substrates.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Where sealants are qualified with primers use only these primers.

2.2 SEALANT MATERIAL DESIGNATIONS

.1 Colours: multiple colours to be selected by Consultant from manufacturer's complete range.

.2 Type A: Polyurethanes One Part.
- .1 Modulus of elasticity to accommodate joint substrate and design

.3 Type B: Silicones One Part.
- .1 Modulus of elasticity to accommodate joint substrate and design

.4 Type C: Acrylic Latex One Part.

.5 Preformed Compressible and Non-Compressible back-up materials (backer rod).
- .1 Polyethylene, Urethane, Neoprene or Vinyl Foam.
  - .1 Extruded open cell foam backer rod.
  - .2 Size: oversize 30 to 50 %.

.6 Bond Breaker Tape.
- .1 Polyethylene bond breaker tape which will not bond to sealant.

2.3 SEALANT SELECTION

.1 Perimeters of exterior openings where frames meet exterior facade of building: Sealant type: A.

.2 Seal interior perimeters of exterior openings as detailed on drawings: Sealant type: C.

.3 Joint between flooring and frames: Sealant type B

.4 Perimeters of interior frames, as detailed and itemized: Sealant type: C.

2.4 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant in accordance with sealant manufacturer's written recommendations.

.2 Primer: in accordance with sealant manufacturer's written recommendations.

Part 3 Execution

3.1 EXAMINATION

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

- .1 Inform Consultant of unacceptable conditions immediately upon discovery.

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

3.2 SURFACE PREPARATION

.1 Completely remove all existing caulking and existing residue on all precast joint surfaces

.2 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants

.3 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair Work.

.4 Apply primer to existing substrate surfaces to receiving sealant. Do not prime compressible back-up materials

.5 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.6 Ensure joint surfaces are dry and frost free.

.7 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

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

3.6 APPLICATION

.1 Sealant:

.1 Apply sealant in accordance with manufacturer's written instructions.

.2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.

.3 Apply sealant in continuous beads.

.4 Apply sealant using gun with proper size nozzle.

.5 Use sufficient pressure to fill voids and joints solid.

.6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.

.7 Tool exposed surfaces before skinning begins to give slightly concave shape.

.8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:

.1 Cure sealants in accordance with sealant manufacturer's instructions.

.2 Do not cover up sealants until proper curing has taken place.

3.7 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

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

.2 Clean adjacent surfaces immediately.

.3 Remove excess and droppings, using recommended cleaners as work progresses.

.4 Remove masking tape after initial set of sealant.

3.8 PROTECTION

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

.2 Repair damage to adjacent materials caused by joint sealants installation.

END OF SECTION

Part 1 General

1.1 GENERAL NOTES

.1 All metal doors and frames to be painted.

.2 Door sizes are frame rebate sizes.

.3 Where doors are fire rated or ULC-labelled, door frames and hardware shall match.

.4 Provide sealant around perimeter of all hollow metal frames, both sides.

.5 Provide door caps across head of exterior doors.

No.	Room	Door				Frame				Glazing	Label	Remarks
Door	Name	Type	Width	Height	Finish	Type	Throat Dim	Finish	Details	Type	Min.	
100.1	AUDITORIUM	HMD	1/653+/- 1/1066+/-	2060+/-	PT	HMF	120+/-	PT	-	-	-	CONFIRM EXACT DOOR AND THROAT SIZES ON SITE. INSULATED DOOR.

Legend:

HMD	Hollow metal door
PT	Painted
HMF	Hollow metal frame

1 GENERAL

1.01 RELATED SECTION

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 - Submittal Procedures

.3 Section 07 92 00 – Joint Sealants

.4 Section 08 71 00 – Door Hardware

.5 Section 09 91 99 - Painting

1.02 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A 653/A 653M-15e1, 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-G40.20-13/G40.21-13, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-13, Welded Steel Construction (Metal Arc Welding).

.3 Canadian Steel Door Manufacturers' Association (CSDMA)

.4 National Fire Protection Association (NFPA)
- .1 NFPA 80-2016, Standard for Fire Doors and Fire Windows.

.5 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S104-10, Standard Method for Fire Tests of Door Assemblies.
- .2 CAN/ULC-S105-16, Standard Specification for Fire Door Frames Meeting the Performance Required by CAN4-S104.

1.03 SUBMITTALS

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

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

2 PRODUCTS

2.01 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A 653M, Z275 for exterior installations, minimum nominal base steel thickness in accordance with the following:
- .1 Door face sheets: 1.6mm
- .2 Frames: 1.6 mm

2.02 DOOR CORE MATERIALS

.1 Exterior Doors: face sheets welded, with a core composed of rigid modified polyisocyanurate, closed cell type; minimum density of 32 kg/m and RSI of 1.9.

2.03 ADHESIVES

.1 Steel components: heat resistant, spray grade, resin reinforced neoprene/rubber (polychloroprene) based, low viscosity, contact cement.

2.04 PRIMER

.1 Low VOC type recommended by door and frame manufacturer.

2.05 PAINT

.1 Field paint steel doors and frames in accordance with Section 09 91 99 - Painting. Protect weather strips from paint. Provide final finish free of scratches or other blemishes.

2.06 ACCESSORIES

.1 Door silencers: single stud rubber/neoprene type.

.2 Metallic paste filler: to manufacturer's standard.

.3 Sealant: in accordance with Section 07 92 00 - Sealants

2.07 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Factory blank, reinforce, drill and tap frames for surface, recessed, mortised, templated and electronic hardware as required using templates provided by finish hardware supplier.

.4 Protect mortised cutouts with steel guard boxes.

.5 On site modifications are not acceptable.

.6 Prepare frame for door silencers, 3 for single door, 2 at head for double door.

.7 Manufacturer's nameplates on frames and screens are not permitted.

.8 Conceal fastenings except where exposed fastenings are indicated.

.9 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

2.08 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Locate each wall anchor immediately above or below each hinge reinforcement on hinge jamb and directly opposite on strike jamb.

.3 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

.4 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.09 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Securely attach floor anchors to inside of each jamb profile.

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

.7 Provide thermally broken frames at all exterior doors.

2.10 DOOR FABRICATION GENERAL

.1 Doors: swing type, flush.

.2 Fabricate doors with longitudinal edges lock seamed and adhesive assisted.

.3 Factory blank, reinforce, drill and tap doors for surface, recessed, mortised, templated and electrified hardware as required using templates provided by finish hardware supplier.

.4 On site modifications are not acceptable.

.5 Factory reinforce doors as required for hardware.

.1 Provide recessed channels top and bottom of interior doors, spot welded

in-place

.6 Provide factory-applied touch-up primer at areas where zinc coating has been removed during fabrication.

.7 Manufacturer's nameplates on doors are not permitted.

.8 Provide insulated doors at all exterior locations.

3 EXECUTION

3.01 INSTALLATION GENERAL

.1 Install doors and frames to CSDMA Installation Guide.

3.02 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Provide vertical support at centre of head for openings over 1200 mm wide. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

3.03 DOOR INSTALLATION

.1 Install doors and hardware in accordance with hardware templates and manufacturer's instructions and Section 08 71 00 - Door Hardware.

.2 Provide even margins between doors and jambs and doors and finished floor surface as follows.
- .1 Hinge side: 1.0 mm.
- .2 Latchside and head: 1.5 mm.
- .3 Finished floor surface: 13 mm.

.3 Adjust operable parts for correct function.

3.04 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 08 11 00 - Metal Doors and Frames

1.2 REFERENCES

.1 Canadian Steel Door and Frame Manufacturers' Association (CSDFMA).

.2 CSDFMA Canadian Metric Guide for Steel Doors and Frames (Modular Construction): Standard hardware location dimensions, or as indicated for special conditions.

.3 CAN CSA B-651-12 Accessible Design for the Built Environment.

.4 American National Standards Institute / Builders Hardware Manufacturers Association:

- .1 ANSI/BHMA A156.3-2014
  Exit Devices.
- .2 ANSI/BHMA A156.4-2013
  Door Controls - Closers.
- .3 ANSI/BHMA A156.6-2010
  Architectural Door Trim.
- .4 ANSI/BHMA A156.8-2010
  Door Control - Overhead Stops and Holders.
- .5 ANSI/BHMA A156.16-2013
  Auxiliary Hardware.
- .6 ANSI/BHMA A156.18-2012
  Materials and Finishes.
- .7 ANSI/BHMA A156.21-2014
  Thresholds.
- .8 ANSI/BHMA A156.22-2012
  Door Gasketing and Edge Seal Systems.
- .9 ANSI/BHMA A156.26-2012
  Continuous Hinges

1.3 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheets indicating hardware proposed, including ANSI function where ANSI used in this specification, grade, type, series, BHMA finish, fir label listing, in accordance with Section 01 33 00 - Submittal Procedures.

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

.3 Hardware List:
- .1 Submit a typewritten Finishing Hardware schedule in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Indicate specified hardware, including make, model, base material, function, size, finish and other pertinent information.

.4 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

.5 Closeout Submittals:
- .1 Provide operation, maintenance data, parts list and manufacturer's instructions for each type of locksets, exit hardware, door closers and door holders for incorporation into manual specified in Section 01 78 00 - Closeout Documents.

1.4 QUALITY ASSURANCE

.1 Regulatory Requirements:
- .1 Use hardware for doors in fire separations and exit doors certified by a Canadian Certification organization accredited by Standards Council of Canada.
- .2 All fire and life safety codes shall be met as required by the authority having jurisdiction.
- .3 Use lock and latchsets with lever handles meeting requirements of CAN/CSA - B651, Barrier Free Design, unless specified otherwise.

.4 Pre-installation Meetings: the Door Hardware Supplier shall arrange, attend and conduct a pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements.

.5 It shall be clearly understood that within the terms of this Subcontract, the Door Hardware Supplier is bound not just as a supplier, but as a Subcontractor and is responsible for the supply of Project services relative to project co-ordination, supervision and inspection.

.6 No claims for extra money will be entertained if such claims are from lack of co-ordination between the Door Hardware Subcontractor and any other Subcontractor. Ensure that Work of other Subcontractors, as it proceeds, will accommodate the installation of hardware.

.7 Attend site meetings as requested by the Contractor.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
- .1 Deliver, store, handle and protect materials in accordance with Section 01 45 00 - Quality Control.
- .2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

.2 Storage and Protection:
- .1 Store finishing hardware in locked, clean and dry area.

1.6 WASTE DISPOSAL AND MANAGEMENT

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

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

.3 Dispose of all packaging material in appropriate on-site bin for recycling in accordance with site waste management program.

1.7 MAINTENANCE

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

PART 2 Products

2.1 HARDWARE ITEMS

.1 Door hardware, as specified, to be certified to ANSI/BHMA standards.

.2 Use one manufacturer's products only for all similar items.

.3 Acceptable Materials: Where materials are specified by trade name and/or model number refer to the Instructions to Tenderers for procedure to be followed in applying for approval of substitutions within the allotted time period stipulated prior to Tender closing. Substitutions to the specified products will not be accepted nor considered at time of shop drawing submission.

2.2 DOOR HARDWARE

.1 Continuous Hinges shall comply with ANSI/BHMA A156.26

.1 Continuous hinges for exterior doors shall be aluminum material, gear type, edge mount, heavy duty, minimum thirty- two thrust bearings, staggered screw holes. Leaves should not extend fully across both the frame rebate and the edge of exterior door thus reducing transfer of cold.

.2 Factory cut, maintaining three rows of two screws (six total) at both top and bottom, to length required for door height. Length to match door height. 12.7mm of door heel exposure is acceptable. For exterior door application the length should be reduced to allow installation of the door sweep across the full width of the exterior door face without interfering with the hinge knuckle.

.2 Exit Devices shall comply with ANSI/BHMA A156.3

.1 Type 3: Mortise push pad type, grade 1
(Fig. 6 as illustrated in ANSI/BHMA A156.3)

.2 Functions:
01 - Exit only, no trim or blank escutcheon.

.3 Door Controls - Closers shall comply with ANSI/BHMA A156.4

.1 Heavy duty. Full rack and pinion hydraulic action. Cast iron cylinder body. Non-sized fully adjustable spring power and back check. Full plastic cover.

.2 Provide adapter plates as required for proper installation of door closers.

.3 EDA - extra duty arm

2.2 DOOR HARDWARE (Cont'd)

.4 Architectural Door Trim. Kick plates shall comply with ANSI/BHMA A156.6

.1 Type J102: Bevelled edges. 1.27mm material thickness. Type 304 stainless steel. Height as specified x length to suit.

.5 Door Control - Overhead Stops & Holders shall comply with ANSI/BHMA A156.8

.1 Type 2 heavy duty overhead surface slide type.

.2 All listed degrees of opening should be reviewed and confirmed before preparation and/or installation.

.6 Threshold shall comply with ANSI/BHMA A156.21

.1 Type J32100. Extruded aluminum. Slope and height to meet barrier free accessible requirements. Width to suit jamb and floor conditions. Depth as required.

.7 Door Sweep shall comply with ANSI/BHMA A156.22

.1 Type R3E436. Aluminum extrusion c/w solid silicone seal. Applied to bottom pull side face of door. Predrilled with oblong screw holes for adjustment. Order less cUL label where listed for non fire labeled door.

.8 Weatherstripping shall comply with ANSI/BHMA A156.22

.1 Type R3E296. Extruded aluminum with silicone rubber insert. Predrilled with oblong screw holes for adjustment. Designed to provide continuous weather seal at head. Surface hardware to be attached to frame through weatherstrip section. Confirm frame stop width sufficient to support 38.1±mm wide extrusion. Provide shim as required.

2.3 FASTENINGS

.1 All hardware is to be installed using manufactures' supplied fasteners. Failure to comply may void warranties and applicable licensed labels.

.2 Self tapping/tek screws used for installation of hinges, locksets, exit devices and door closers will not be acceptable on this project.

.3 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.4 Exposed fastening devices to match finish hardware.

.5 Kick shall be supplied countersunk, oval head, flush mounting socket screws to suit door material.

2.4 KEYING

.1 The Contractor is responsible for providing locks and cylinders as required for his own use during the period of construction.

2.5 FINISHES

.1 Materials and Finishes shall comply with ANSI/BHMA A156.18

Continuous Hinges	CLR	clear anodized aluminum
Exit Device	626	chromium, dull
Door Closers	689	spray painted aluminum
	SRI	special rust inhibitor
Kick Plates	630	stainless steel, satin
O/H Stops	630	stainless steel, satin
Threshold & W/Stripping	AL	clear anodized aluminum

2.6 ABBREVIATIONS

PSF	pressed steel frame
INS. HMD	insulated hollow metal door
LH	left hand
RH	right hand
LHR	left hand reverse
RHR	right hand reverse

PART 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

.2 When requested, furnish metal door and frame manufacturers with complete instructions and templates for preparation of their work to receive hardware.

.3 Furnish manufacturer's instructions for proper installation of each hardware component.

3.2 INSTALLATION

.1 Install hardware to standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association, or as indicated for special conditions.

.2 Only tradesmen competent in the installation of Finishing Hardware shall be used for this purpose. Qualification would require a minimum (5) years experience in commercial application. The installer shall adjust, clean and make good all installation of Finishing Hardware to the satisfaction of the Departmental Representative.

.3 Kick plates are to be installed 0.79mm maximum up from the bottom edge of door push side. On single doors install in the centre of the door equally spaced to clear between the frame jamb stops and/or gasketing.

.4 Installer to caulk exterior threshold base to ensure proper seal.

.5 Weatherstripping, gasketing, etc. is not to be installed until final coat of paint has been applied to the door and frame and is completely dry.

.6 All existing door hardware & fasteners not being reused is to be returned to Owner.

.7 All existing door hardware preps in both frames & doors, walls and floors are to be filled as required and where applicable made ready for painting.

3.3 ADJUSTING

.1 Adjust door hardware for optimum, smooth operating condition, safety and for weather tight closure.

.2 Lubricate hardware, operating equipment and other moving parts.

.3 Adjust door hardware to provide tight fit at contact points with frames.

3.4 CLEANING

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

.2 Clean hardware with damp cloth and approved non-abrasive cleaner. Polish hardware in accordance with manufacturer's instructions.

.3 Remove protective material from hardware items where present.

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

3.5 DEMONSTRATION

.1 Maintenance Staff Briefing:
  .1 Brief maintenance staff regarding:

    .1 Proper care, cleaning and general maintenance of projects complete hardware.

    .2 Use, application and storage of wrenches for exit devices and door closers.

.2 Demonstrate operation, operating components, adjustment features and lubrication requirements.

3.6 INSPECTIONS

.1 The Door Hardware Supplier is to make periodic site inspections during installation of hardware to ensure that all hardware supplied is being applied in accordance with specifications, details and Departmental Representative's directions. Inform the Contractor and the Departmental Representative in writing of such inspections, pointing out errors, omissions, etc.; so that same may be corrected.

3.7 HARDWARE SCHEDULE

.1 The following is a list of hardware to define required standards on this project. Alternates subject to review and written acceptance prior to submission, within the allotted time period, of the Tender closing. Substitution without prior approval will not be accepted in the shop drawing submission.

ITEM #1 1 PAIR DOORS — EXTERIOR FROM AUDITORIUM — LHR/RHR-A
1/653± x 2060± x 45 — INS. HMD/PSF
1/1066± x 2060± x 45
TYPE HMD/HMF

2	EA	CONT. HINGE			CLR
1	EA	EXIT DEVICE	TYPE 3 - 01 x 4FT	RHR	626
			c/w DOUBLE DOOR STRIKE		
			CUT/FILE STRIKE LIP FLUSH WITH FACE OF DOOR		
2	EA	FLUSHBOLTS	L04251 x 304.8mm		626
1	EA	DOOR CLOSER	C02021 EDA x 62G SHOE & BENT ARM		SRI 689
			SEE SPECIAL TEMPLATE ST-2730		
1	EA	KICK PLATE	J102 203.2 x 628±mm x MS		630
1	EA	KICK PLATE	J102 203.2 x 1041±mm x MS		630
1	EA	O/H STOP/HOLD	C02511 x 90 DEGREE SIZE 2 CONFIRM		630
1	EA	O/H STOP/HOLD	C02511 x 90 DEGREE SIZE 4 CONFIRM		630
1	LEN	T.B. THRESHOLD	J32190 x 1822±mm		AL
		c/w EXTENSIONS/INSERTS AS REQUIRED			
1	EA	DOOR SWEEP	R3E436 x 653±mm (EXTERIOR SIDE)		AL
1	EA	DOOR SWEEP	R3E436 x 1066±mm (EXTERIOR SIDE)		AL
1	SET	W/STRIPPING	R3E296 1/1720mm + 2/2060mm		AL
		INSTALL BEFORE EXIT DEVICE, DOOR CLOSER & O/H STOP/HOLDERS			
1	LEN	STEEL ASTRAGAL	R0Y635 x 2060±mm x MS		600
1	LEN	W/STRIPPING	SELF ADH.		BLK
		INSTALL ON ASTRAGAL			

END OF SECTION

PART 1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 – Submittal Procedures

.3 Section 07 92 00 – Sealants

.4 Section 09 91 99 – Painting

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C475/C475M-15, Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C645-14e1, Specification for Nonstructural Steel Framing Members.
- .3 ASTM C754-15, Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- .4 ASTM C840-16, Specification for Application and Finishing of Gypsum Board.
- .5 ASTM C1002-14, 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, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .7 ASTM C1396/C1396M-14a, Standard Specification for Gypsum Board
- .8 ASTM D1037-12, Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials
- .9 ASTM D3273-16, Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC S102-11, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DESIGN REQUIREMENTS

.1 Partition assemblies to be non-combustible construction, sound and fire resistance rated where applicable.

1.4 SUBMITTALS

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

.2 Submit test reports from approved independent testing laboratory certifying partition system complies with sound transmission rating and fire-resistance rating as specified.

.3 Submit shop drawings indicating stud design size, thickness and connection details for all locations.

1.5 STORAGE AND HANDLING

.1 Store materials inside, level, under cover. Protect from weather, damage from construction operations and other causes, in accordance with manufacturer's printed instructions.

.2 Handle materials to prevent damage to edges or surfaces. Protect metal accessories and trim from being bent or damaged.

1.6 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data in accordance with Section 01 00 10 – General Instructions.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

PART 2 PRODUCTS

2.1 NON-STRUCTURAL METAL FRAMING

.1 Non-load bearing channel stud framing: to ASTM C645, stud sizes as indicated, roll formed from hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 460 mm centres. Minimum design metal thickness of:
- .1 Standard walls: 0.9mm or as indicated.
- .2 Jamb studs for all door openings: 1.5mm

.2 Floor tracks: to ASTM C645, in widths to suit stud sizes, 32 mm flange height.

.3 Ceiling tracks: to ASTM C645, in widths to suit stud sizes, 50 mm flange height with slotted screw connections to accommodate 25mm structural deflection.

.4 Metal channel stiffener: 19 x 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.5 Metal furring runners, hangers, tie wires, inserts, anchors: to ASTM C645

.6 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

2.2 GYPSUM BOARD

.1 Standard board: to ASTM C 1396 regular and Type X, thickness as indicated,

1200 mm wide x maximum practical length, ends square cut, edges tapered.

.2 Steel drill screws: to ASTM C1002.

.3 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, metal, zinc-coated by hot-dip process, 0.5 mm base thickness, perforated flanges, one piece length per location.

.4 Joint compound:
.1 Standard board: to ASTM C475, asbestos-free.

PART 3 EXECUTION

3.1 ERECTION OF FRAMING

.1 Install steel framing members to receive screw-attached gypsum board in accordance with ASTM C 754 except where specified otherwise.

.2 Align standards partition tracks at floor and underside of structure and secure at 600 mm on centre maximum.

.3 Place studs vertically at 400 mm on centre and not more than 50 mm from abutting walls, and at each side of openings and corners. Position studs in tracks at floor and ceiling. Cross brace steel studs as required to provide rigid installation to manufacturer's instructions.

.4 Erect metal studding to tolerance of 1:1000.

.5 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.6 Provide two studs extending from floor to ceiling at each side of openings wider than stud centres specified. Secure studs together, 50 mm apart using column clips or other approved means of fastening placed alongside frame anchor clips.

.7 Install heavy gauge double jamb studs at openings.

.8 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end, in accordance with manufacturer's instructions. Install intermediate studs above and below openings in same manner and spacing as wall studs.

.9 Provide 40 mm stud or furring channel secured between studs for attachment of fixtures behind lavatory basins, toilet and bathroom accessories, and other fixtures including grab bars and towel rails, attached to steel stud partitions.

.10 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.11 Extend partitions to underside of deck except where noted otherwise.

.12 Maintain clearance under beams and structural slabs to avoid transmission of

structural loads to studs. Use slotted tracks.

.13 Install continuous insulating strips to isolate studs from uninsulated surfaces.

3.2 ERECTION OF GYPSUM BOARD AND ACCESSORIES

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Install acoustic gypsum board and suspension system in accordance to manufacturer's written instruction and reviewed shop drawings.

.3 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

.4 Support light fixtures by providing additional ceiling suspension hangers within 150 mm of each corner and at maximum 600 mm around perimeter of fixture.

.5 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers, grilles.

.6 Install 19 x 64 mm furring channels parallel to, and at exact locations of steel stud partition header track.

.7 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.8 Furr above suspended ceilings for gypsum board fire and sound stops and to form plenum areas as indicated.

.9 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

.10 Install acoustical insulation and sealant in sound rated partitions to correspond with tested assembly.

.11 Install gypsum boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.12 Install control joints at maximum 10m intervals, both horizontal and vertical, for uninterrupted wall assemblies within common plane.

3.3 APPLICATION

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

.2 Apply gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm on centre.

3.4 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length

pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm on centre.

.2 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated. Seal joints with sealant.

.3 Install insulating strips continuously at edges of gypsum board and casing beads abutting metal window and exterior door frames, to provide thermal break.

.4 Install access doors to electrical and mechanical fixtures specified in respective sections.
.1 Rigidly secure frames to furring or framing systems.

3.5 FINISHING

.1 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International commended Specification on Levels of Gypsum Board Finish:
.1 Levels of finish:
.1 Level 2: for concealed gypsum board walls and ceilings
.2 Level 4: generally, for exposed gypsum board walls and ceilings

.2 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 - Submittal Procedures

1.2 REFERENCES

.1 American Association of Textile Chemists and Colorists (AATCC)
- .1 AATCC 16-04, Color Fastness to Light.
- .2 AATCC 134-2011, Electrostatic Propensity of Carpet.
- .3 AATCC 175-2013, Stain Resistance: Pile Floor Coverings.

.2 Carpet and Rug Institute (CRI)
- .1 CRI-104-96, Standard Installation of Commercial Carpet.

1.3 SUBMITTALS

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

.2 Submit product data sheet for each carpet, adhesive, carpet protection and subfloor patching compound.

.3 Submit data on specified products, describing physical and performance characteristics, sizes, patterns, colours, and methods of installation.

.4 Submit duplicate full size pieces of each colour selected.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data in accordance with Section 01 00 10 – General Instructions.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Store packaged materials in original containers or wrapping with manufacturer's seals and labels intact.

.2 Prevent damage to materials during handling and storage. Keep materials under cover and free from dampness.

.3 Store materials in area of installation for minimum period of 48 hours prior to installation.

1.6 EXTRA MATERIALS

.1 Provide 50 m^2 of each colour, pattern and type of carpeting. Provide as complete, un-cut tiles.

.2 Extra materials to be from same production run as installed materials.

.3 Identify each package of carpet and each container of adhesive.

.4 Deliver and store where directed by Departmental Representative.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with 01 00 10 – General Instructions.

PART 2 Products

2.1 MODULAR CARPET TILE

.1 Carpet Tile Dimensions: nominal 229 x 914 mm

.2 Tufted weight : 610.3 g/sq m

.3 Gauge: 47.2 rows / 10 cm

.4 Stitches: 41 stitches / 10 cm

.5 Finished pile thickness: 2.36 mm

.6 Total thickness: 5.64 mm

.7 Colour: To be selected from manufacturer’s full colour range. Allow for 1 accent colour equal to 5% of total area. Colour and pattern to be confirmed by Consultant.

.8 Acceptable product: Shaw Contract Saturate Tile or approved equivalent.

2.2 ACCESSORIES

.1 Wall base: same material and colour as adjacent floor carpet tile, 100mm height or as noted on drawings with hemmed top edge.

.2 Seaming sealer adhesive: type recommended by carpet manufacturer for purpose intended.

.3 Adhesive: type recommended by carpet manufacturer for purpose intended.

.4 Subfloor patching compound: Portland cement base filler, mix with latex and water to form a cementitious paste.

.5 Stair nosing: flexible solid colour vinyl stair nosing RCN-XX-A as manufactured by Johnsonite or approved equivalent. Colour to be selected from manufacturer’s full colour range.

PART 3 Execution

3.1 SUB-FLOOR TREATMENT

.1 Concrete shall be inspected to determine special care required to make it a suitable foundation for carpet. Cracks 3 mm wide or protrusions over 0.8 mm will be filled and levelled with appropriate and compatible latex patching compound.

.2 Do not exceed manufacturer's recommendations for patch thickness.

.3 Large patch areas are to primed with a compatible primer.

.4 Concrete substrates shall be cured, clean and dry.

.5 Concrete substrates shall be free of paint, dirt, grease, oil, curing or parting agents, and other contaminates, including sealers, that may interfere with the bonding of the adhesive.

.6 Wherever a powdery or porous concrete surface is encountered, a primer compatible with the adhesive shall be used to provide a suitable surface for glue-down installation.

3.2 PREPARATION

.1 Prepare floor surfaces in accordance with CRI 104 Standard for Installation of Commercial Carpet.

.2 Pre-condition carpeting following manufacturer's printed instructions.

3.3 INSTALLATION

.1 Install carpeting using minimum of pieces.

.2 Install in accordance with manufacturer's printed instructions and in accordance with Carpet and Rug Institute Standard for Installation of Commercial Carpet, CRI 104.

.3 Install carpet after finishing work is completed.

.4 Finish installation to present smooth wearing surface free from conspicuous seams, burring and other faults.

.5 Use material from same dye lot. Ensure colour, pattern and texture match within any one visual area. Maintain constant pile direction.

.6 Adhesive seams and cross-joints. Seam edges must be sealed.

.7 Fit neatly around furniture fitments, around perimeter of rooms into recesses, and around projections.

.8 Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

.9 Install carpet smooth and free of bubbles, puckers, and other defects.

3.4 MODULAR CARPET

.1 Apply acrylic adhesive and install modular carpet in accordance with manufacturer's written instructions.

.2 Lay modular carpet with butt seams.

.3 Roll modular carpet with appropriate roller for complete contact of carpet with mill-applied adhesive to sub-floor.

3.5 SEAMS

.1 Seal edges of cut-outs with latex.

.2 Carpet visibility of seams and joints to acceptable industry standards.

3.6 PROTECTION OF FINISHED WORK

.1 Vacuum carpets clean immediately after completion of installation. Protect traffic areas.

.2 Prohibit traffic on carpet for a period of 24 hours until adhesive is cured.

END OF SECTION

1 General

1.01 RELATED SECTIONS

.1 Section 01 00 10 – General Instructions

.2 Section 01 33 00 – Submittal Procedures

.3 Section 01 78 00 – Closeout Submittals

1.02 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM E 84-17, Standard Test Method for Surface Burning Characteristics of Building Materials.
- .2 ASTM C 423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.

1.03 SUBMITTALS

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

.2 Submit a complete set of CAD generated shop drawings or standard details prepared by the manufacturer showing all necessary details and dimension requirements of acoustical panels.

1.04 QUALITY ASSURANCE

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

.2 Construct one representative mock-up of acoustical wall panel system.

.3 Construct mock-up of minimum full panel height by minimum 2.4m length where directed by Consultant.

.4 Allow 48 hours for inspection of mock-up by Consultant before proceeding with work.

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

.6 Fire-Test-Response: Provide acoustical panels meeting the following as determined by testing components in accordance with ASTM E-84 test procedures. ASTM E-84 testing must be performed by a testing organization acceptable to authorities having jurisdiction.
- .1 As determined by testing per ASTM E-84:
  - .1 Classification: Class “A” or “1”.
  - .2 Flame Spread: 25 or less.
  - .3 Smoke Developed Index: 450 or less.

1.05 CLOSEOUT SUBMITTALS

.1 Provide information required in accordance with Section 01 78 00 – Closeout Submittals

1.06 DELIVERY, STORAGE, AND HANDLING

.1 Comply with fabric and acoustic panel unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

.2 Deliver materials and panels in unopened bundles and stored in a temperature controlled dry place with adequate air circulation.

.3 On-site storage shall be such as to assure all panels and associated materials are protected from damage.

.4 Prior to installation, site must be free of wet and dusty trades and the climatic conditions stabilized to normal operational levels. Allow panels to stabilize on-site for 24 hours prior to installation.

.5 Panels must be handled by persons wearing clean light-weight gloves. Persons installing hardware to substrate (clips, screws, anchors, etc.) must wear the clean light-weight gloves before handling the panels.

2 Products

2.01 PRODUCTS

.1 Pre-fabricated Acoustical Panels when mounted directly to a solid substrate as follows:
- .1 Panel Size: As indicated on architectural drawings.
- .2 Panel Composition: 25 mm Medium Density 6-7 PCF Fiberglass Core and Fabric.
- .3 Nominal Thickness: 25 mm.
- .4 Acoustical Absorption: 25 mm Thick Acoustical Panel: Noise Reduction Coefficients (NRC) rating of 0.90 when tested to ASTM C423.
- .5 Fire Performance: Class A – ASTM E-84 Standard. Flame spread less than 25 and smoke developed less than 50.
- .6 Surface Finish: Specified fabric is bonded or stretched applied over the face of the panel and edge turned with a minimum of 25 mm on the back of the panel. Panel corners are tailor finished to give a clean appearance.
- .7 Edges: Resin Hardened. Pencil radius.
- .8 Wall Mounting System: Mechanical Z-Clips.
- .9 Ceiling Mounting System: Spiral anchor spring fastened to the back of the panel and clipped to an adjustable hanger hook with aircraft cable.
- .10 Acceptable products :
  - .1 Nexus Acoustical Panel by Sky Acoustics Inc.
  - .2 AP acoustic wall panel by Decoustics.
  - .3 Approved equivalent.

.2 Upholstery fabric:
- .1 Content: 100% Polyester, 15% Polyester
- .2 Weight: 313 gr/lm
- .3 Width: 137cm
- .4 Backing: Acrylic
- .5 Finish: PFOA –free stain resistant

.6 Bolt size: 51m
.7 Acoustical Rating (per ASTM C423 for upholstered walls): 0.85 NRC
.8 Lightfastness: 200+ hours
.9 Acceptable products: Tek-Wall Truss from Maharam or approved equivalent.
.10 Fabric colour: 007 Well.

3 Execution

3.01 MANUFACTURER'S INSTRUCTIONS

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

3.02 INSTALLATION

.1 Ensure substrate surface is straight to tolerance of plus or minus 3 mm over 3000 mm.

.2 Install acoustic units to clean, dry and firm substrate using mounting clips as recommended by manufacturer. Ensure units installed with correct face exposed.

.3 Install acoustic units plumb and aligned.

.4 Scribe acoustic units to fit adjacent work and butt joints tight.

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

1.2 REFERENCES

.1 Master Painters Institute (MPI)
  .1 MPI Architectural Painting Specifications Manual, latest edition.

1.3 SUBMITTALS

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

.2 Product Data:
  .1 Submit product data and instructions for each paint and coating product to be used.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data in accordance with Section 01 00 10 – Closeout Submittals.

.2 Provide additional unopened 1 litre can of each paint formula and colour used in project. Store where directed by Consultant.

1.5 STORAGE AND HANDLING

.1 Storage and Protection:
  .1 Provide and maintain dry, temperature controlled, secure storage.
  .2 Store materials and supplies away from heat generating devices.
  .3 Store materials and equipment in well ventilated area within temperature as recommended by manufacturer.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Section 01 74 21 – Waste Management and Disposal

1.7 SITE CONDITIONS

.1 Lighting:
  .1 Provide minimum lighting level of 323 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
  .1 Apply paint finishes when ambient air and substrate temperatures at location of installation can be satisfactorily maintained during application and drying process, within MPI and paint manufacturer's prescribed limits.
  .2 Test concrete, masonry and plaster surfaces for alkalinity as required.
  .3 Apply paint to adequately prepared surfaces, when moisture content is

below paint manufacturer's prescribed limits.

.3 Additional application requirements:

.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.

PART 2 Products

2.1 MATERIALS

.1 Paint materials listed in the MPI Approved Products List (APL) are acceptable for use on this project.

.2 Provide paint materials for paint systems from single manufacturer.

.3 Only qualified products with E3 "Environmentally Friendly" rating are acceptable for use on this project.

.4 Conform to latest MPI requirements for all painting work including preparation and priming.

.5 Materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, thinners, solvents, etc.) in accordance with MPI - Architectural Painting Specification Manual and MPI - Maintenance Repainting Manual "Approved Product" listing.

2.2 COLOURS

.1 Colour schedule will be based upon selection of 5 base colours and 2 accent colours.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site, in accordance with manufacturer's written instructions.

.2 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.3 Thin paint for spraying in accordance with paint manufacturer's instructions.

.4 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 GLOSS/SHEEN RATINGS

.1 Paint gloss/sheen to be defined in accordance with MPI values. Gloss/Sheens to be selected after award of contract. Provide for a total of 3 different gloss/sheens for each painting formula.

2.5 INTERIOR PAINTING

.1 Galvanized Metal, including, but not limited to, exposed ducts, pipes, metalworks, doors and frames, etc…:
- .1 INT 5.3A- Acrylic finish over cementitious primer.
- .2 Primer: MPI #26 - cementious

.2 Wood veneer millwork and casework:
- .1 INT 6.4M – W.B. Varnish, Clear, semi-gloss finish.

.3 Plaster and gypsum board: gypsum wallboard for walls and ceilings.
- .1 INT 9.2M - Institutional low VOC finish

PART 3 Execution

3.1 GENERAL

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

.2 Perform preparation and operations for interior painting in accordance with MPI - Architectural Painting Specifications Manual and MPI - Maintenance Repainting Manual except where specified otherwise.

3.2 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

3.3 PREPARATION

.1 Protection:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.

.2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.

.3 Place "WET PAINT" signs in occupied areas as painting operations progress.

.3 Clean and prepare surfaces in accordance with MPI - Architectural Painting Specification Manual specific requirements and coating manufacturer's recommendations.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Where possible, prime non-exposed surfaces of interior wood surfaces before installation. Always prime every surface, exposed and concealed, of exterior wood surfaces prior to application.

.1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.6 Apply vapour impermeable primer to all gypsum walls and gypsum board applied to underside of trusses and roof assemblies. Apply sufficient number and thickness of applications as required to meet maximum permeability.

.7 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 1000 mm.

.8 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.

.9 Touch up of shop primers with primer as specified.

.10 Do not apply paint until prepared surfaces have been inspected by Consultant.

3.4 APPLICATION

.1 Conform to manufacturer's application instructions unless specified otherwise.

.2 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.3 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.4 Sand and dust between coats to remove visible defects.

.5 Apply minimum one coat of primer and 2 coats of finish colour and gloss/sheen to all areas unless indicated otherwise.

.6 Where clear finishes or stains indicated, apply minimum 3 coats of clear finishing product.

.7 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.8 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.5 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Paint conduits, piping, hangers, ductwork and other mechanical and electrical equipment exposed in finished areas, to match adjacent surfaces, except as indicated.

.2 Do not paint over nameplates.

.3 Keep sprinkler heads free of paint.

.4 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

.5 Paint natural gas piping to match adjacent surface finish.

.6 Paint both sides and edges of backboards for telephone and electrical equipment before installation with ULC fire-resistive coating. Leave equipment in original finish except for touch-up as required, and paint conduits, mounting accessories and other unfinished items.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

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

.1 Material Safety Data Sheets (MSDS).

.2 National Fire Protection Association (NFPA)

.1 NFPA 10-2013, Standard for Portable Fire Extinguishers.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Provide shop drawings.

.4 Quality control submittals: submit following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence and cleaning procedure.

.2 Manufacturer's Field Reports: submit manufacturer's written reports within 3 days of review, verifying compliance of Work, as described in PART 3, FIELD QUALITY CONTROL.

.5 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 00 10 – General Instructions.

1.3 DELIVERY, STORAGE AND HANDLING

.1 Packing, shipping, handling and unloading:

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

Part 2 Products

2.1 MULTI-PURPOSE DRY CHEMICAL EXTINGUISHERS

.1 Stored pressure rechargeable type with hose and shut-off nozzle, ULC labelled for A, B and C class protection.

.1 Size 4.5kg, type 4A-80B-C.

2.2 IDENTIFICATION

.1 Identify extinguishers in accordance with recommendations of ANSI/NFPA 10.

.2 Attach tag or label to extinguishers, indicating month and year of installation. Provide space for service dates.

Part 3 Execution

3.1 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 or mount extinguishers on brackets as indicated, in accordance with NFPA 10.

3.3 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

END OF SECTION

PART 1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
.1 ASTM f851-87(2013, Standard Test Method for Self-Rising Mechanisms.

1.3 QUALITY ASSURANCE

.1 Manufacturer: Company specializing in seating with a minimum of ten years' experience in manufacturing seating.

.2 Engineer Qualifications: Manufacturer to employ a registered licensed professional engineer to certify that the equipment to be supplied meets or exceeds the design criteria of this specification.

.3 Installation: Shall be handled directly by the manufacturer or by a factory certified installation sub-contractor.

.4 Product Liability: Certification of insurance coverage for the life of the product.

.5 Welding Processes: To be performed by certified professional welding contractors in accordance with AWSD1.1.

.6 Product Improvements: Equipment provided shall incorporate manufacturer's design improvements and materials current at time of shipment, provided that such improvements and materials are consistent with the intent of these specifications.

1.4 SUBMITTALS

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

.2 Manufacturer's specifications.

.3 Plan View and Section Drawings providing full layout details and seating capacities.

.4 Shop drawings showing all equipment to be furnished.

.5 Samples of material and color finish as requested by architect.

1.5 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data in accordance with Section 01 00 10 – Closeout Submittals.

1.6 DESIGN CRITERIA

.1 Chairs:
- .1 Seats shall be cantilevered, self-centering, automatic lift, maximizing seatway upon seat lift for ease of passage and janitorial access.
- .2 Seats shall be tested and certified to support and withstand an evenly distributed load of 600 lbs. (272kg.).
- .3 Seats shall be tested and certified to ASTM Designation F851-87 Test Method for Self-Rising Mechanism.
- .4 Material Flammability: Shall satisfy applicable test, codes, standards, of requirements as follows:
- .5 Polyethylene or polypropylene where used shall meet the Federal Motor Vehicles Safety Standard No. 302 which specifies a burning rate of less than 4” per minute.
- .6 Upholstery materials where used meet Class 1 requirements of U.S. Department of Commerce, CS 191-52, as required by the State of California Home Furnishings bulletin 117.
- .7 Cushioning and padding meet California Bulleting 117, Resilient Cellular Materials Section A & D dated February 1975 when tested in accordance with Federal Test Method Standard 191, Method 5903.2.

1.7 WARRANTY

.1 The manufacturer shall warrant all work performed under these specifications to be free of defects for a period of two years.

PART 2 Products

2.1 GENERAL

.1 This specification is based on upholstered seating as manufactured by Audience Systems.

.2 Acceptance of products by other manufacturer is subject to the approval of the Architect.

2.2 DIMENSIONS

.1 Chair dimensions, seatways and all other aspects of layout are per plans. Dimensions must be strictly adhered to.

2.3 FABRICATION

.1 Chair Type: Tread fixed.

.1 Chair shall be Espace 628T chair with upholstered seat and back. Chair shall have a gravity tip mechanism for automatically lifting the seat to uniform folded position without the need for a spring. Chairs must be grouped in quantities and location per plan.

.2 Beam mounted design, consisting of tread fixed leg and beam assemblies and chair assemblies.

.1 Tread fixed leg and beam assembly: Consisting of a transverse beam to facilitate chair position, tubular steel legs and pressed steel feet.

.2 Chair Assemblies: Comprising standard / armrest assemblies, upholstered seat and upholstered back.

.1 Cast aluminum standard / armrest assemblies: when mounted to the transverse beam, these will properly support the seats and backs and coordinate the action of the armrest, seat, and back. The armrest subassembly will be spring assisted in its operation.

.2 Tablet Arm: The armrest shall be a ABS armrest with standard black finish. The armrests will incorporate an integral fold-away writing tablet with anti-panic mechanism facilitating fast emergency egress. Writing tablet assembly to consist of steel bracket with MDF with plastic laminate writing tablet and magnetic catch.

.1 Upholstered seat – fully enveloped: Seat shall be an upholstered plywood base construction including a waterfall front edge. The plywood base shall have a 2” ergonomically shaped polyurethane foam pad which will be adhered to the base. The specified fabric cover will be secured to the seat in full side wrap to maximize the retention means.

.2 Upholstered Standard Height Back – Fully Enveloped: Back shall consist of ½” thick cross-banded plywood padded with 1¾” polyurethane foam and upholstered in the specified fabric presenting a strong, attractive unified assembly. The whole of the outside of the back will be wood Windsor Oak veneer with clear lacquer finish.

.3 Fabric: Camira Xtreme. Colour to be selected from full colour range.

.2 Chair Dimensions:

.1 Seat up envelope: 174 mm (6⅞”)

.2 Seat down envelope: 635 mm (25”) (660 mm (26”) when writing tablet is in use).

.3 Seat height: 457 mm (18”)

.4 Armrest height: 616 mm (24¼”) (654mm (25¾”) when writing tablet is in use)

.5 Back height: 851mm (33½”).

.3 Finish:

.1 Metal parts: Epoxy polyester powder coat finish in RAL 9005 black.
.2 Writing tablet bracket: Bright zinc plated with clear corrosion-proof coat.
.3 Writing tablet: plastic laminate from standard laminate selection.
.4 Plastic parts: RAL 9005 black.

PART 3 Execution

3.1 GENERAL

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

3.2 INSTALLATION

.1 The installation of the chairs will be handled directly by a factory authorized installation sub-contractor qualified to perform the installation function.

3.3 MAINTENANCE AND OPERATION

.1 Instructions in both operation and maintenance shall be transmitted to the owner by the manufacturer’s representative:

.2 Maintenance and operation of the chairs shall be the responsibility of the owner or his duly authorized representative and shall include the following:
.1 Chair operation, who will assure that the operation is in accordance with the manufacturer’s instructions.
.2 Only attachments specifically approved by the manufacturer for the specific installation shall be attached to the chairs.

3.4 ADJUSTMENT AND CLEANING

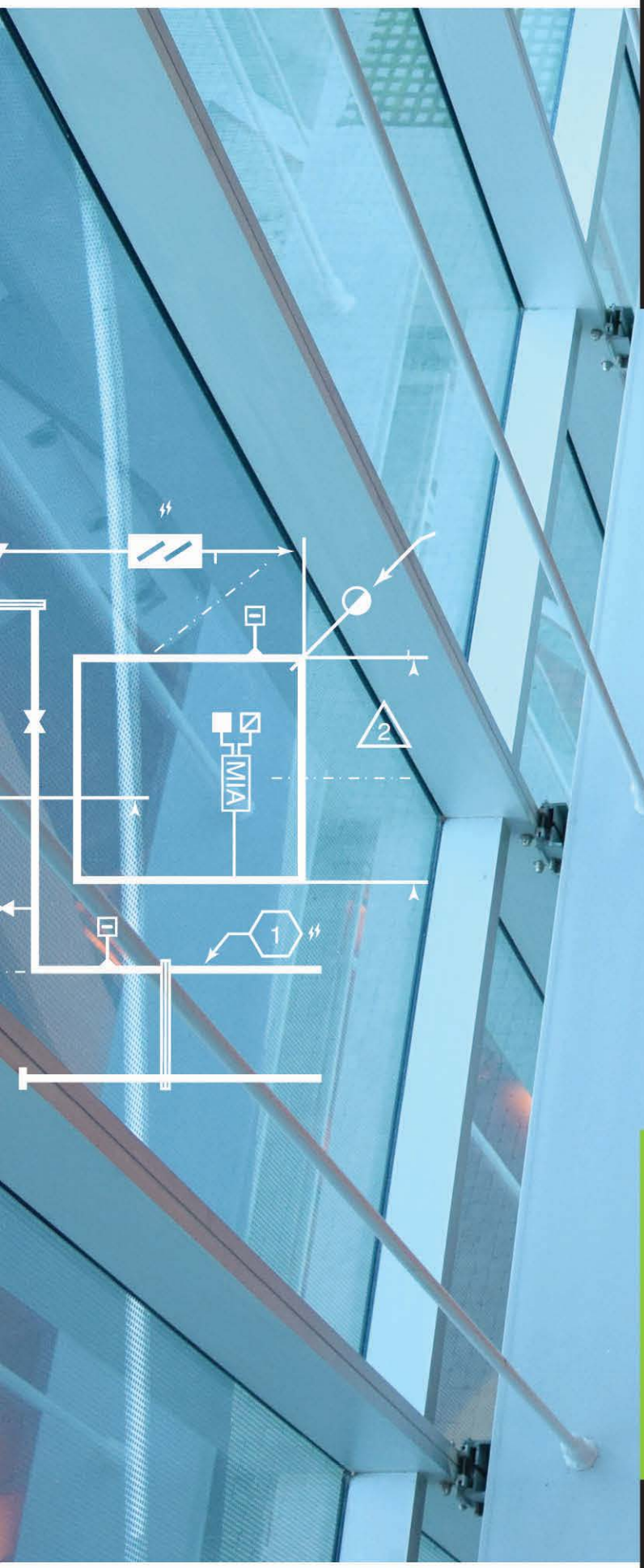
.1 All installed equipment shall be perpendicular and laterally parallel to the floor, aligned and secured in accord with manufacturer’s drawings.

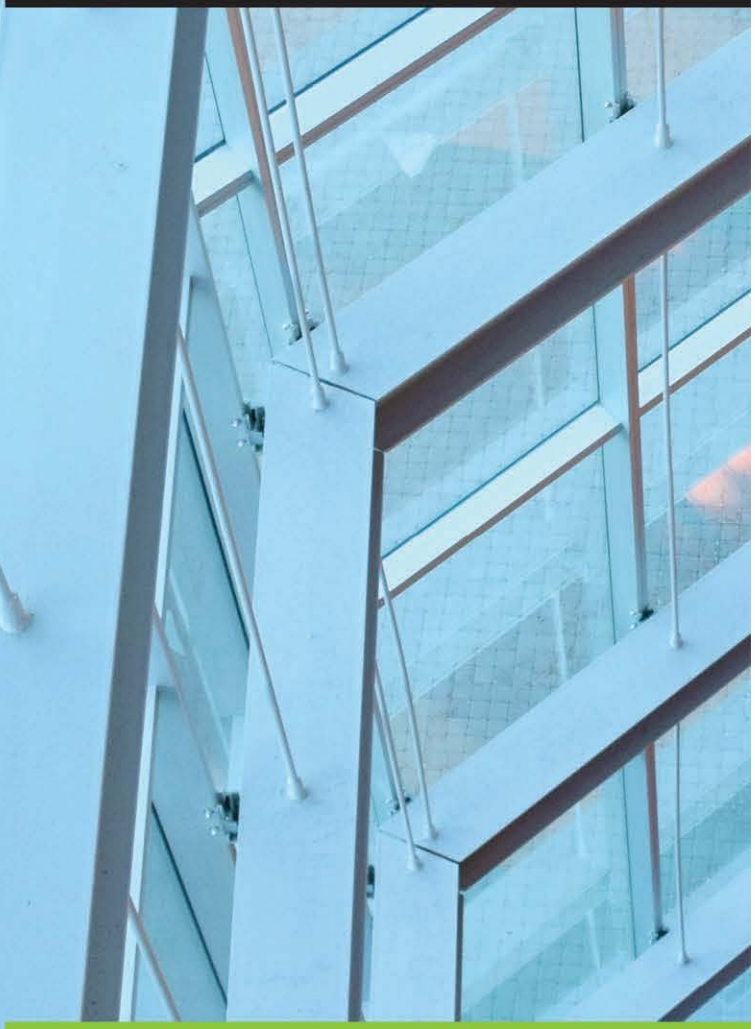
.2 Clean work area and remove debris from site.

END OF SECTION

PAGEAU MOREL

UN ENGAGEMENT DURABLE | A SUSTAINABLE COMMITMENT





CFIA

OLF Building 201 Auditorium, Break Areas and C Wing Millwork | GRC Project #1217

7400-002-00

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OLF Building 201 Auditorium, Beak Areas and C Wing Millwork | GRC Project #1217

Electromechanical Specifications 7400-002-00

September 29, 2017

For Tender

Mechanical **Electrical**

This document should not be used for construction purposes

Part 1 General

1.1 RELATED SECTIONS

.1 Section 09 91 13- Painting

.2 Section 23 05 93- Testing, Adjusting and Balancing for HVAC

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Shop Drawings:

.1 Indicate on drawings:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.2 Shop drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 - General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for auditorium's HVAC systems (existing and new).

.1 Operation and maintenance manual approved by, and final copies deposited with, Engineer before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93- Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Engineer for approval. Submission of individual data will not be accepted unless directed by Engineer.

.2 Make changes as required and re-submit as directed by Engineer.

.6 Site records:

.1 Engineer will provide 1set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems and control systems.

.2 Transfer information on a bi-weekly basis to reproducible, revising reproducible to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.7 As-built drawings:

.1 Prior to start of Testing, Adjusting and Balancing for HVAC, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: - "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Engineer for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.8 Submit copies of as-built drawings for inclusion in final TAB report.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Not Used

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 13- Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.3 SYSTEM CLEANING

.1 Clean interior and exterior of all systems located in the Auditorium. Vacuum interior of ductwork.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

3.5 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

END OF SECTION

Part 1 General

1.1 USE OF SYSTEMS

.1 Use of existing ventilating and heating systems for supplying temporary ventilation and heat is permitted only under following conditions:

.1 There is no possibility of damage.

.2 Supply ventilation systems are protected by 60% filters, inspected daily, changed every 2 weeks or more frequently as required.

.3 Return systems have approved filters over openings, inlets, outlets.

.4 Systems will be:

.1 Operated by Contractor.

.2 Monitored continuously by Contractor.

Part 2 Products

2.1 NOT USED

.1 Not Used.

Part 3 Execution

3.1 NOT USED

.1 Not Used.

END OF SECTION

Part 1 General

1.1 QUALIFICATIONS OF TAB PERSONNEL

.1 Submit names of personnel to perform TAB to Engineer within 10 days of award of contract.

.2 Provide documentation confirming qualifications, successful experience.

.3 TAB: performed in accordance with the requirements of standard under which TAB Firm's qualifications are approved:

.1 Associated Air Balance Council, (AABC) National Standards for Total System Balance, MN-1-2016.

.2 National Environmental Balancing Bureau (NEBB) TABES, Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems-2005.

.3 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), HVAC TAB HVAC Systems - Testing, Adjusting and Balancing-2002.

.4 Recommendations and suggested practices contained in the TAB Standard: mandatory.

.5 Use TAB Standard provisions, including checklists, and report forms to satisfy Contract requirements.

.6 Use TAB Standard for TAB, including qualifications for TAB Firm and Specialist and calibration of TAB instruments.

.7 Where instrument manufacturer calibration recommendations are more stringent than those listed in TAB Standard, use manufacturer's recommendations.

.8 TAB Standard quality assurance provisions such as performance guarantees form part of this contract.

.1 For systems or system components not covered in TAB Standard, use TAB procedures developed by TAB Specialist.

.2 Where new procedures, and requirements, are applicable to Contract requirements have been published or adopted by body responsible for TAB Standard used (AABC, NEBB, or TABB), requirements and recommendations contained in these procedures and requirements are mandatory.

1.2 PURPOSE OF TAB

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

.2 Adjust and regulate equipment and systems to meet specified performance requirements and to achieve specified interaction with other related systems under normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.3 EXCEPTIONS

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

1.4 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.5 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Division 23.

1.6 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Engineer for verification of TAB reports.

1.7 START OF TAB

.1 Start TAB when building is essentially completed, including:

.2 Installation of ceilings, doors, windows, other construction affecting TAB.

.3 Application of weather stripping, sealing, and caulking.

.4 Provisions for TAB installed and operational.

.5 Start-up, verification for proper, normal and safe operation of mechanical and associated electrical and control systems affecting TAB including but not limited to:

.1 Proper thermal overload protection in place for electrical equipment.

.2 Air systems:

.1 Filters in place, clean.

.2 Duct systems clean.

.3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.

.4 Correct fan rotation.

.5 Fire, smoke, volume control dampers installed and open.

.6 Coil fins combed, clean.

.7 Access doors, installed, closed.

.8 Outlets installed, volume control dampers open.

1.8 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:

.1 HVAC systems: plus 5%, minus 5%.

1.9 ACCURACY TOLERANCES

.1 Measured values accurate to within plus or minus 2% of actual values.

1.10 INSTRUMENTS

.1 Prior to TAB, submit to Engineer list of instruments used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Engineer.

1.11 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit, prior to commencement of TAB:

.2 Proposed methodology and procedures for performing TAB if different from referenced standard.

1.12 PRELIMINARY TAB REPORT

.1 Submit for checking and approval of Engineer, prior to submission of formal TAB report, sample of rough TAB sheets. Include:

.1 Details of instruments used.

.2 Details of TAB procedures employed.

.3 Calculations procedures.

.4 Summaries.

1.13 TAB REPORT

.1 Format in accordance with referenced standard.

.2 TAB report to show results in SI units and to include:

.1 Project record drawings.

.2 System schematics.

.3 Submit 1 soft copy (pdf) of TAB Report to Engineer for verification and approval, in English.

1.14 VERIFICATION

.1 Reported results subject to verification by Engineer.

.2 Provide personnel and instrumentation to verify up to 30% of reported results.

.3 Number and location of verified results as directed by Engineer.

.4 Pay costs to repeat TAB as required to satisfaction of Engineer.

1.15 SETTINGS

.1 After TAB is completed to satisfaction of Engineer, replace drive guards, close access doors, lock devices in set positions, ensure sensors are at required settings.

.2 Permanently mark settings to allow restoration at any time during life of facility. Do not eradicate or cover markings.

1.16 COMPLETION OF TAB

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

1.17 AIR SYSTEMS

.1 Standard: TAB to most stringent of TAB standards of SMACNA, AABC, NEBB and ASHRAE.

.2 Do TAB of following systems, equipment, components, controls:

.1 Auditorium ventilation system, supply and return (system AHU-6)

.3 Qualifications: personnel performing TAB qualified to standards of AABC or NEBB.

.4 Measurements: to include as appropriate for systems, equipment, components, controls: air velocity, static pressure, flow rate, pressure drop (or loss), temperatures (dry bulb, wet bulb, dewpoint), duct cross-sectional area, RPM, electrical power, voltage.

.5 Locations of equipment measurements: to include as appropriate:

.1 Inlet and outlet of dampers, filter, coil, fan, other equipment causing changes in conditions.

.6 Locations of systems measurements to include as appropriate: main ducts, main branch, sub-branch, run-out (or grille, register or diffuser).

Part 2 Products

2.1 NOT USED

.1 Not used.

Part 3 Execution

3.1 NOT USED

.1 Not used.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Materials and methods for pressure testing ducts over 5m in length, forming part of a supply, return or exhaust ductwork system directly or indirectly connected to air handling equipment.

.2 Sustainable requirements for construction and verification.

1.2 RELATED SECTIONS

.1 Section 23 31 13.01- Metal ducts – Low pressure to 500 Pa

1.3 REFERENCE STANDARDS

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

.1 Material Safety Data Sheets (MSDS).

.2 Sheet Metal and Air Conditioning Contractor's National Association (SMACNA)

.1 SMACNA HVAC Air Duct Leakage Test Manual, 2012.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties. Include pressure test information and results as follows:

.1 Submit proposed report form and test report format to Engineer for approval at least three months before proposed date of first series of tests. Do not start tests until approval received in writing from Departmental Representative.

.2 Prepare report of results and submit to Departmental Representative within 24 hours of completion of tests. Include:

.1 Schematic of entire system.

.2 Schematic of section under test showing test site.

.3 Required and achieved static pressures.

.4 Orifice differential pressure at test sites.

.5 Permissible and actual leakage flow rate (L/s) for test sites.

.6 Witnessed certification of results.

.3 Include test reports in final TAB report.

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Instructions: submit manufacturer's installation instructions.

.6 Manufacturer's field reports specified.

1.5 QUALITY ASSURANCE

.1 Health and Safety:

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

Part 2 Products

2.1 TEST INSTRUMENTS

.1 Test apparatus to include:

.1 Fan capable of producing required static pressure.

.2 Duct section with calibrated orifice plate mounted and accurately located pressure taps.

.3 Flow measuring instrument compatible with the orifice plate.

.4 Calibration curves for orifice plates used.

.5 Flexible duct for connecting to ductwork under test.

.6 Smoke bombs for visual inspections.

.2 Test apparatus: accurate to within +/- 3% of flow rate and pressure.

.3 Submit details of test instruments to be used to Departmental Representative at least three months before anticipated start date.

.4 Test instruments: calibrated and certificate of calibration deposited with Departmental Representative no more than 28 days before start of tests.

.5 Re-calibrated every six months thereafter.

2.2 EQUIPMENT LEAKAGE TOLERANCES

.1 Equipment and system components such as VAV boxes, duct heating leakage: 2%

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 TEST PROCEDURES

.1 Maximum lengths of ducts to be tested consistent with capacity of test equipment.

.2 Section of duct to be tested to include:

.1 Fittings, branch ducts, tap-ins.

.3 Repeat tests until specified pressures are attained. Bear costs for repairs and repetition to tests.

.4 Base partial system leakage calculations on SMACNA HVAC Air Duct Leakage Test Manual.

.5 Seal leaks that can be heard or felt, regardless of their contribution to total leakage.

3.3 SITE TOLERANCES

.1 System leakage tolerances specified are stated as percentage of total flow rate handled by system. Pro-rate specified system leakage tolerances. Leakage for sections of duct systems: not to exceed total allowable leakage.

.2 Leakage tests on following systems not to exceed specified leakage rates.

.1 Small duct systems up to 250 Pa: leakage 2%.

.2 VAV box and duct on downstream side of VAV box: leakage 2%.

.3 Large low pressure duct systems up to 500 Pa: leakage 2%.

.4 HP duct systems up to 1000 Pa pressure classification, including upstream side of VAV boxes: leakage 1.

.3 Evaluation of test results to use surface area of duct and pressure in duct as basic parameters.

3.4 TESTING

.1 Test ducts before installation of insulation or other forms of concealment.

.2 Test after seals have cured.

.3 Test when ambient temperature will not affect effectiveness of seals, and gaskets.

.4 Flexible connections to VAV boxes.

3.5 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services.

.1 Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.

.2 Manufacturer's Field Services: provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, at stages listed:

.1 After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.

.2 Twice during progress of Work at 25%and 60% complete.

.3 Upon completion of the Work, after cleaning is carried out.

.4 Obtain reports, within 3 days of review, and submit, immediately, to Departmental Representative.

.2 Performance Verification:

.1 Departmental Representative to witness tests and to verify reported results.

.2 To be certified by same TAB agency approved by Departmental Representative to undertake TAB on this project.

3.6 CLEANING

.1 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)

.1 ANSI/ASHRAE/IESNA 90.1-16, SI; Energy Standard for Buildings Except Low-Rise Residential Buildings.

.2 ASTM International Inc.

.1 ASTM C335-10e1, Standard Test Method for Steady State Heat Transfer Properties of Pipe Insulation.

.2 ASTM C449/C449M-00, Standard Specification for Mineral Fiber-Hydraulic-Setting Thermal Insulating and Finishing Cement.

.3 ASTM C553-13, Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

.4 ASTM C921-15, Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation.

.3 Canadian General Standards Board (CGSB)

.1 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.

.4 Thermal Insulation Association of Canada (TIAC): National Insulation Standards (2005).

.5 Underwriters Laboratories of Canada (ULC)

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

1.2 DEFINITIONS

.1 For purposes of this section:

.1 "CONCEALED" - insulated mechanical services and equipment in suspended ceilings and non-accessible chases and furred-in spaces.

.2 "EXPOSED" - means "not concealed" as previously defined.

.3 Insulation systems - insulation material, fasteners, jackets, and other accessories.

.2 TIAC Codes:

.1 CRD: Code Round Ductwork,

.2 CRF: Code Rectangular Finish.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Provide manufacturer's printed product literature and datasheets for duct insulation, and include product characteristics, performance criteria, physical size, finish and limitations.

.1 Description of equipment giving manufacturer's name, type, model, year and capacity.

.2 Details of operation, servicing and maintenance.

.3 Recommended spare parts list.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

Part 2 Products

2.1 FIRE AND SMOKE RATING

.1 To CAN/ULC-S102:

.1 Maximum flame spread rating: 25.

.2 Maximum smoke developed rating: 50.

2.2 INSULATION

.1 Mineral fibre: as specified includes glass fibre, rock wool, slag wool.

.2 Thermal conductivity ("k" factor) not to exceed specified values at 24 degrees C mean temperature when tested in accordance with ASTM C335.

.3 TIAC Code C-1: Rigid mineral fibre board to ASTM C612, with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this Section).

.4 TIAC Code C-2: Mineral fibre blanket to ASTM C553 faced with factory applied vapour retarder jacket to CGSB 51-GP-52Ma (as scheduled in PART 3 of this section).

.1 Mineral fibre: to ASTM C553.

.2 Jacket: to CGSB 51-GP-52Ma.

.3 Maximum "k" factor: to ASTM C553.

2.3 JACKETS

.1 Canvas:

.1 220 gm/m^2cotton, plain weave, treated with dilute fire retardant lagging adhesive to ASTM C921.

.2 Lagging adhesive: compatible with insulation.

2.4 ACCESSORIES

.1 Vapour retarder lap adhesive:

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

.2 Indoor Vapour Retarder Finish:

.1 Vinyl emulsion type acrylic, compatible with insulation.

.3 Insulating Cement: hydraulic setting on mineral wool, to ASTM C449.

.4 ULC Listed Canvas Jacket:

.1 220 gm/m^2cotton, plain weave, untreated

.5 Tape: self-adhesive, aluminum, reinforced, 75mm wide minimum.

.6 Contact adhesive: quick-setting

.7 Canvas adhesive: washable.

.8 Tie wire: 1.5mm stainless steel.

.9 Banding: 19mm wide, 0.5mm thick stainless steel.

.10 Fasteners: 4mm diameter pins with 35mm diameter clips, length to suit thickness of insulation.

Part 3 Execution

3.1 APPLICATION

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

3.2 PRE-INSTALLATION REQUIREMENTS

.1 Pressure test ductwork systems complete, witness and certify.

.2 Ensure surfaces are clean, dry, free from foreign material.

3.3 INSTALLATION

.1 Install in accordance with TIAC National Standards.

.2 Apply materials in accordance with manufacturer's instructions and as indicated.

.3 Use 2 layers with staggered joints when required nominal thickness exceeds 75 mm.

.4 Maintain uninterrupted continuity and integrity of vapour retarder jacket and finishes.

.1 Ensure hangers, and supports are outside vapour retarder jacket.

.5 Apply high compressive strength insulation where insulation may be compressed by weight of ductwork.

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

3.4 DUCTWORK INSULATION SCHEDULE

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

TIAC Code	TIAC Code	Vapour Retarder	Thickness
Rectangular cold and dual temperature supply air ducts	C-1	yes	50
Round cold and dual temperature supply air ducts	C-2	yes	50
Return and exhaust ducts exposed in space being served	none		

.2 Exposed round ducts 600 mm and larger, smaller sizes where subject to abuse:

.1 Use TIAC code C-1 insulation, scored to suit diameter of duct.

.1 Finishes: conform to following table:

	TIAC Code	
	Rectangular	Round
Indoor, concealed	none	none
Indoor, exposed elsewhere	CRF/2	CRD/3

3.5 CLEANING

.1 Clean in accordance with Section 01 00 10 - General Instructions.

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

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 ASME

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Test Reports: submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.

.4 Shop Drawings:

.1 Provide diagrams showing normal positions, model numbers, air piping and wiring layouts.

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

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 - General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for pneumatic control system for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

Part 2 Products

2.1 CONTROL AIR TUBING

.1 Plastic: flame retardant PVC tubing with minimum burst gauge pressure of 1.4 MPa at 80 degrees C.

2.2 THERMOSTAT

.1 Existing thermostat to be refurbished and recalibrated by Contractor.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 MANUFACTURER'S INSTRUCTIONS

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

3.3 INSTALLATION

.1 Identify and code pneumatic tubing at every branch and at each piece of equipment and components.

3.4 FIELD QUALITY CONTROL

.1 Start-Up and Adjustment:

.1 Upon completion of installation, test, adjust and regulate controls or safety equipment provided under this Section.

.2 Adjust and place in operating condition.

3.5 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 23 05 94 - Pressure Testing of Ducted Air Systems

1.2 REFERENCE STANDARDS

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

.2 ASTM International

.1 ASTM A653/A653M-15e1, Standard Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.

.3 Green Seal Environmental Standards (GS)

.1 GS-36-13, Standard for Adhesives for Commercial Use.

.4 National Fire Protection Association (NFPA)

.1

.5 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA HVAC Duct Construction Standards - Metal and Flexible, 2013.

.2 SMACNA HVAC Air Duct Leakage Test Manual, 2012.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Test and Evaluation Reports:

.1 Certification of Ratings:

.1 Catalogue or published ratings to be those obtained from tests carried out by manufacturer or independent testing agency signifying adherence to codes and standards.

.2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings Under Construction.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect metal ducts from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SEAL CLASSIFICATION

.1 Classification as follows:

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

.2 Seal classification:

.1 Class A: longitudinal seams, transverse joints, duct wall penetrations and connections made airtight with sealant and tape.

.2 Class B: longitudinal seams, transverse joints and connections made airtight with sealant or combination thereof.

.3 Class C: transverse joints and connections made air tight with sealant, gaskets or combination thereof. Longitudinal seams unsealed.

.4 Unsealed seams and joints.

2.2 SEALANT

.1 Sustainability Characteristics:

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

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

2.3 TAPE

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

2.4 DUCT LEAKAGE

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

2.5 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows:

- .1 centreline radius: 1.5 times width of duct.
- .2 Round: smooth radius, centreline radius: 1.5 times diameter.

.3 Mitred elbows, rectangular:

- .1 To 400mm: with single thickness turning vanes.
- .2 Over 400mm: with double thickness turning vanes.

.4 Branches:

- .1 Rectangular main and branch: with 45 degrees entry on branch radius on branch 1.5 times width of duct.
- .2 Round main and branch: enter main duct at 45 degrees with conical connection.
- .3 Provide volume control damper in branch duct near connection to main duct.
- .4 Main duct branches: with splitter damper.

.5 Transitions:

- .1 Diverging: 20degrees maximum included angle.
- .2 Converging:30degrees maximum included angle.

.6 Offsets:

- .1 as indicated.

.7 Obstruction deflectors: maintain full cross-sectional area.

- .1 Maximum included angles: as for transitions.

2.6 FIRE STOPPING

.1 Retaining angles around duct, on both sides of fire separation in accordance with Section 07 84 00 - Fire Stopping.

.2 Fire stopping material and installation must not distort duct.

2.7 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653/A653M, Z90zinc coating.

.2 Thickness, fabrication and reinforcement: to SMACNA.

.3 Joints: to SMACNA proprietary manufactured duct joint. Proprietary manufactured flanged duct joint to be considered to be a class A seal.

2.8 HANGERS AND SUPPORTS

.1 Hangers and Supports:

.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.1 Maximum size duct supported by strap hanger: 500.

.2 Hanger configuration: to SMACNA.

.3 Hangers: galvanized steel angle with galvanized steel rods following table:

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

.4 Upper hanger attachments

.1 For concrete: manufactured concrete inserts.

.2 For steel joist: manufactured joist clamp.

.3 For steel beams: manufactured beam clamps:

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 GENERAL

.1 Do work SMACNA as indicated.

.2 Do not break continuity of insulation vapour barrier with hangers or rods.

.1 Insulate strap hangers 100 mm beyond insulated duct. Ensure diffuser is fully seated.

.3 Support risers in accordance with SMACNA.

.4 Install breakaway joints in ductwork on sides of fire separation.

.5 Install proprietary manufactured flanged duct joints in accordance with manufacturer's instructions.

.6 Manufacture duct in lengths and diameter to accommodate installation of acoustic duct lining.

3.3 HANGERS

.1 Strap hangers: install in accordance with SMACNA.

.2 Angle hangers: complete with locking nuts and washers.

.3 Hanger spacing: as follows:

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

3.4 SEALING AND TAPING

.1 Apply sealant in accordance with SMACNA.

.2 Bed tape in sealant and recoat with minimum of 1coat of sealant to manufacturers recommendations.

3.5 LEAKAGE TESTS

.1 Refer to Section 23 05 94- Pressure Testing of Ducted Air Systems.

.2 In accordance with SMACNA HVAC Duct Leakage Test Manual.

.3 Do leakage tests in sections.

.4 Make trial leakage tests as instructed to demonstrate workmanship.

.5 Do not install additional ductwork until trial test has been passed.

.6 Test section minimum of 30m long with not less than three branch takeoffs and two90 degrees elbows.

.7 Complete test before performance insulation or concealment Work.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)

.1 SMACNA - HVAC Duct Construction Standards - Metal and Flexible, 2005.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Indicate:

.1 Flexible connections.

.2 Duct access doors.

.3 Turning vanes.

.4 Instrument test ports.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect air duct accessories from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

.1 Manufacture in accordance with SMACNA - HVAC Duct Construction Standards.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame

.2 Material:

.1 Fire resistant, self-extinguishing, neoprene coated glass fabric, temperature rated at minus 40degrees C to plus 90degrees C, density of 1 kg/m^2.

2.3 ACCESS DOORS IN DUCTS

.1 Non-Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame.

.2 Insulated Ducts: sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 0.6 mm thick complete with sheet metal angle frame and 25 mm thick rigid glass fibre insulation.

.3 Gaskets: neoprene.

.4 Hardware:

.1 Up to 300 x 300mm: two sash locks complete with safety chain.

.2 301 to 450mm: four sash locks complete with safety chain.

.3 451 to 1000mm: piano hinge and minimum two sash locks.

.4 Doors over 1000mm: piano hinge and two handles operable from both sides.

.5 Hold open devices.

.6 300 x 300 mm glass viewing panels.

2.4 TURNING VANES

.1 Factory or shop fabricated double thickness with trailing edge, to recommendations of SMACNA and as indicated.

2.5 INSTRUMENT TEST

.1 1.6mm thick steel zinc plated after manufacture.

.2 Cam lock handles with neoprene expansion plug and handle chain.

.3 28 mm minimum inside diameter. Length to suit insulation thickness.

.4 Neoprene mounting gasket.

2.6 SPIN-IN COLLARS

.1 Conical galvanized sheet metal spin-in collars with lockable butterfly damper.

.2 Sheet metal thickness to co-responding round duct standards.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 INSTALLATION

.1 Flexible Connections:

.1 Install in following locations:

.1 Inlets and outlets to supply air units and fans.

.2 Inlets and outlets of exhaust and return air fans.

.3 As indicated.

.2 Length of connection: 100mm.

.3 Minimum distance between metal parts when system in operation: 75mm.

.4 Install in accordance with recommendations of SMACNA.

.5 When fan is running:

.1 Ducting on sides of flexible connection to be in alignment.

.2 Ensure slack material in flexible connection.

.6 Locations:

.1 Fire and smoke dampers.

.2 Control dampers.

.3 Devices requiring maintenance.

.4 Required by code.

.5 Reheat coils.

.6 Elsewhere as indicated.

.2 Instrument Test Ports:

.1 General:

.1 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.2 Locate to permit easy manipulation of instruments.

.3 Install insulation port extensions as required.

.4 Locations:

.1 For traverse readings:

.1 Ducted inlets to roof and wall exhausters.

.2 Inlets and outlets of other fan systems.

.3 Main and sub-main ducts.

.4 And as indicated.

.2 For temperature readings:

.1 At outside air intakes.

.2 In mixed air applications in locations as approved by Engineer.

.3 At inlet and outlet of coils.

.4 Downstream of junctions of two converging air streams of different temperatures.

.5 And as indicated.

.3 Turning Vanes:

.1 Install in accordance with recommendations of SMACNA and as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 SMACNA HVAC Duct Construction Standards, Metal and Flexible-2013.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Construction IAQ Management Plan:

.1 Submit Indoor Air Quality (IAQ) Plan for construction phases of building.

.2 During construction meet or exceed the requirements of SMACNA IAQ Guideline for Occupied Buildings Under Construction.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 - General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for dampers for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 GENERAL

.1 Manufacture to SMACNA standards.

2.2 SPLITTER DAMPERS

.1 Fabricate from same material as duct but one sheet metal thickness heavier, with appropriate stiffening.

.2 Double thickness construction.

.3 Control rod with locking device and position indicator.

.4 Rod configuration to prevent end from entering duct.

.5 Pivot: piano hinge.

.6 Folded leading edge.

2.3 SINGLE BLADE DAMPERS

.1 Fabricate from same material as duct, but one sheet metal thickness heavier. V-groove stiffened.

.2 Size and configuration to recommendations of SMACNA, except maximum height 100 mm.

.3 Locking quadrant with shaft extension to accommodate insulation thickness.

.4 Inside and outside bronze end bearings.

.5 Channel frame of same material as adjacent duct, complete with angle stop.

2.4 MULTI-BLADED DAMPERS

.1 Factory manufactured of material compatible with duct.

.2 Opposed blade: configuration, metal thickness and construction to recommendations of SMACNA.

.3 Maximum blade height: 100 mm.

.4 Bearings: pin in bronze bushings.

.5 Linkage: shaft extension with locking quadrant.

.6 Channel frame of same material as adjacent duct, complete with angle stop.

.7 Maximum leakage : 2%

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 INSTALLATION

.1 Install where indicated.

.2 Install in accordance with recommendations of SMACNA and in accordance with manufacturer's instructions.

.3 Locate balancing dampers in each branch duct, for supply, return and exhaust systems.

.4 Runouts to registers and diffusers: install single blade damper located as close as possible to main ducts.

.5 Dampers: vibration free.

.6 Ensure damper operators are observable and accessible.

.7 Corrections and adjustments conducted by Engineer.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 23 33 00 - Air Duct Accessories

1.2 REFERENCE STANDARDS

.1 National Fire Protection Association (NFPA)

.1 NFPA 90A-15, Standard for the Installation of Air Conditioning and Ventilating Systems.

.2 Underwriters Laboratories of Canada (ULC)

.1 CAN/ULC-S112-10, Standard Test Method of Fire Test of Fire Damper Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Indicate the following:

.1 Fire dampers.

.2 Fire stop flaps.

.3 Operators.

.4 Fusible links.

.5 Design details of break-away joints.

.3 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 - General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for fire dampers for incorporation into manual.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Submit maintenance materials in accordance with Section 01 00 10 - General Instructions.

.2 Provide:

.1 2 fusible links of each type.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect fire dampers from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 FIRE DAMPERS

.1 Fire dampers: arrangement Type A bear label of ULC, meet requirements of authorities having jurisdiction. Fire damper assemblies fire tested in accordance with CAN/ULC-S112.

.2 Mild steel, factory fabricated for fire rating requirement to maintain integrity of fire wall and/or fire separation.

.1 Fire dampers: 1-1/2hour fire rated unless otherwise indicated.

.2 Fire dampers: automatic operating type and have dynamic rating suitable for maximum air velocity and pressure differential to which it will be subjected.

.3 Top hinged: offset single damper, round or square; guillotine type sized to maintain full duct cross section.

.4 Fusible link actuated, weighted to close and lock in closed position when released or having negator-spring-closing operator for multi-leaf type or roll door type in horizontal position with vertical air flow.

.5 40 x 40 x 3 mm retaining angle iron frame, on full perimeter of fire damper, on both sides of fire separation being pierced.

.6 Equip fire dampers with steel sleeve or frame installed disruption ductwork or impair damper operation.

.7 Equip sleeves or frames with perimeter mounting angles attached on both sides of wall or floor opening. Construct ductwork in fire-rated floor-ceiling or roof-ceiling assembly systems with air ducts that pierce ceiling to conform with ULC.

.8 Design and construct dampers to not reduce duct or air transfer opening cross-sectional area.

.9 Dampers shall be installed so that the centerline of the damper depth or thickness is located in the centerline of the wall, partition of floor slab depth or thickness.

.10 Unless otherwise indicated, the installation details given in SMACNA Install Fire Damp HVAC and in manufacturer's instructions for fire dampers shall be followed.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 INSTALLATION

.1 Install in accordance with NFPA 90A and in accordance with conditions of ULC listing.

.2 Maintain integrity of fire separation.

.3 After completion and prior to concealment obtain approvals of complete installation from authority having jurisdiction.

.4 Install access door adjacent to each damper. See Section 23 33 00 - Air Duct Accessories.

.5 Co-ordinate with installer of fire stopping.

.6 Ensure access doors/panels, fusible links, damper operators are easily observed and accessible.

.7 Install break-away joints of approved design on each side of fire separation.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Indicate following:

.1 Capacity.

.2 Throw and terminal velocity.

.3 Noise criteria.

.4 Pressure drop.

.5 Neck velocity.

1.2 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 00 10 - General Instructions.

.2 Include:

.1 Keys for volume control adjustment.

.2 Keys for air flow pattern adjustment.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect diffuser, registers and grilles from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards.

2.2 GENERAL

.1 To meet capacity, pressure drop, terminal velocity, throw, noise level, neck velocity as indicated.

.2 Frames:

.1 Full perimeter gaskets.

.2 Concealed fasteners.

.3 Concealed manual volume control damper operators.

2.3 MANUFACTURED UNITS

.1 Grilles, registers and diffusers of same generic type, products of one manufacturer.

2.4 RETURN AND EXHAUST GRILLES AND REGISTERS

.1 Type RG: aluminum grille, single 0 degrees deflection, bladed spacing of 19 mm, bladed oriented on horizontal. Finish: black

2.5 DIFFUSERS

.1 Type A

.1 Aluminum, linear diffuser type, having adjustable eccentric roller, plenum with round side inlet and integrated perforated baffle. Diffuser and rollers finish: black.

.2 Length: 1,300mm

.3 Slots: 4

.4 Acceptable products: Nad model SAL35, Emco Klima model SAL35, Grada model RT.

.2 Architectural

.1 Inactive diffuser section matching visual aspect of type A diffuser. Finish: black

.2 Acceptable product: same manufacturer of Type A diffuser.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for diffuser, register and grille installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Engineer.

.2 Inform Engineer of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 INSTALLATION

.1 Install in accordance with manufacturer’s instructions.

.2 Install with flat head screws in countersunk holes where fastenings are visible.

.3 Bolt grilles, registers and diffusers, in place, in gymnasium and similar game rooms.

.4 Provide concealed safety chain on each grille, register and diffuser in gymnasium and similar game rooms and elsewhere as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 - General Instructions.

.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 00 10 - General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)

.2 National Fire Protection Association (NFPA)

.1 NFPA 90A-2015, Standard for the Installation of Air-Conditioning and Ventilating Systems.

.3 CSA Group

.1 Ontario Electrical Safety Code (26th Edition) consisting of CSA C22.1-15, Canadian Electrical Code, Part 1 (23rd Edition), Safety Standard for Electrical Installations and Ontario Amendments to CSA C22.1-15, Canadian Electrical Code, Part I

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.2 Product data to include:

.1 Equipment schedules, including rated capacities, operating characteristics, electrical power and accessories.

.2 Wiring Diagrams: Power and control wiring.

.3 Shop Drawings:

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

.4 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect fan coil units from nicks, scratches, and blemishes.

Part 2 Products

2.1 FAN COIL UNITS

.1 Cabinet: steel, 1.2mm thick, recessed. Front inlet/ top outlet.

.2 Hydronic coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 2.1 mm, rated for a minimum working pressure of 2,067 kPa and a maximum entering-water temperature of 104 deg C. Minimum fin thickness shall be 0.1mm. Coils shall be circuited for counter flow to maximize unit efficiency. Coil casing shall be fabricated from galvanized steel.

.3 Blower motors: 3 speed, 120V, single phase.

.4 Blower wheel: cadmium plated steel and aluminum, directly connected to motor, statically and dynamically balanced.

.5 Built-in thermostat, Fan delay switch and speed selector (off/low/medium/high).

.6 Filter: replaceable.

.7 Finish: all steel parts shall be degreased, phosphatized and coated with durable rust resistant primer.

.8 Levelling bolts: four leveling bolts.

.9 Assembly fully wired to one outlet location.

.10 Multiple knockouts for up to 38 mm diameter conduit.

.11 Electrical rating: as indicated.

.12 Performances and dimensions: as indicated.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Engineer. Inform Engineer of unacceptable conditions immediately upon discovery.

.2 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Engineer.

3.2 INSTALLATION

.1 Install units as per manufacturer recommendations.

.2 Make piping, electrical and control connections.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10- General Instructions.

.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 00 10- General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 All Section of Division 01.

.2 Section 26 05 32 - Outlet Boxes, Conduit Boxes and Fittings.

1.2 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-15 and Ontario Amendments, Ontario Electrical Safety Code 26th edition/2015.

.2 CAN3-C235-83(R2010), Preferred Voltage Levels for AC Systems, 0 to 50,000 V.

.2 Institute of Electrical and Electronics (IEEE)/National Electrical Safety Code Product Line (NESC)

.1 IEEE SP1122-2000, The Authoritative Dictionary of IEEE Standards Terms, 7th Edition.

1.3 DEFINITIONS

.1 Electrical and electronic terms: unless otherwise specified or indicated, terms used in these specifications, and on drawings, are those defined by IEEE SP1122.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all items identified in Division 26.

.3 Shop drawings:

.1 Submit wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure co-ordinated installation.

.2 If changes are required, notify Departmental Representative of these changes before they are made.

.4 Certificates:

.1 Provide CSA certified material and equipment.

.2 Where CSA certified equipment or material is not available, submit such material or equipment authority having jurisdiction for approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit, upon completion of Work, load balance report as described in PART 3 - LOAD BALANCE.

.6 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

.5 Manufacturer's Field Reports: submit to Departmental Representative manufacturer's written report, within 3 days of review, verifying compliance of Work and electrical system and instrumentation testing, as described in PART 3 - FIELD QUALITY CONTROL.

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data:

.1 Provide for each system and principal item of equipment as specified in technical sections for use by operation and maintenance personnel.

.2 Operating instructions to include following:

.1 Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.

.2 Start up, proper adjustment, operating, lubrication, and shutdown procedures.

.3 Safety precautions.

.4 Procedures to be followed in event of equipment failure.

.5 Other items of instruction as recommended by manufacturer of each system or item of equipment.

.3 Post instructions where directed.

.4 Ensure operating instructions will not fade when exposed to sunlight and are secured to prevent easy removal or peeling.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 Operating voltages: to CAN3-C235.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard.

.1 Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

.3 Language operating requirements: provide identification nameplates for control items in English.

2.2 MATERIALS AND EQUIPMENT

.1 Provide material and equipment in accordance with Section 01 61 00 - Common Product Requirements.

.2 Equipment and Material to be CSA certified. Where CSA certified material and equipment are not available, obtain special approval from authority having jurisdiction before delivery to site and submit such approval as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.3 Factory assemble control panels and component assemblies.

2.3 ELECTRIC MOTORS, EQUIPMENT AND CONTROLS

.1 Verify installation and co-ordination responsibilities related to motors, equipment and controls, as indicated.

2.4 WARNING SIGNS

.1 Warning Signs: in accordance with requirements of Departmental Representative.

.2 Decal signs, minimum size 175 x 250 mm.

2.5 WIRING TERMINATIONS

.1 Ensure lugs, terminals, screws used for termination of wiring are suitable for either copper or aluminum conductors.

2.6 EQUIPMENT IDENTIFICATION

.1 Identify electrical equipment with nameplates as follows:

.1 Nameplates: plastic laminate 3 mm thick plastic engraving sheet, black face, white core, lettering accurately aligned and engraved into core.

.2 Sizes as follows:

NAMEPLATE SIZES			
Size 1	10 x 50 mm	1 line	3 mm high letters
Size 2	12 x 70 mm	1 line	5 mm high letters
Size 3	12 x 70 mm	2 lines	3 mm high letters
Size 4	20 x 90 mm	1 line	8 mm high letters
Size 5	20 x 90 mm	2 lines	5 mm high letters
Size 6	25 x 100 mm	1 line	12 mm high letters
Size 7	25 x 100 mm	2 lines	6 mm high letters

.2 Labels: embossed plastic labels with 6 mm high letters unless specified otherwise.

.3 Wording on nameplates and labels to be approved by Departmental Representative prior to manufacture.

.4 Allow for minimum of twenty-five (25) letters per nameplate.

.5 Nameplates for terminal cabinets and junction boxes to indicate system and/or voltage characteristics.

.6 Terminal cabinets and pull boxes: indicate system and voltage.

2.7 WIRING IDENTIFICATION

.1 Identify wiring with permanent indelible identifying markings, numbered coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.

.2 Maintain phase sequence and colour coding throughout.

.3 Colour coding: to CSA C22.1.

.4 Use colour coded wires in communication cables, matched throughout system.

2.8 CONDUIT AND CABLE IDENTIFICATION

.1 Colour code conduits, boxes and metallic sheathed cables.

.2 Code with plastic tape or paint at points where conduit or cable enters wall, ceiling, or floor, and at 15m intervals.

.3 Colours: 25mm wide prime colour and 20mm wide auxiliary colour.

Type	Prime	Auxiliary
up to 250 V	Yellow	
up to 600 V	Yellow	Green
Telephone	Green	
Other Communication Systems	Green	Blue
Fire Alarm	Red	
Other Security Systems	Red	Yellow

2.9 FINISHES

.1 Shop finish metal enclosure surfaces by application of rust resistant primer inside and outside, and at least two coats of finish enamel.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Do complete installation in accordance with CSA C22.1 except where specified otherwise.

3.3 NAMEPLATES AND LABELS

.1 Ensure manufacturer's nameplates, CSA labels and identification nameplates are visible and legible after equipment is installed.

3.4 CONDUIT AND CABLE INSTALLATION

.1 If plastic sleeves are used in fire rated walls or floors, remove before conduit installation.

.2 Install cables, conduits and fittings embedded or plastered over, close to building structure so furring can be kept to minimum.

3.5 LOCATION OF OUTLETS

.1 Locate outlets in accordance with Section 26 05 32- Outlet Boxes, Conduit Boxes and Fittings.

.2 Change location of outlets at no extra cost or credit, providing distance does not exceed 3000 mm, and information is given before installation.

.3 Locate light switches on latch side of doors.

.1 Locate disconnect devices in mechanical and elevator machine rooms on latch side of floor.

3.6 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 If mounting height of equipment is not specified or indicated, verify before proceeding with installation.

.3 Install electrical equipment at following heights unless indicated otherwise.

.1 Local switches: 1400mm.

.2 Wall receptacles:

.1 General: 300mm.

.3 Telecommunication outlets: 300mm.

.4 Fire alarm stations: 1500mm.

.5 Fire alarm bells: 2100 mm.

.6 Clocks: 2100mm.

3.7 FIELD QUALITY CONTROL

.1 Load Balance:

.1 Measure phase current to panelboards with normal loads (lighting) operating at time of acceptance; adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Provide upon completion of work, load balance report as directed in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS, phase and neutral currents on panelboards, dry-core transformers and motor control centres, operating under normal load, as well as hour and date on which each load was measured, and voltage at time of test.

.2 Conduct following tests in accordance with Section 01 45 00- Quality Control.

.1 Power distribution system including phasing, voltage, grounding and load balancing.

.2 Circuits originating from branch distribution panels.

.3 Lighting and its control.

.4 Systems: fire alarm.

.5 Insulation resistance testing:

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Megger 350-600 V circuits, feeders and equipment with a 1000 V instrument.

.3 Check resistance to ground before energizing.

.3 Carry out tests in presence of Departmental Representative.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.8 SYSTEM STARTUP

.1 Instruct Departmental Representative operating personnel in operation, care and maintenance of systems, system equipment and components.

.2 Arrange and pay for services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components and instruct operating personnel.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCE STANDARDS

.1 CSA International

.1 CAN/CSA-C22.2 No.18-98(R2003), Outlet Boxes, Conduit Boxes and Fittings.

.2 CAN/CSA-C22.2 No.65-03(R2008), Wire Connectors (Tri-National Standard with UL 486A-486B and NMX-J-543-ANCE-03).

.2 Electrical and Electronic Manufacturers' Association of Canada (EEMAC)

.1 EEMAC 1Y-2-1961, Bushing Stud Connectors (1200 Ampere Maximum Rating).

.3 National Electrical Manufacturers Association (NEMA)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wire and box connectors from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Pressure type wire connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors as required.

.2 Fixture type splicing connectors to: CAN/CSA-C22.2 No.65, with current carrying parts of copper sized to fit copper conductors 10 AWG or less.

.3 Bushing stud connectors: to NEMA to consist of:

.1 Connector body and stud clamp for round copper.

.2 Clamp for round conductors.

.3 Stud clamp bolts.

.4 Bolts for copper bar and conductors.

.5 Sized for conductors as indicated.

.4 Clamps or connectors for armoured cable, as required to: CAN/CSA-C22.2 No.18.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Remove insulation carefully from ends of conductors cables and:

.1 Install mechanical pressure type connectors and tighten screws with appropriate compression tool recommended by manufacturer. Installation shall meet secureness tests in accordance with CAN/CSA-C22.2 No.65.

.2 Install fixture type connectors and tighten to CAN/CSA-C22.2 No.65. Replace insulating cap.

.3 Install bushing stud connectors in accordance with EEMAC 1Y-2.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 – Common Work Results Electrical.

.2 Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.3 Section 26 05 34 – Conduits, Conduit Fastening and Conduit Fittings.

.4 Section 26 50 00 – Lighting.

.5 Section 28 31 00.01 – Multiplex Fire Alarm System.

1.2 PRODUCT DATA

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

1.3 DELIVERY, STORAGE AND HANDLING

.1 Packaging Waste Management: remove for reuse and return of padding, crates, pallets, packaging materials.

Part 2 Products

2.1 BUILDING WIRES

.1 Conductors: stranded for 10 AWG and larger. Minimum size: 12 AWG.

.2 Copper conductors: size as indicated, with 600, 1000 V insulation of cross-linked thermosetting polyethylene material rated RW90 XLPE Non Jacketted.

2.2 ARMOURED CABLES

.1 Conductors: insulated, copper, size as indicated.

.2 Type: AC90.

.3 Armour: interlocking type fabricated from aluminum strip.

.4 Connectors: anti short connectors.

2.3 FIRE ALARM CABLE

.1 In accordance with Section 28 31 00.01 - Multiplex Fire Alarm System.

Part 3 Execution

3.1 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Perform and local authority having jurisdiction over installation Departmental Representative.

.3 Perform tests before energizing electrical system.

3.2 GENERAL CABLE INSTALLATION

.1 Terminate cables in accordance with Section 26 05 20 - Wire and Box Connectors - (0-1000 V).

.2 Cable Colour Coding: to Section 26 05 00 - Common Work Results for Electrical.

.3 Conductor length for parallel feeders to be identical.

.4 Lace or clip groups of feeder cables at distribution centres, pull boxes, and termination points.

.5 Wiring in walls: typically drop or loop vertically from above to better facilitate future renovations. Generally wiring from below and horizontal wiring in walls to be avoided unless indicated.

.6 Branch circuit wiring for surge suppression receptacles and permanently wired computer and electronic equipment to be 2-wire circuits only, i.e. common neutrals not permitted.

.7 Provide numbered wire collars for control wiring. Numbers to correspond to control shop drawing legend. Obtain wiring diagram for control wiring.

3.3 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:

.1 In conduit systems in accordance with Section 26 05 34- Conduits, Conduit Fastenings and Conduit Fittings.

.2 In surface and lighting fixture raceways in accordance with Section 26 50 00 – Lighting.

3.4 INSTALLATION OF ARMOURED CABLES

.1 Group cables wherever possible on channels.

3.5 INSTALLATION OF ALUMINUM SHEATHED CABLE

.1 Group cables wherever possible on channels.

3.6 CLEANING

.1 Progress cleaning: clean in accordance with section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA Group

.1 CSA C22.1-15 and Ontario Amendments, Ontario Electrical Safety Code 26th edition/2015.

.2 CSA C22.2 No.41-13, Grounding and Bonding Equipment (Tri-National Standard, with NMX-J-590ANCE and UL 467).

.3 CSA C22.2 No.65-13, Wire connectors (Tri-National Standard, with UL 486A-486B NMX-J-543-ANCE).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect connectors and terminations from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CONNECTORS AND TERMINATIONS

.1 Copper compression connectors to CSA C22.2 No.65 as required sized for conductors.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install stress cones, terminations, and splices in accordance with manufacturer's instructions.

.2 Bond and ground as required to CSA C22.2No.41.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results for Electrical.

1.2 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.1-15 and Ontario Amendments, Ontario Electrical Safety Code 26th edition/2015.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for connectors and terminations for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements 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 dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect connectors and terminations from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1.

.2 102 mm square or larger outlet boxes as required.

.3 Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system are grouped.

2.2 FLOOR BOXES

.1 Concrete tight electro-galvanized sheet steel floor boxes with adjustable finishing rings to suit floor finish with brushed aluminum faceplate. Device mounting plate to accommodate short or long ear duplex receptacles. Minimum depth: 73 mm for receptacles and communication outlets.

.2 Adjustable, watertight, concrete tight, cast floor boxes with openings drilled and tapped for 21 and 27 mm conduit. Minimum size: 73 mm deep.

2.3 CONDUIT BOXES

.1 Cast aluminum FD FS boxes with factory-threaded hubs and mounting feet for surface wiring of devices.

2.4 FITTINGS - GENERAL

.1 Bushing and connectors with nylon insulated throats.

.2 Knock-out fillers to prevent entry of debris.

.3 Conduit outlet bodies for conduit up to 35 mm and pull boxes for larger conduits.

.4 Double locknuts and insulated bushings on sheet metal boxes.

Part 3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of debris during construction. Remove upon completion of work.

.3 For flush installations mount outlets flush with finished wall using plaster rings to permit wall finish to come within 6 mm of opening.

.4 Provide correct size of openings in boxes for conduit, mineral insulated and armoured cable connections. Do not install reducing washers.

.5 Vacuum clean interior of outlet boxes before installation of wiring devices.

.6 Identify systems for outlet boxes as required.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CAN/CSA C22.2 No. 18-98(R2011), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.

.2 CSA C22.2 No. 45-M1981(R2003), Rigid Metal Conduit.

.3 CSA C22.2 No. 56-13, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2013), Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-M1984(R2011), Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect conduits, conduit fastenings and conduit fittings from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 CABLES AND REELS

.1 Provide cables on reels or coils.

.1 Mark or tag each cable and outside of each reel or coil, to indicate cable length, voltage rating, conductor size, and manufacturer's lot number and reel number.

.2 Each coil or reel of cable to contain only one continuous cable without splices.

.3 Reel and mark shielded cables rated 2,001 volts and above.

2.2 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, aluminum threaded.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.3 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal steel.

2.3 CONDUIT FASTENINGS

.1 One hole malleable iron straps to secure surface conduits 50 mm and smaller.

.2 Two hole steel straps for conduits larger than 50 mm.

.3 Beam clamps to secure conduits to exposed steel work.

.4 Channel type supports for two or more conduits.

.5 Threaded rods, 6 mm diameter, to support suspended channels.

2.4 CONDUIT FITTINGS

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 27 mm and larger conduits.

.3 Stainless coupling for aluminum conduit

2.5 EXPANSION FITTINGS FOR RIGID CONDUIT

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 100 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

2.6 FISH CORD

.1 Polypropylene.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Surface mount conduits except where specifically mentioned on drawings.

.3 Use rigid aluminum conduit in crawl space.

.4 Use electrical metallic tubing (EMT) in all other area.

.5 Use flexible metal conduit for connection to motors in dry areas.

.6 Minimum conduit size for lighting and power circuits: 21 mm.

.7 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.8 Mechanically bend steel conduit over 25 mm diameter.

.9 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.10 Install fish cord in empty conduits.

.11 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.12 Dry conduits out before installing wire.

3.3 SURFACE CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

3.4 CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

3.5 CONDUITS IN CAST-IN-PLACE CONCRETE

.1 Locate to suit reinforcing steel.

.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.

.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

3.6 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results for Electrical.

.2 Section 26 50 00 – Lighting

1.2 ACTION AND INFORMATIONAL SUBMITTALS

.1 Shop Drawings:

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

.2 Closeout Submittals:

.1 Submit maintenance data in accordance with Section 01 00 10 – General Instructions.

.2 Manufacturer's Instructions: submit manufacturer's installation instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect exist signs from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 Control system: by one manufacturer and assembled from compatible components.

2.2 EMERGENCY SHUNT BYPASS RELAY

.1 Size: 8.6 cm x 6.4 cm x 4.7 cm

.2 Mounting: 13mm Knockout

.3 Network port: 2x RJ45 or 2x low voltage wires ports or Tx Rx wireless capability

.4 Color: Red

.5 Relay type: Latching

.6 Load contacts: 16 A, 120 V, AC.

.7 Auxiliary contacts for pilot light.

.8 Coloured pre-stripped leads.

.9 The relay is to be open when normal power is present, but will latch closed if normal power is lost.

.10 Module to be compatible with phase diming module so that it by-basses the zone fed by the phase diming module in case of normal power lost.

.11 Equipped with a push button to allow users to test the emergency operation.

2.3 PHASE DIMING MODULE

.1 Size: 8.6 cm x 6.4 cm x 4.7 cm

.2 Mounting: 13mm Knockout

.3 Network port: 2x RJ45 or 2x low voltage wires ports or Tx Rx wireless capability

.4 Color: Red

.5 Relay type: Latching

.6 Connect into other lighting control devices via CAT-5e Cable, low voltage wires, or wirelessly

.7 Load contacts: 16 A, 120 V, AC.

.8 Auxiliary contacts for pilot light.

.9 Coloured pre-stripped leads.

.10 Module to perform phase cut dimming (either forward or reverse depending on model) of the line voltage being supplied to a 120 VAC.

.11 Module to dim the switched line voltage connection going to a 2-wire dimming tracks.

.12 Module to be compatible with Emergency shunt bypass relay.

2.4 LOW VOLTAGE EMERGENCY RELAYS

.1 Size: 8.6 cm x 6.4 cm x 4.7 cm

.2 Mounting: 13mm Knockout

.3 Network port: 2x RJ45 or 2x low voltage wires ports or Tx Rx wireless capability

.4 Connect into other lighting control devices via CAT-5e Cable, low voltage wires, or wirelessly

.5 Device diming via 0-10V

.6 Every Low Voltage Emergency Relay shall be configurable remotely from the software and locally via the device push-button.

.7 Color: White

.8 Relay type: Latching

.9 Electrically operated by signal from Remote Control Switches and\or System controller, mechanically latched until activated.

.10 Load contacts: 20 A, 120 V, AC.

.11 Auxiliary contacts for pilot light.

.12 Coloured pre-stripped leads.

.13 The relay force lighting fixtures to full output if normal power is lost.

2.5 LOW VOLTAGE RELAYS

.1 Size: 8.6 cm x 6.4 cm x 4.7 cm

.2 Mounting: 13mm Knockout

.3 Network port: 2x RJ45 or 2x low voltage wires ports or Tx Rx wireless capability

.4 Connect into other lighting control devices via CAT-5e Cable, low voltage wires, or wirelessly.

.5 Device diming via 0-10V

.6 Every Low Voltage Relay shall be configurable remotely from the software and locally via the device push-button.

.7 Color: White

.8 Relay type: Latching

.9 Electrically operated by signal from Remote Control Switches and\or System controller, mechanically latched until activated.

.10 Load contacts: 20 A, 120 V, AC.

.11 Auxiliary contacts for pilot light.

.12 Coloured pre-stripped leads.

2.6 REMOTE CONTROL SWITCHES

.1 8 buttons low voltage control switch (Up-Down/On-Off for zone: 1, 2, 3, and 4).

.1 Confirm button wording with departmental representative.

.2 Size: 7 cm x 4.7 cm x 2.5 cm

.3 Mounting: Single Gang Switch Box

.4 Connect into other system controller via CAT-5e Cable, low voltage wires, or wirelessly.

.5 Color: black

2.7 SYSTEM CONTROLLER

.1 Device shall be an integrated touchscreen lighting controller compatible to control and communicate with all lighting control devices via CAT-5e Cable, low voltage wires, or wirelessly

.2 Capable of controlling of traditional line-voltage dimming, switching, 0-10 V, IEC 60929 Appendix E, and DMX for RGB and tunable white fixtures.

.3 On screen lighting design and setup, with no computer required.

.4 Automatic wake-up with proximity sensor

.5 Capable of integrating with Building Management Systems (BMS) through BACnet/IP

.6 Dimensions

.1 Touch Screen: 175 mm (diagonal) minimum

.2 Unit Size: 200 mm x 130 mm x 35 mm

.3 Mounting: 3-Gang Box

.4 Mounting Height: 152 cm

.5 Network port: 2x RJ45, DMX and low voltage wire or wireless control

.7 Allow manual bypass.

.8 Communicates with other devices in the system via network based interface.

.9 Device shall automatically detect all devices downstream of it.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

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

3.2 INSTALLATION

.1 Locate and install equipment in accordance with manufacturer's recommendations and as indicated.

.2 Connect zones 1A, 1B, and 1C so that they are controlled together (dim and brighten together).

.3 Confirm with departmental representative required pre-set zones (up to 16)

3.3 FIELD QUALITY CONTROL

.1 Site Tests:

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Actuate control units in presence of Departmental Representative to demonstrate lighting circuits are controlled as designated.

.3 Train Departmental Representative in modifying the programming of all devices.

3.4 CLEANING

.1 Proceed in accordance with Section 01 00 10 – General Instructions.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00 - Common Work Results for Electrical.

.2 Section 26 28 16.02 - Moulded Case Circuit Breakers.

1.2 DESIGNATED CONTRACTOR

.1 Hire the services of Marois Électrique (819) 771-6261 to do the work inside panel SB-01-1.

1.3 REFERENCE STANDARDS

.1 CSA International

.1 CSA C22.2 No.29-11, Panelboards and Enclosed Panelboards.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.5 CLOSEOUT SUBMITTALS

.1 Submit in updated new panel schedule in accordance with Section 01 00 10 – General Instructions.

Part 2 Products

2.1 PANELBOARDS

.1 There are existing FPE panels presently installed in the building. All materials must be selected to ensure compatibility with the existing panels.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02 - Moulded Case Circuit Breakers.

.2 Breakers with thermal and magnetic tripping in panelboards except as indicated otherwise.

.3 Lock-on devices for emergency lighting circuits.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Connect loads to circuits.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

3.4 PROTECTION

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

.2 Repair damage to adjacent materials caused by panelboards installation.

Part 4 Appendix

4.1 ELECTRICAL PANELS

END OF SECTION

APPENDIX

Electrical Panels

Project/Projet: CFIA Auditorium

Panel/Panneau: PC2 - Existing

Revision: 0

Location: Basement/Crawl Space

CIRCULATION		
To	INIT.	DATE

Panel Rating: 100 A

Voltage & Phase

● 120/208Y-3Ø ○ 208Y-3Ø ○ 347/600Y-3Ø
○ 120/240Δ ○ 240Δ ○ 600Y-3Ø
○ 277/480 ○ Autre

MANUFAC: FPE

Rev	#	Description	Brk	P.	A	B	C	P.	Brk	Description	#	Rev
	1	**WALL LIGHTING AUDITORIUM**	15A	1				15A	1	**WALL LIGHTING AUDITORIUM**	7	
	2	**WALL LIGHTING AUDITORIUM**	15A	1				15A	1	SPARE	8	
	3	**WALL LIGHTING AUDITORIUM**	15A	1				15A	1	SPARE	9	
	4	**WALL LIGHTING AUDITORIUM**	15A	1				15A	1	SPARE	10	
	5	**WALL LIGHTING AUDITORIUM**	15A	1				15A	1	SPARE	11	
	6	**WALL LIGHTING AUDITORIUM**	15A	1				15A	1	SPARE	12	
			Total Load		VA	VA	VA					
					0 A	0 A	0 A					

Project/Projet: CFIA Auditorium

Panel/Panneau: PC2 - Modified

Revision: 0

Location: Basement/Crawl Space

CIRCULATION		
To	INIT.	DATE

Panel Rating: 100 A

Voltage & Phase

(●) 120/208Y-3Ø ( ) 208Y-3Ø ( ) 347/600Y-3Ø
( ) 120/240Δ ( ) 240Δ ( ) 600Y-3Ø
( ) 277/480 ( ) Autre

MANUFAC: FPE

Rev	#	Description	Brk	P.	A	B	C	P.	Brk	Description	#	Rev
	1	**AUDITORIUM CEILING LIGHTS**	15A	1	516			15A	1	**WATER RADIATOR**	7	
	2	**AUDITORIUM CEILING LIGHTS**	15A	1		412		15A	1	SPARE	8	
	3	**SPARE**	15A	1				15A	1	SPARE	9	
	4	**SPARE**	15A	1				15A	1	SPARE	10	
	5	**SPARE**	15A	1				15A	1	SPARE	11	
	6	**SPARE**	15A	1				15A	1	SPARE	12	
			Total Load		516 VA	412 VA	VA					
					4 A	3 A	0 A					

CIRCULATION		
To	INIT.	DATE

Project/Projet: CFIA Auditorium

Panel/Panneau: PC4 - Existing

Revision: 0

Location: Basement/Crawl Space

Panel Rating: 225 A

Voltage & Phase

● 120/208Y-3Ø ○ 208Y-3Ø ○ 347/600Y-3Ø
○ 120/240Δ ○ 240Δ ○ 600Y-3Ø
○ 277/480 ○ Autre

MANUFAC: FPE

Rev	#	Description	Brk	P.	A	B	C	P.	Brk	Description	#	Rev
	1	CLEANING PLUG	15 A	2				1	15 A	LIGHT IN BASEMENT	22	
	2	-	-	-				1	15 A	PLUG IN BASEMENT	23	
	3	CLEANING PLUG	15 A	2				1	15 A	LIGHT IN BASEMENT	24	
	4	-	-	-				1	15 A	LIGHT IN BASEMENT	25	
	5	CLEANING PLUG	15 A	2				1	15 A	PLUG ON COLUMN	26	
	6	-	-	-				1	15 A	PLUG ON COLUMN	27	
	7	CLEANING PLUG	15 A	2				1	15 A	PLUG SOUTH WALL	28	
	8	-	-					1	15 A	LIBRE	29	
	9	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	LIGHT IN BASEMENT	30	
	10	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	PLUG ON COLUMN	31	
	11	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	CLEANING 1ST FLOOR	32	
	12	**PLUG NORTH-END AUDITORIUM**	15 A	1				-	-	-	33	
	13	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	FC8	34	
	14	**LIGHTS IN PROJECTION BOOTH**	15 A	1				1	15 A	FC4	35	
	15	**PLUGS IN PROJECTION BOOTH**	15 A	1				1	15 A	WF-37	36	
	16	**PROJECTION SCREEN PLUG**	15 A	1				1	15 A	WF-40	37	
	17	**PROJECTION SCREEN PLUG**	15 A	1				1	15 A	WF-38	38	
	18	**PROJECTION SCREEN PLUG**	15 A	1				1	15 A	**AUDITORIUM PLUG**	39	
	19	**PROJECTION SCREEN PLUG**	15 A	1				1	15A	UNIT HTR FRONT ENTRANCE	40	
	20	TYPE Y FIXTURES	20 A	1				1	15 A	EXISTING CIRCUIT	41	
	21	TYPE Y FIXTURES	20A	1				1	15 A	EXISTING CIRCUIT	42	
			Total Load		VA	VA	VA					
					0 A	0 A	0 A					

CIRCULATION		
To	INIT.	DATE

Project/Projet: CFIA Auditorium

Panel/Panneau: PC4 - Modified

Revision: 0

Location: Basement/Crawl Space

Panel Rating: 225 A

Voltage & Phase

● 120/208Y-3Ø ○ 208Y-3Ø ○ 347/600Y-3Ø
○ 120/240Δ ○ 240Δ ○ 600Y-3Ø
○ 277/480 ○ Autre

MANUFAC: FPE

Rev	#	Description	Brk	P.	A	B	C	P.	Brk	Description	#	Rev
	1	CLEANING PLUG	15 A	2				1	15 A	LIGHT IN BASEMENT	22	
	2	-	-	-				1	15 A	PLUG IN BASEMENT	23	
	3	CLEANING PLUG	15 A	2				1	15 A	LIGHT IN BASEMENT	24	
	4	-	-	-				1	15 A	LIGHT IN BASEMENT	25	
	5	CLEANING PLUG	15 A	2				1	15 A	PLUG ON COLUMN	26	
	6	-	-	-				1	15 A	PLUG ON COLUMN	27	
	7	CLEANING PLUG	15 A	2				1	15 A	PLUG SOUTH WALL	28	
	8	-	-					1	15 A	LIBRE	29	
	9	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	LIGHT IN BASEMENT	30	
	10	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	PLUG ON COLUMN	31	
	11	**PLUG NORTH-END AUDITORIUM**	15 A	1				1	15 A	CLEANING 1ST FLOOR	32	
	12	**PLUG SOUTH AUDITORIUM WALL**	15 A	1				-	-	-	33	
	13	**PLUG NORTH AUDITORIUM WALL**	15 A	1				1	15 A	FC8	34	
	14	**SPARE**	15 A	1				1	15 A	FC4	35	
	15	**SPARE**	15 A	1				1	15 A	WF-37	36	
	16	**PROJECTION SCREEN PLUG**	15 A	1				1	15 A	WF-40	37	
	17	**PROJECTION SCREEN PLUG**	15 A	1				1	15 A	WF-38	38	
	18	**PROJECTION SCREEN PLUG**	15 A	1				1	15 A	**AUDITORIUM PLUG**	39	
	19	**PROJECTION SCREEN PLUG**	15 A	1				1	15A	UNIT HTR FRONT ENTRANCE	40	
	20	TYPE Y FIXTURES	20 A	1				1	15 A	EXISTING CIRCUIT	41	
	21	TYPE Y FIXTURES	20A	1				1	15 A	EXISTING CIRCUIT	42	
				Total Load	VA	VA	VA					
					0 A	0 A	0 A					

Project/Projet: CFIA Auditorium

Panel/Panneau: PECI - Existing

Revision: 0

Location: Basement/Crawl Space

CIRCULATION		
To	INIT.	DATE

Panel Rating: 225 A

Voltage & Phase

● 120/208Y-3Ø ○ 208Y-3Ø ○ 347/600Y-3Ø
○ 120/240Δ ○ 240Δ ○ 600Y-3Ø
○ 277/480 ○ Autre

MANUFAC: FPE

Rev	#	Description	Brk	P.	A	B	C	P.	Brk	Description	#	Rev
	1	**STEP-LIGHTS AUDITORIUM**	15 A	1				1	15 A	VALENCE LIGHTS 1ST FLOOR C BLOCK	16	
	2	**CEILING LIGHTS AUDITORIUM**	15 A	1				1	15 A	DOOR OPENER 1ST FLOOR C BLOCK	17	
	3	**CEILING LIGHTS AUDITORIUM**	15 A	1				1	15 A	EMERGENCY LIGHTS 2ND & 3RD FLOOR	18	
	4	**EXIT LIGHTS AUDITORIUM**	15 A	1				1	15 A	EMERGENCY LIGHTS 2ND & 3RD FLOOR	19	
	5	**LIGHTING PROJECTION BOOTH**	15 A	1				1	15 A	EMERGENCY LIGHTS 2ND & 3RD FLOOR	20	
	6	LIGHTING C-17	15 A	1						SPACE	21	
	7	LIGHTING WASHROOM 1ST	15 A	1				1	15 A	EXISTING CIRCUIT	22	
	8	LIGTHING CB2	15 A	1				1	20 A	OUTSIDE PLUG	23	
	9	EXIT LIGHTING	15 A	1						SPACE	24	
	10	BATTERY UNIT	15 A	1						SPACE	25	
	11	PLUG TEL PANEL	15 A	1						SPACE	26	
	12	SPACE								SPACE	27	
	13	SPACE								SPACE	28	
	14	SPACE								SPACE	29	
	15	SPACE								SPACE	30	
			Total Load		VA	VA	VA					
					0 A	0 A	0 A					

Project/Projet: CFIA Auditorium

Panel/Panneau: PECI - Modified

Revision: 0

Location: Basement/Crawl Space

CIRCULATION		
To	INIT.	DATE

Panel Rating: 225 A

Voltage & Phase

(●) 120/208Y-3Ø ( ) 208Y-3Ø ( ) 347/600Y-3Ø
( ) 120/240Δ ( ) 240Δ ( ) 600Y-3Ø
( ) 277/480 ( ) Autre

MANUFAC: FPE

Rev	#	Description	Brk	P.	A	B	C	P.	Brk	Description	#	Rev
	1	**STEP-LIGHTS AUDITORIUM**	15 A	1	72			1	15 A	VALENCE LIGHTS 1ST FLOOR C BLOCK	16	
	2	**CEILING LIGHTS AUDITORIUM**	15 A	1		147		1	15 A	DOOR OPENER 1ST FLOOR C BLOCK	17	
	3	**SPARE**	15 A	1				1	15 A	EMERGENCY LIGHTS 2ND & 3RD FLOOR	18	
	4	**EXIT LIGHTS AUDITORIUM**	15 A	1				1	15 A	EMERGENCY LIGHTS 2ND & 3RD FLOOR	19	
	5	**SPARE**	15 A	1				1	15 A	EMERGENCY LIGHTS 2ND & 3RD FLOOR	20	
	6	LIGHTING C-17	15 A	1						SPACE	21	
	7	LIGHTING WASHROOM 1ST	15 A	1				1	15 A	EXISTING CIRCUIT	22	
	8	LIGTHING CB2	15 A	1				1	20 A	OUTSIDE PLUG	23	
	9	EXIT LIGHTING	15 A	1						SPACE	24	
	10	BATTERY UNIT	15 A	1						SPACE	25	
	11	PLUG TEL PANEL	15 A	1						SPACE	26	
	12	SPACE								SPACE	27	
	13	SPACE								SPACE	28	
	14	SPACE								SPACE	29	
	15	SPACE								SPACE	30	
			Total Load		72 VA	147 VA	VA					
					1 A	1 A	0 A					

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00- Common Work Results for Electrical.

1.2 REFERENCE STANDARDS

.1 CSA International

.1 CSA C22.2 No.42-10 (R2015), General Use Receptacles, Attachment Plugs and Similar Devices.

.2 CAN/CSA C22.2 No.42.1-00(R2009), Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).

.3 CSA C22.2 No.55-M1986(R2008), Special Use Switches.

.4 CSA C22.2 No.111-10, General-Use Snap Switches (Bi-national standard, with UL 20).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for wiring devices for incorporation into manual.

1.5 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Store and protect wiring devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 SWITCHES

.1 20 or 15A, 120 V or 347 V, single pole, double pole, three-way, four-way as indicated on drawings. Switches to: CSA C22.2 No.55 and CSA C22.2 No.111.

.2 Manually-operated general purpose AC switches with following features:

- .1 Terminal holes approved for No. 10 AWG wire.
- .2 Silver alloy contacts.
- .3 Urea or melamine moulding for parts subject to carbon tracking.
- .4 Suitable for back and side wiring.
- .5 White toggle.

.3 Switches of one manufacturer throughout project.

2.2 RECEPTACLES

.1 Duplex receptacles, CSA type 5-15 R, 125 V, 15 A, U ground, to: CSA C22.2 No.42 with following features:

- .1 Black urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Break-off links for use as split receptacles.
- .4 Eight back wired entrances, four side wiring screws.
- .5 Triple wipe contacts and rivetted grounding contacts.

.2 Single receptacles CSA type 5-15 R, 125 V, 15 A, U ground with following features:

- .1 Black urea moulded housing.
- .2 Suitable for No. 10 AWG for back and side wiring.
- .3 Four back wired entrances, 2 side wiring screws.

.3 Other receptacles with ampacity and voltage as indicated.

.4 Receptacles of one manufacturer throughout project.

2.3 COVER PLATES

.1 Cover plates for wiring devices to: CSA C22.2 No.42.1.

.2 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.3 Stainless steel cover plates, thickness 2.5 mm for wiring devices mounted in flush-mounted outlet box.

.4 Weatherproof spring-loaded cast aluminum cover plates complete with gaskets for receptacles or switches as indicated.

.5 Lockable spring-loaded cast aluminum cover plates, complete with gaskets for receptacles as indicated.

2.4 SOURCE QUALITY CONTROL

.1 Cover plates from one manufacturer throughout project.

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Switches:

.1 Install single throw switches with handle in "UP" position when switch closed.

.2 Install switches in gang type outlet box when more than one switch is required in one location.

.3 Mount toggle switches at height in accordance with Section 26 05 00- Common Work Results for Electrical.

.2 Receptacles:

.1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.

.2 Mount receptacles at height in accordance with Section 26 05 00- Common Work Results for Electrical.

.3 Where split receptacle has one portion switched, mount vertically and switch upper portion.

.4 Install GFI type receptacles as indicated.

.3 Cover plates:

.1 Install suitable common cover plates where wiring devices are grouped.

.2 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.

.3 Install label on cover to identify circuit number and panel in accordance with 26 05 00 – Common Work Results for Electrical.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

3.4 PROTECTION

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

.2 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.

.3 Repair damage to adjacent materials caused by wiring device installation.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 CSA International

.1 CSA C22.2 No. 5-09, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, and NMX-J-266-ANCE-2010).

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

.3 Include time-current characteristic curves for breakers with ampacity of<100/>A and over or with interrupting capacity of 22,000 A symmetrical (rms) and over at system voltage.

.4 Certificates:

.1 Prior to installation of circuit breakers in either new or existing installation, Contractor must submit electronic copy of production certificate of origin from the manufacturer. Production certificate of origin must be duly signed by factory and local manufacturer's representative certifying that circuit breakers come from this manufacturer and are new and meet standards and regulations.

.1 Production certificate of origin must be submitted to Departmental Representative for approval.

.2 Delay in submitting production of certificate of origin will not justify any extension of contract and additional compensation.

.3 Any work of manufacturing, assembly or installation to begin only after acceptance of production certificate of origin by Departmental Representative. Unless complying with this requirement, Departmental Representative reserves the right to mandate manufacturer listed on circuit breakers to authenticate new circuit breakers under the contract, and to Contractor's expense.

.4 Production certificate of origin must contain:

.1 Manufacturer's name and address and person responsible for authentication. Person responsible must sign and date certificate.

.2 Licensed dealer's name and address and person of distributor responsible for Contractor's account.

.3 Contractor's name and address and person responsible for project.

.4 Local manufacturer's representative name and address. Local manufacturer's representative must sign and date certificate.

.5 Name and address of building where circuit breakers will be installed:

.1 Project title: CFIA OLF Building 201 Auditorium, Break Areas and C Wing Millwork

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

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

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 There are existing panels on site that need new breakers. Materials installed in these panels must be selected to ensure compatibility with the existing. Refer to panel schedule.

2.2 BREAKERS GENERAL

.1 Bolt-on moulded case circuit breaker: quick-make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees C ambient.

.2 Circuit breakers to have minimum short circuit rating of 10 kA

2.3 OPTIONAL FEATURES

.1 Include:

.1 On-off locking device (Emergency Lighting Circuit).

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Install circuit breakers as indicated.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 09 24 - Lighting Control Devices

1.2 REFERENCE STANDARDS

.1 American National Standards Institute/Institut of Electrical and Electronics Engineers (ANSI/IEEE).

.1 ANSI/IEEE C62.41-1991, Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits.

.2 ASTM International Inc.

.1 ASTM F1137-00(2006), Standard Specification for Phosphate/Oil and Phosphate/Organic Corrosion Protective Coatings for Fasteners.

.3 Canadian Standards Association (CSA International)

.4 ICES-005-07, Radio Frequency Lighting Devices.

.5 Underwriters' Laboratories of Canada (ULC)

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Provide manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified, for review by Departmental Representative.

.3 Photometric data to include:

.1 IES file for all luminaire type.

.2 Technical data sheet clearly indicating:

.1 Physical dimension and characteristic.

.2 Lumen output.

.3 Power consumption (walls).

.4 Bug rating (when applicable).

.3 Lighting calculations results for parking area. Calculations are to be performed by independent software (not affiliated with any manufacturer.

.2 Samples:

.1 Provide samples of all proposed luminaire, upon request by Departmental Representative.

.3 Quality assurance submittals: provide following in accordance with Section 01 45 00 - Quality Control.

.1 Manufacturer's instructions: provide manufacturer's written installation instructions and special handling criteria, installation sequence, and cleaning procedures.

1.4 QUALITY ASSURANCE

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

1.5 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.6 DELIVERY, STORAGE, AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect exist signs from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Divert unused metal materials from landfill to metal recycling facility.

.5 Disposal and recycling of fluorescent lamps as per local regulations.

.6 Disposal of old PCB filled ballasts.

Part 2 Products

.1 LED1 – Track lighting system

.1 Tracks:

.1 Length:243cm

.2 Maximum width: 40mm

.3 Maximum height: 40mm
.4 Color: black
.5 Dimming Electronic Low Voltage
.6 Voltage: 120V
.7 Copper alloy bus bars
.8 Mounting:
.1 Fixtures may be installed or removed anywhere along the track
.2 Track provided with end cap and all suspension accessories

.2 Luminaire
.1 Compatible with track system described above
.2 Cylindrical shape
.3 Dimensions:
.1 Circumference: between 100 and 120mm
.2 Height: between 115 and 130mm
.4 Black finish
.5 Aluminium body
.6 Lumen output: between 1600 and 1800
.7 Efficiency: greater that 75lm/W
.8 Light color: 3000K with 3 Step MacAdam Ellipse Binninor better
.9 Beam angle: 55 degree +/-10
.10 Dimming 0-10V
.11 Diver must be recessed in track (hidden) or included in the fixture housing (driver surface mounted on track are not acceptable)
.12 Head must be able to be aimed 360° horizontally and 90° vertically
.13 Desired look:

.2 LED 2 – Pot lights

.1 100mm opening
.2 Voltage: 120V
.3 Flange color TBD
.4 Light color: 3000K with 3 Step MacAdam Ellipse Binninor better
.5 Lumen output:1500 lm
.6 Efficiency: greater that 75 lm/W
.7 Dimming 0-10V
.8 Wide distribution
.9 70% lumen maintenance at 50000Hrs

.3 LED 3 – Stair lighting

.1 Voltage: 120V
.2 Mounting horizontal on 50*100 1 gang box
.3 Aluminum alloy finish
.4 Lumen output:30 lm
.5 Light color: 3000K
.6 Dimming Electronic Low Voltage
.7 Desired look:

.4 LED 4 -Exterior Lighting

.1 Wall mounted LED luminaire aluminium
.2 Finish color: black
.3 Light temperature : 3000K
.4 Suitable for damped location. (IP 65 Rated)
.5 Operating temperature : -40°C to 40°C.
.6 Dimensions(+/- 10%): 100 mm thick * 150 mm wide * 200 mm high
.7 Lumen Output : 2000 minimum (delivered)
.8 Input Power: 22W or less
.9 Operating Voltage : 120V
.10 CRI: 90
.11 Integrated photo control sensor

Part 3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

.2 Provide adequate support to suit ceiling system.

.3 Angle luminaire as directed by departmental representative.

.4 Allow for two (2) additional visits to readjust lights as required by departmental representative.

3.2 WIRING

.1 Connect luminaires to lighting circuits:

.1 Install rigid conduit for luminaires as indicated.

.2 Lighting fixtures to be wired with and controlled by devices in 26 09 24 - Lighting Control Devices

3.3 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.4 CLEANING

.1 Clean in accordance with Section 01 00 10 – General Instructions.

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

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 REFERENCE STANDARDS

.1 Canadian Standards Association (CSA International)

.1 CSA C22.2 No.141-02, Unit Equipment for Emergency Lighting.

.2 CSA C860-01(December 2002), Performance of Internally-Lighted Exit Signs.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for wire and box connectors for incorporation into manual.

1.4 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect exist signs from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 STANDARD UNITS

.1 Exit signs composed of a green pictogram and a white or pale colour conform to the ISO 3864-1 standard. Dimensions shall conform to the ISO 7010 standard.

.2 The equipment shall operate with universal 2-wire AC input voltage of 120 to 347VAC at less than 2.5W.

.3 The equipment shall be suitable for wall, or ceiling mount.

.4 The housing shall be constructed of rugged extruded aluminum and have a maximum depth of 635mm.

.5 The faceplate shall be constructed of extruded aluminum and shall incorporate a protective clear polycarbonate panel.

.6 Each face plate shall come standard with two legend films for pictogram and direction selection.

.7 The light source shall be white light-emitting diodes (LED) and shall provide even illumination in normal and emergency operation.

.8 The pictogram Exit Sign shall meet CSA 22.2 No.141-10.

Part 3 Execution

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

3.2 INSTALLATION

.1 Install exit lights to manufacturer's recommendations, listing requirements, NFPA standard and local regulatory requirements.

.2 Connect fixtures to exit light circuits.

.3 Connect emergency lamp sockets to emergency circuits.

.4 Ensure that exit light circuit breaker is locked in on position.

3.3 CLEANING

.1 Proceed in accordance with Section 01 00 10 – General Instructions.

.2 On completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 00 10 – General Instructions.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical.

1.2 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

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

1.3 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect clock systems from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 DIRECT READ WALL CLOCK

.1 Direct-read (digital) clocks: 120 V ac.

.2 Rectangular dial: 30 cm x 15 cm x 4 cm

.3 Numerals: red on black indicating 0:00 to 23:59 h, illuminated.

.4 Single dial: surface mounted.

.5 Durable ABS frame and shatterproof polycarbonate lens

.6 Internal battery backup

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

.1 Locate direct read clocks as indicated and connect to 120 V, 60 Hz, ac circuit.

3.3 SITE TESTS

.1 Perform tests in accordance with Section 26 05 00- Common Work Results for Electrical.

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by clock systems installation.

END OF SECTION

Part 1 General

1.1 RELATED SECTIONS

.1 Section 26 05 00- Common Work Results for Electrical.

.2 Section 26 05 21 - Wires and Cables

.3 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings

1.2 REFERENCE STANDARDS

.1 National Research Council Canada (NRC).

.1 National Building Code of Canada 2015 (NBC).

.2 Treasury Board of Canada Secretariat (TBS), Occupational Safety and Health (OSH).

.1 Fire Protection Standard-10.

.3 Underwriter's Laboratories of Canada (ULC)

.1 CAN/ULC-S524-14, Standard for the Installation of Fire Alarm Systems.

.2 CAN/ULC-S527-11 (2014), Standard for Control Units for Fire Alarm Systems.

.3 CAN/ULC-S528-14, Manual Pull Stations for Fire Alarm Systems.

.4 CAN/ULC-S529-16, Smoke Detectors for Fire Alarm Systems.

.5 CAN/ULC-S537-13, Standard for the Verification of Fire Alarm Systems.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for multiplex fire alarm system and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

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

.2 Indicate on shop drawings:

.1 Detail assembly and internal wiring diagrams for control units.

.2 Overall system riser wiring diagram initiating zones, control equipment; identifying terminations, terminal numbers, conductors and raceways.

.3 Details for devices.

.4 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.

.5 Step-by-step operating sequence, cross referenced to logic flow diagram.

1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 00 10 – General Instructions.

.2 Operation and Maintenance Data: submit operation and maintenance data for fire alarm system for incorporation into manual.

.3 Include:

.1 Instructions for complete fire alarm system to permit effective operation and maintenance.

.2 Technical data - illustrated parts lists with parts catalogue numbers.

.3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.

.4 List of recommended spare parts for system.

1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit maintenance materials in accordance with Section 01 00 10 – General Instructions.

1.6 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect fire alarm devices from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

Part 2 Products

2.1 EXISTING SYSTEM

.1 The Main Fire Alarm panel is located in the building services office, on the ground floor.

.2 The model of the panel is a Edwards EC3 System. The fire alarm detection and annunciation loops are conventional.

.3 All added components must be compatible with the existing system.

2.2 WIRING

.1 Twisted copper conductors: rated 300 V.

.2 conductors shall be twisted and/or shielded with on aluminium ribbon

.3 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements. Minimum requirements shall be:

.1 Detection circuits: no. 18 AWG twisted and shielded pairs;

.2 Speaker circuits: no. 18 AWG twisted pairs;

.3 Horns and bells circuits: no. 16 AWG;

.4 Command circuits and combustion product detector power circuits: no. 14 AWG;

.5 Interface circuits with ventilation control cabinets and ventilation motor starters: no. 14 AWG;

.6 Interface circuits with ventilation motor starters and ventilation control cabinets: no. 14 AWG.

.1 Cables or conductors shall be mechanically protected by metallic conduit in accordance with Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings with set screw couplings or aluminium armor in accordance with Section 26 05 21 - Wires and Cables.

.2 Cables or conductors protected by metallic conduit do not require a bounding conductor.

.3 Cables or conductors protected by metallic armor require a bounding conductor that shall be bare copper or green jacketed and insulated copper. If circuit voltage is less than 50 V, a bounding conductor is not required.

.4 Trouble signaling device circuits outside the building shall be protected by temporary suppression of gas discharge zinc oxide varistors.

2.3 SMOKE DETECTOR

.1 Smoke detector: photo-electric type.

.1 Twistlock Plug-in type with fixed base.

.2 Wire-in base assembly with integral red alarm LED.

.3 The addressable photoelectric smoke detector shall be self adjusting against aging and dirt accumulation and fully supervised against component failure.

.4 The detector shall have the capability of operating one (1) remote alarm or auxiliary relay. The remote alarm indicator or auxiliary relay is normally operated by the associated detector. However, the system shall be capable of being programmed to operate the alarm indicator or relay independently of the associated detector. All detectors and/or relays connected to the circuit can be in alarm or activated simultaneously.

2.4 BELLS

.1 Bells: surface mounted, single stroke, 24 V dc, 150mm

2.5 MANUAL SATIONS

.1 Manual pull stations: to CAN/ULC-S528.

.2 Conventional interface connection

.3 French and English inscription, metal or polycarbonate body and semi recessed mounting

Part 3 Execution

3.1 EXAMINATION

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

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

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

3.2 INSTALLATION

.1 Install systems in accordance with CAN/ULC-S524.

.2 Connect signalling circuits to main control panel.

.3 Sprinkler system: wire alarm and supervisory switches and connect to control panel.

.4 Splices are not permitted.

.5 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, annunciator equipment and CCU, as required by equipment manufacturer.

.6 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

.7 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.

.8 Do not wire up any 120 VA.C. circuit in the same conduit than extra-low voltage, trouble signaling device or alarm device circuit conduit.

3.3 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system:

.1 Test all such installed devices on existing system

.2 Produce a CAN/ULC-S537 conform report certifying the entire installation (existing components and added ones).

3.4 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 00 10 – General Instructions.

.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 00 10 – General Instructions.

3.5 PROTECTION

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

.2 Repair damage to adjacent materials caused by fire alarm system installation.

3.6 CLOSEOUT ACTIVITIES

.1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

END OF SECTION